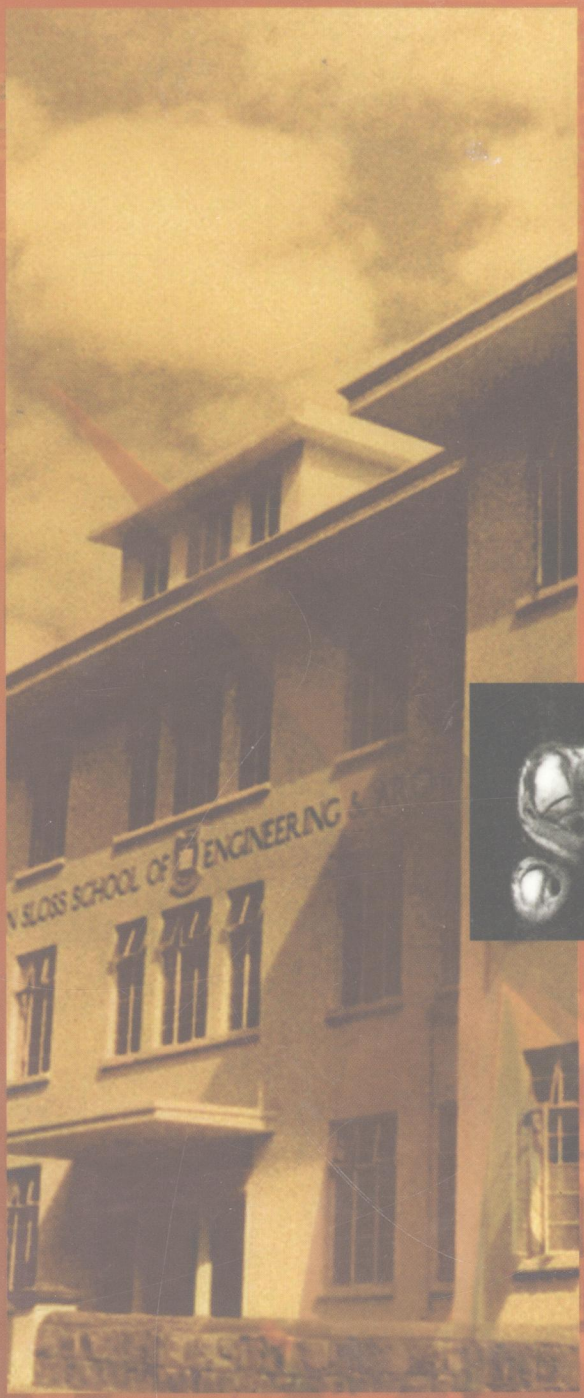
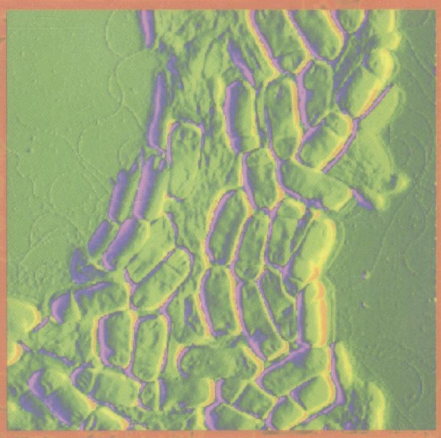
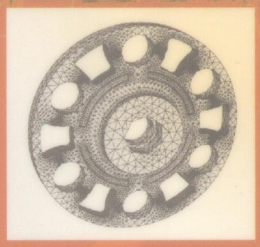
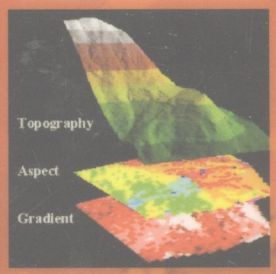
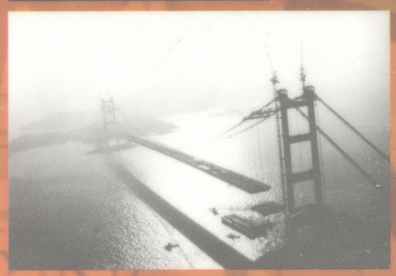
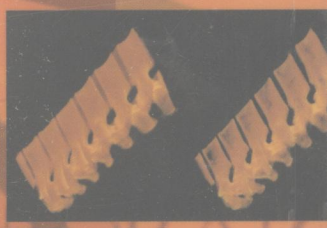


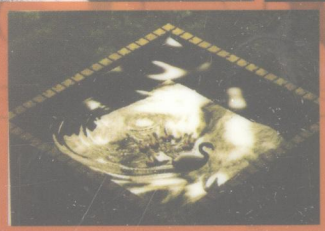












Engineering at HKU

90 Years of Dedication

Only an anniversary gives a community certainty that achievements can defy mortality

1911-2001

FACULTY OF ENGINEERING

THE UNIVERSITY OF HONG KONG

Engineering at HKU
90 Years of Dedication

Only an anniversary gives a community certainty that achievements can defy mortality

CONTENTS

水火金木土穀、惟修

正德利用厚生、惟和

WATER AND FIRE, METAL AND WOOD, EARTH AND GRAIN:
HERE IS PROGRESS;
PROPRIETY OF CONDUCT, CONVENIENCE TO MANKIND,
PLENTY IN SUSTENANCE: HERE IS HARMONY.

The Book of Historical Documents 尚書,
Part II (The Books of Yu 虞書)
Book II (The Counsels of the Great Yu 大禹謨), 7.

The above was the inscription on the front of the former Peel Engineering Laboratory, opened in 1934, to express the ideals of engineering education and development for the benefit of society. It is a quotation of the Great Yu and refers to the nine services to be accomplished by the Government in order to provide livelihood for the people. In Chinese history, the Great Yu regulated the rivers and introduced artificial irrigation to make agriculture possible; he was the first engineer, became emperor, and is the father of Chinese civilization. The quotation was translated by Mr. Lam Tung, B.A. (see *Hong Kong University Engineering Journal, Vol. VI, Sept. 1934*).

The more classical translation of 1865 by James Legge *(The Chinese Classics, Vol. III, The Shoo King, or The Book of Historical Documents, Reprinted from the last editions of the Oxford University Press, Hong Kong University Press, 1960, reprinted 1970)* reads as follows:

There are water, fire, metal, wood, earth, and grain,
- these must be duly regulated;
there are the rectification of [the people's] virtue, the conveniences
of life, and the securing of abundant means of sustentation,
- these must be harmoniously attended to.

FOREWORD

"Only an anniversary gives a community certainty that achievements can defy mortality" as E.H. Gombrich had vividly delineated in *The History of Anniversaries: Time, Number and Sign*. In its 90 years of history, the Faculty of Engineering has made significant contributions to Hong Kong society by educating generation after generation of engineers who have played indispensable roles in building up the industry and infrastructure of the territory. It is not exaggerating to say that the Faculty's advances, in research as well as education and training, are part and parcel of the miraculous metamorphosis of Hong Kong from a "barren rock" to a modern metropolitan city today.

Continuing that tradition today, the Faculty is forging ahead with increasing intensity on teaching and research. It has just launched two new interdisciplinary programmes in conjunction with the Faculty of Medicine - a BSc in Bioinformatics and a BEng in Medical Engineering, and has spearheaded a new Innovation and Technology Internship Scheme, which integrates undergraduate teaching and research by encouraging students to participate in the exciting research work of the staff. In the past year, members of the Faculty have garnered a total of $22.8 million from Research Grant Council research fund and $42.7 million from Innovation and Technology Fund, representing 21% and 58% of the University's share respectively.

The past year has been most memorable for its numerous events and activities. Many may recall with fondness the enchanting reunion evening on December 1, 2001, in which over 300 alumni and friends came to celebrate the Faculty's 90th birthday. Over 40 academic activities - symposium, distinguished lectures, seminars and conferences were held, not without an extra festive air.

I'd like to express my sincere gratitude to everyone who has helped to organise those and other meaningful events and activities in celebration of the Faculty's 90 years of history. My special thanks go to the Faculty 90th Anniversary Advisory Committee and its Working Groups, Ir. Edmund Leung and Professor A.K.H. Kwan for their hard work and unstinting support, and to Professor H.C. Chan for taking up the daunting task of editing this 90th anniversary volume which captures the achievements of the Faculty in education and research in its 90 years as well as its history and growth.

An anniversary is a time for reflection. In our reflection, there is not only a sense of pride over what we have achieved all the years but also a renewed determination to continue to strive in pursuit of excellence in education, research and training.

J.H.W. Lee
Redmond Chair of Civil Engineering
Dean of Engineering

PREFACE

I am most honoured to be Chief Editor of this 90th anniversary volume. In combing through archives and records of the Faculty in preparation for this book to capture the most significant developments and record some of the most memorable events in the history of the Faculty, I was constantly amazed by the hard, efficient work and, consequently, magnificent feats performed by members of the Faculty throughout the nine decades, and inevitably found it a daunting task to fully report here the Faculty's contribution to and impact on the well-being of Hong Kong. I sincerely hope that the long hours we have spent selecting the materials for inclusion do pay off, that is, the book fairly and sufficiently reflects the richness of our Faculty's history.

In 1986 the Faculty celebrated its 75th Anniversary. The 15 years that followed have witnessed rapid and historical changes in this part of the world: the return of the sovereignty of the territory of Hong Kong to the People's Republic of China, the Asian economic crisis and the ensuing pressure to transform Hong Kong into a high technology and knowledge-based economy, the relocation of labour intensive and manufacturing industries to the Pearl River Delta, to name just a few.

In line with the changing demands of the Hong Kong society, the University has carried through a number of reforms. We have adopted a credit-based curriculum, putting strong emphasis on problem-based learning, self-learning and lifelong learning. The Faculty has introduced no less than seven new undergraduate programmes and four taught master programmes in the past five years. Basic research as well as applied research and development have been receiving unprecedented attention. In 2001-2002 alone, researchers in the Faculty secured a total of $42.8 million grants from the Innovation and Technology Fund for applied research projects.

Readers will find in this publication an account of the Faculty's evolution driven by the growing needs of the society, its pioneering advancement in technology and expansion of knowledge, as well as a record of its work in making Hong Kong an ever better place.

The achievements of the Faculty of Engineering over the past 90 years are something we are proud of. The Faculty has produced many distinguished graduates and has been the breeding ground of many outstanding academics of international stature. Their commitment to serve the community and their accomplishments deserve our respect and recognition. We have mentioned but some of them in this book.

In this anniversary volume, we have given an outline and have tried to give, as accurately as we could ascertain, an account of the history and development of the Faculty in its 90 years of existence. We have taken stock of our past and achievements, with more explanations and elaboration on the developments in the past 15 years, in teaching, learning and research. I am most pleased to report that during the last 15 years the contributions of the Faculty in educating and nourishing young minds and in serving the community were no less if not more than those made in the first 75 years. In accord with the rapid globalisation which we find ourselves in, a chapter has been devoted to report on our efforts to foster academic and research collaboration with overseas institutions and international exchange of students. Collaboration and exchange have also taken a new dimension with a growing number of links being established with universities in the People's Republic of China. Moreover, we present the strengths and contributions of the Faculty and the impact we have made on Hong Kong.

To mark the 90th anniversary, we have organised more than 40 activities to celebrate this very special year. The highlights of this eventful year are the 90th Anniversary Symposium held on 30 November and 1 December, 2001 and the Reunion Dinner. We are most grateful to the distinguished guest speakers and outstanding alumni for their lively and stimulating lectures and talks. I would also like to thank our alumni and guests for joining us at the Reunion Dinner in reminiscing the good old days.

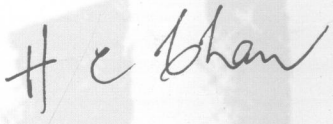
We are grateful to The Honourable Mr. Tung Chee Hwa, the Chief Executive of HKSAR and our Chancellor, and many prominent society leaders and renowned academics for their congratulatory messages, kind words and encouragement. We are also indebted to our faithful and distinguished alumni for their fascinating reminiscences. These recollections of the old days will certainly be invaluable historical records of the Faculty of Engineering.

We hope readers will find this book interesting. Although the purpose of the book is commemorative, we thought it would be of particular interests to readers who are our alumni, friends and supporters in Hong Kong's industry and commerce.

On behalf of the Publication Sub-committee I wish to express our sincere gratitude to all who have contributed to this publication. We appreciate the efforts of all who have provided materials and input and are very grateful to all who have given generously their time as well as their financial support on this august occasion.

Last but not least, I must acknowledge the good work of all the members of the Publication Sub-committee, in particular Mrs. Angela Tsang, Ms. Eunice Chan and Ms. Hailey Lam and all supporting staff of the Faculty Office and Departmental Offices.

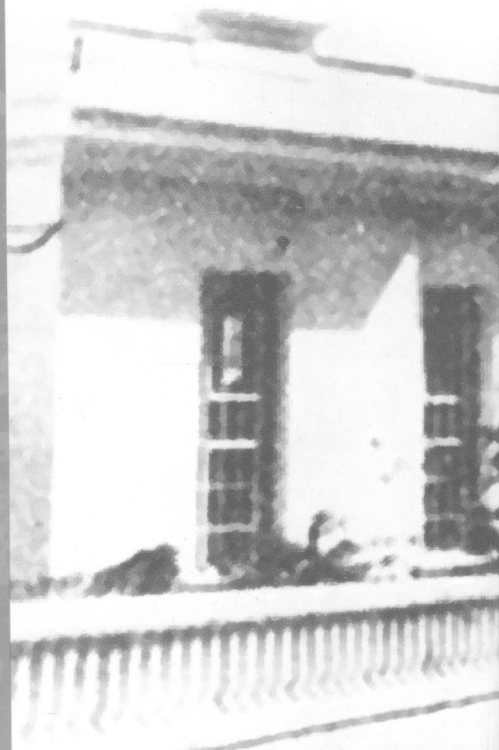
Finally, I should mention that if there happen to be any omissions, errors, inaccuracies or imperfections in this publication, please kindly accept my sincere apology.



H.C. Chan
Chief Editor and
Honorary Professor of the Department of Civil Engineering

You have not done enough, you have never done enough, so long as it is still possible that you have something to contribute.

- Dag Hammarskjold (1905-1961)



MESSAGES

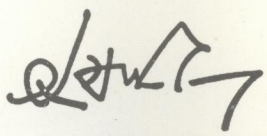
MESSAGES

Chancellor

The Honourable Mr. Tung Chee Hwa

Being one of the two founding faculties of The University of Hong Kong, the Faculty of Engineering has grown and evolved over the past 90 years to serve our community. It has successfully nurtured a pool of highly-skilled engineering professionals for Hong Kong. Building on its remarkable past achievements and dedication to academic and research excellence, the Faculty is well placed to make significant contribution to Hong Kong's development into a knowledge-based economy.

On this 90th Anniversary occasion, I would like to extend my heartfelt congratulations to the staff, students and alumni of the Faculty. I wish the Faculty every success in the years ahead.



The Honourable Mr. Tung Chee Hwa
Chancellor of The University of Hong Kong
Chief Executive of the Hong Kong
Special Administrative Region

Council Chairman

Dr. K.K. Fung

In its 90 years of history, the Faculty has made significant contributions to the transformation of Hong Kong's industry and economy. It has fostered generations of engineers, who have all contributed to building up our society, being the only institution to offer education in engineering for over 50 years since the early 1910s. Many prominent leaders in the industry were invariably our alumni.

On the advent of its 90th birthday and at a time when the global economy is confronted with an array of challenges, I am fully confident the Faculty will continue its tradition of bringing out the best of our next generation, and imparting to them not only knowledge of engineering, but also the values and attitudes to build a better tomorrow.

My warmest congratulations to the Faculty of Engineering on its 90th Anniversary.

Dr. K.K. Fung
Council Chairman

Pro-Chancellor

Dr. The Honourable Ti-liang Yang

My warmest congratulations to the Faculty of Engineering on the occasion of its 90th anniversary. This Faculty was one of the earliest establishments when the University of Hong Kong was founded, at a time when industry was virtually non-existent here. Its establishment reflected the needs of our emerging society 90 years ago.

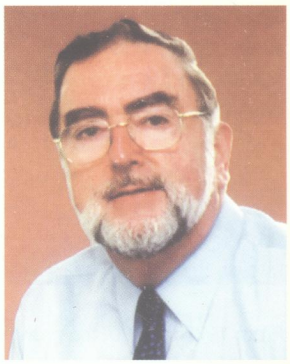
The Faculty has continued to flourish alongside the territory and many of its graduates have played a leading role in transforming Hong Kong from a small fishing port into one of the most successful cities in the world.

The Faculty's importance is no less today than it was all those years ago. The University has always sought to play a pioneering and an innovative role in the development of Hong Kong. By providing degrees in all the major fields of modern engineering it is continuing to attract the very best students and to turn out engineers of the highest calibre. These graduates will provide the foundation of Hong Kong's future prosperity. I look forward to watching this tradition continue.

Dr. the Honourable Ti-liang Yang
Pro-Chancellor (1994-2001)
The University of Hong Kong

Vice-Chancellor

Professor W.I.R. Davies



As one of the first Faculties established after The University of Hong Kong was founded in 1911, Engineering has formed part of the backbone of the University over the last nine decades. It has also played a crucial role in the development of the city it was established to serve, and has embodied the pioneering nature of Hong Kong. During the pre-war years, it was an important provider in both Hong Kong and Mainland China of first-rate engineers.

In the wake of the war years, its Department of Civil Engineering played a significant part in re-building the city. And, as Hong Kong has flourished, so has the Faculty. Today, it is one of the largest Faculties in the University, accepting some 1,110 students annually. Its five departments serve every aspect of industry from manufacturing to information technology.

For 90 years the Faculty of Engineering has dedicated itself to making lasting contributions to Hong Kong, China and the surrounding region. Under successive Deans, the Faculty has established a sound and solid foundation from which to launch itself into this new century and to tackle the challenges of a new era in engineering. I have no doubt that the Faculty will continue to adapt to the demands of the community, providing distinguished leaders in a very considerable number of the disciplines within the engineering professions.

The University's thanks, and my own congratulations, go to all those who, since 1911, have helped make Engineering at HKU the well-respected and internationally-recognised Faculty it is today. My very warm wishes for its continued success.

Professor W.I.R. Davies
Vice-Chancellor

Special Advisor to the Vice-Chancellor

Professor Y.K. Cheung, OBE, FREng, MCAS, FRSC

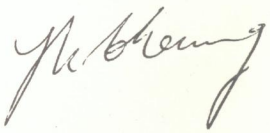
The Faculty of Engineering, being as old as The University of Hong Kong, is celebrating its 90th Anniversary. It is a great honour for me to offer my warmest congratulations to members of the Faculty for the excellent work they have done in undergraduate and postgraduate engineering education, and in the training of future leaders in the engineering profession.

I came back to the University nearly a quarter of a century ago as Professor and Head of Civil Engineering. I have served the University during this period as Dean of Engineering and Architecture, Dean of Engineering, Pro-Vice-Chancellor, Acting Registrar and Acting Deputy Vice-Chancellor, and on many occasions also as Acting Vice-Chancellor.

From 1977 to 2000, the growth and development of the Faculty of Engineering has been phenomenal, and this is fully demonstrated by the more than doubling of Bachelor graduates (from 207 to 577) and teaching staff (from 59 to 123). Besides, the postgraduate number has increased by more than 30 times (from 10 to 336).

In place of the three small buildings on the north side of the Pokfulam Road (Ho Tung Workshop, Duncan Sloss Building and Peel Laboratory, occupying 8,765 m^2), we now have two very large buildings (Haking Wong Building and Chow Yei Ching Building) and two floors of the Composite Building, totalling 35,832 m^2.

We have indeed made a lot of progress, and it is not difficult to identify a large number of leading engineers in Hong Kong who were graduates of this Faculty. However, competition is becoming much keener with the establishment of engineering faculties in four other universities. I am sure that our Faculty, being the oldest and the most prestigeous faculty of engineering in Hong Kong, will continue to uphold the high standard of the previous 90 years and serve the people of Hong Kong and China well for many, many more years to come.



Professor Y.K. Cheung
Special Advisor to the Vice-Chancellor
Pro-Vice-Chancellor (1988-1998)
Dean of Engineering (1978-1987)
Head of Department of Civil Engineering (1977-1993)

The Honourable Sir Sze-yuen Chung, GBM, GBE, FREng, JP

On the august occasion of the 90th anniversary of the Faculty of Engineering of The University of Hong Kong, I would like to proffer my warmest congratulations to the Dean of Engineering, Professor J.H.W. Lee, and all his past and present colleagues for the success and achievements during the past 90 years.

During its first 30 years from 1911 to 1941 when I graduated from the Engineering Faculty, the Faculty produced only 342 graduates in total. In its second 30 years from 1942 to 1971, the output of graduates had increased to 875. The great expansion and diversification of the Faculty took place in its third 30 years from 1972 to 2001, during which three new departments were introduced. At the same time, the number of graduates output soared by 15 times to 13,500. Today, the Faculty has an annual intake of about 1,110 students in both undergraduate and postgraduate studies.

I wish the Faculty of Engineering continued success and look forward to the celebration of its first century in year 2011.

The Honourable Sir Sze-yuen Chung
Senior Member of Hong Kong Executive Council (1980-88)
Convenor of Hong Kong SAR Executive Council (1997-99)

Dr. the Honourable Rosanna Wong Yick-ming, JP

My warmest congratulations on this wonderful anniversary!

The Faculty of Engineering is one of the two founding Faculties of the University and has, over the past 90 years, enjoyed the highest level and quality of teaching and research. Your lecturers and professors, as well as your graduates, are recognised around the world for their intellect, skill and leadership in the different branches of engineering. Their contributions have been a great credit, not only to themselves, but also to the Faculty of Engineering and The University of Hong Kong.

As you face the challenges of the new century, I believe that the Faculty will adapt to the changes required of a new knowledge-based society. Inter-disciplinary initiatives, as well as a creative and broadly based curriculum will ensure that the Faculty of Engineering will continue to remain at the helm of its field.

My congratulations again.

Dr. the Honourable Rosanna Wong Yick-ming
Chairman of the Education Commission

Dr. Alice Lam, JP

On the special occasion of the 90th anniversary of the Faculty of Engineering, I congratulate the Faculty on its achievements over the years in education, training and research.

Engineering and technology are important driving forces for development and achievement in today's knowledge-based economy. The University Grants Committee is fully committed to the promotion of quality education and academic excellence. The Faculty of Engineering will contribute to and play an important role in the realisation of these goals.

I wish the Faculty success and prosperity in the years to come.

Dr. Alice Lam
Chairman
University Grants Committee

Ir. Lee Shing-see, JP

The year 2001 marks the 90th anniversary of the Faculty of Engineering and The University of Hong Kong. For nearly a century, the University has nurtured generations of engineers buttressing the development of Hong Kong. I am proud to be a graduate of this University. It is also a privilege for me to apply my engineering knowledge in a number of mega infrastructure projects, many of which have received international acclaim.

Hong Kong is in transition to a knowledge-based economy. There are definitely more roles for engineers to play in the years ahead. I am confident that the University will continue to excel in engineering research and tertiary education.

Lee Shing See

Ir. Lee Shing-see
Secretary for Works

Ir. Dr. the Honourable Raymond Ho Chung-tai, MBE, JP

It gives me great pleasure to offer my congratulations to the Faculty of Engineering on its 90th anniversary.

I am particularly proud of my association with the Faculty as an alumnus. Since its establishment as one of the two founding faculties of The University of Hong Kong in 1911, the Faculty of Engineering has been playing an important role in providing education for young engineers and advancing academic research in engineering. To date, over 13,500 graduates have graduated from the Faculty. Over the years, they have demonstrated their excellence in the engineering profession. Many of them have made their names in other sectors as well.

Whilst building on its areas of excellence, the Faculty continues to evolve to meet the needs of society. One excellent example is the establishment of the Department of Computer Science in 1988 in response to the rapid development in the field. I am confident that the Faculty will go from strength to strength in serving our community in the years to come.

Raymond Ho

Ir. Dr. the Honourable Raymond Ho Chung-tai
Member of the Legislative Council
(Engineering Functional Constituency)

Ir. Dr. Joseph M.K. Chow, JP

On the occasion of the 90th anniversary of the Faculty of Engineering of The University of Hong Kong, it gives me great pleasure to offer, on behalf of The Hong Kong Institution of Engineers, our congratulations to the Faculty on its success and achievements made over the years.

For 90 years, the Faculty has been dedicated to meeting the needs of the times and made steady progress toward the eminent position it holds in the region today. The Faculty, with its first intake of 37 students in 1912, produced over 13,500 well-qualified graduates over the years to provide engineering services to our community through their various roles in the professional, industrial, academic and government sectors. If success of university education is measured by the success of its graduates, the Faculty has certainly excelled.

I am very proud to be one of the graduates of the Faculty nearly 40 years ago and cherish many fond memories of the early 60's. I wish to take this opportunity to pay tribute to all members of the Faculty, past and present, for their dedication and professionalism.

In the years to come, I am confident that the Faculty will continue to provide world class engineering and technical education and research and contribute to the development of Hong Kong in the 21st century.

Ir. Dr. Joseph M.K. Chow
President
The Hong Kong Institution of Engineers

Professor Lu Yong-xiang

On the occasion of the 90th anniversary of the founding of the Faculty of Engineering of The University of Hong Kong, I would like to send my warmest congratulations to all members and students of the Faculty.

The Faculty has gone through a brilliant development of 90 years, bringing up a lot of excellent engineers, and making great achievements in establishing new branches of engineering science and developing modern engineering technology, thus promoting the development of social productivity and the advancement of science and technology in Hong Kong.

The Chinese Academy of Sciences and The University of Hong Kong have established a good relationship in scientific exchange and cooperation. In the area of engineering science, both sides have some advantages complementary to each other. There is broad prospect for cooperation between the two parties in scientific research and talents cultivation.

I sincerely hope that the Faculty will make further innovative progress on the basis of good traditions, and compose a more splendid chapter in the new century.

Professor Lu Yong-xiang
President
Chinese Academy of Sciences

Professor Song Jian

On the occasion of the 90th anniversary of the Faculty of Engineering, The University of Hong Kong, I, on behalf of the Chinese Academy of Engineering and myself, extend warm congratulations to all people working and studying in the Faculty.

Engineering science and technology have long been the powerful engine driving human society forward. Being a bridge between scientific discovery and industrial development and a strong force to stimulate industrial revolution, economic development and social progress, it has been playing a crucial role in raising productivity.

With finance and trade being its mainstay, Hong Kong attracts attention from all over the world. The development of engineering science and technology is of great assistance to economic growth and is decisive for Hong Kong to promote its competitive power in the world.

May the well-established friendly relations and cooperation between the Faculty of Engineering, HKU, and the Chinese Academy of Engineering continue to develop!

J. Song

Professor Song Jian
President
Chinese Academy of Engineering

Mr. Anthony Tsui

On behalf of the Croucher Foundation, may I warmly convey our congratulations to the Faculty of Engineering of The University of Hong Kong on the occasion of its 90th Anniversary.

For the past 22 years, the Foundation has been proudly associated with your Faculty through a good number of grants it has offered towards the excellent work and activities undertaken by your members, staff and students, past and present. As a private grant-making body dedicated to the promotion of the standards of science and technology in Hong Kong, our Foundation is committed to excellence and all its grants are made on the basis of intrinsic scientific merits of the applicants. This is judged by panels of leading international experts invited to help us with assessments, and the number of grants and awards won by the Faculty through the years is a true testimony to its achievements.

Please accept, from our Trustees and myself, our best wishes for the continuing success of the Faculty on the way to its Centenary.

Mr. Anthony Tsui
Director
The Croucher Foundation

Dr. William M.W. Mong

The Faculty of Engineering is committed to nurturing young engineers and developing high quality academic research for the past 90 years. It has made outstanding achievements and tremendous contributions to the community of Hong Kong.

On behalf of Shun Hing Group, I wish to extend my heartiest congratulations to the Faculty of Engineering on the occasion of its 90th anniversary.

Dr. William M.W. Mong
Chairman
Shun Hing Electronic Trading Co., Ltd.

Dr. Chow Yei-ching

On the occasion of the 90th anniversary of the Faculty of Engineering of The University of Hong Kong, it is indeed an honour for me to write a congratulatory message for this very special commemorative publication.

Engineering, as explained in the dictionary, means "the practical application of scientific knowledge in the design, construction and control of machines, public services such as roads, bridges, etc., electrical apparatus, chemicals, etc." It is therefore apparent that engineering affects every aspect of our communities, and it will always remain essential and vital for the betterment of the quality of our lives.

Nowadays, like many other parts of the world, Hong Kong has developed into a knowledge-based society and its demand for expertise in specific fields has been ever increasing. In order to keep pace with this magnified need for specialists and experts, our society has, in turn, developed greater demands for higher standards of education and training.

Over the past decades, the Faculty has been playing a key and significant role in discovering, nurturing and training outstanding talents who contribute much to the field of engineering. In addition to the high standards of education it is known for, the dedication and commitment of its members have also helped establish the Faculty as one of the best of its kind in the region.

On the occasion of its 90th Anniversary, I warmly congratulate the Faculty on its outstanding achievements and I wish it continued success in promoting the highest standard of education, and in fostering outstanding candidates who will help build an even better and brighter future for our society.

We can all be certain that the Faculty of Engineering will continue to scale new heights in the many years ahead.

Dr. Chow Yei-ching
Chairman
Chevalier International Holdings Limited

Ir. Willis Yu

It is probably true that whoever best assimilates, controls and processes information will dominate in this knowledge-based economy. Entities are forced to be receptive and responsive, and an edge could only be sustained by continuous improvement and innovation.

Engineers often work behind scenes but examples of their application of technological improvement and innovation are not inconspicuous. Essential infrastructure developments and engineering achievements are the results of big-team-work with key inputs by engineers. There is a need to continuously strive for synergy amongst alumni and non-alumni engineers, together with the academia and industry, to sustain the development and prosperity of Hong Kong and the Greater China.

Our wish is for all alumni to come together and work together. We are proud to be graduates of the Faculty of Engineering of The University of Hong Kong. The years in the University have shaped our maturity, the peer friendships have shaped our networks; the training from the Faculty has shaped our careers; the output of our education has shaped the community. As Ir. Dr. W.K. Lo has expressed through the lyrics of the Association Song :

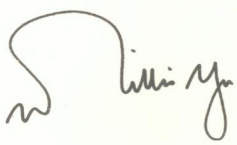
桃李同窗，化春風雨絲，鵬鳥懷大志，耳聰更目明。
格物明德性，知致意誠，正心修身，緊記綱領。

同創美景，此志共永，齊挽手，高山亦變做平地。
發展資訊網絡，造樓宇，鐵路能源連萬里，質素勝。
善用設備，製品求精，展抱負堅心一拼。

桃李盈枝，散芬芳滿苑，龍騰懷大志，各奔向前程。
努力憑沖勁，淵博熱誠，勇敢擔當，工科優勝。

同建社會，千里和應，齊挽手，江海亦變做平地。
持續同建造，護環境，建棟樑傳萬世，可誌銘。
盡力創造，進取求精，展抱負此心可証。

Finally, I would like to congratulate the Faculty of Engineering, on its successfully organisation of the 90th Anniversary Programme and look forward to another decade of prominence to compliment the centennial celebration.



Ir. Willis Yu
President
HKU Engineering Alumni Association (HKUEAA)

Mr. Freddie F.S. Hung

With much pleasure and pride, I would like to extend my heartiest congratulations to all members of the Faculty of Engineering, The University of Hong Kong, on this special occasion of the 90th anniversary.

Although the Computer Science programme only came under the Faculty of Engineering in 1988 - after I had graduated with the Computer Studies degree, there have been excellent development and achievement in these years in the field of information technology and engineering under the Faculty. From hardware and software engineering to the latest bioinformatics technology, the Faculty has not only met the ever evolving demand of the society for high quality people, but also led the technology and engineering development in Hong Kong. Such contributions are especially important to Hong Kong in its transition toward a knowledge-based economy.

May I wish the Faculty every success in the next 90 years.

Mr. Freddie F.S. Hung
President
HKU Computer Science Alumni Association

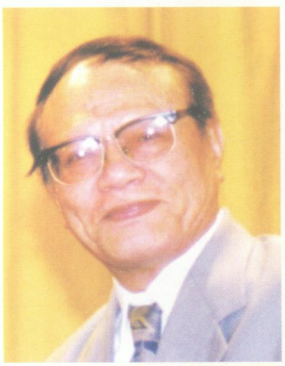
Much of the campus is no longer recognisable to me, but the small part that remains the same from the 1930s brings back sweet memories of the youthful and energetic days of my life.

- Man Hung Cho, Dexter, BSc(Eng), Civil Engineering, 1940

REMINISCENCES

REMINISCENCES: Those were the days...

Man Hung Cho, Dexter



On the 90th anniversary of the Faculty of Engineering, may I, as one of its pre-war graduates, offer my warmest congratulations and best wishes for its continued prosperity for the next 90 years.

I had four very enjoyable and memorable years at The University of Hong Kong. In those days, there were only 16 of us in the Faculty and we had lectures in the Main Building.

Much of the campus is no longer recognisable to me, but the small part that remains the same from the 1930s brings back sweet memories of the youthful and energetic days of my life. I still recall with fondness my former teachers Professor C. A. Middleton Smith, Professor F. A. Redmond, Mr. I. Day, and Mr. D. W. Morley. As Hong Kong and The University of Hong Kong are facing a challenging era of rapid changes in our society, I wish the Faculty of Engineering every success in its continuing pursuit for academic excellence.

Dr. Man Hung Cho, Dexter
BSc(Eng), Civil Engineering, 1940

Albert I. King: Reminiscences of My Years at HKU

I arrived at May Hall in September of 1951, a true greenhorn, ready to be ragged by the more senior residents. A friendship developed very quickly among the victims (freshmen) and pretty soon it was work, eat and very little sleep. There was only one major in Engineering – Civil Engineering but we had to study thermodynamics, electrical circuits and dynamics. The basics of Engineering were emphasised and I feel that it is this excellent grounding that provided me with the ability to go onto graduate school and a higher degree. The final year was most memorable. We lived in that design room day in and day out trying to complete the bridge design. The most laborious part was to make all those little circles that represented rivet heads. The discipline developed over those months was very useful in graduate school where late nights and long hours were expected. Graduation came as a welcomed relief but I was drawn to academia and stayed on at the University as an instructor in Fluid Mechanics, and registered as an MSc student, trying to understand the theories of turbulent flow. Although I did not make much headway in my research, the teaching experience was invaluable. Additionally, the background work I did in turbulent flow allowed me to compete for a national scholarship in the US and I won the Boris Bahkmeteff Scholarship in 1961 to study blood flow. The money came just in time to pay the extra medical expenses incurred when our son was born prematurely. We almost named him Boris. Returning to the University after an absence of 50 years was quite a shock. Most of the buildings I was familiar with are now gone and I got horribly lost wandering around campus. It is indeed true that the engineer is the only creature on earth that can re-shape its surface. In any case, the University is now an impressive place, living up to its reputation as one of the top universities in Asia. My best wishes to the Faculty of Engineering and the University for another century of progress.

Professor Albert I. King
BSc(Eng), Civil Engineering, 1955
Director, Bioengineering Centre, Wayne State University, U.S.A.
Member, National Academy of Engineering

Kong Fung Kew

In 1955, I won a *King Edward VII Scholarship* to study civil engineering at The University of Hong Kong. A momentous event happened that year: the Institution of Civil Engineers, London, accorded full recognition to HKU's BSc(Eng) degree. *The South China Morning Post* also reported that for several years in a row, HKU graduates had won the Bayliss Prize, which was the then top prize in the Institution's examination for corporate membership. The great news gave me added incentive to work hard. As a result, I came top in my class in all three years of the degree course, and won the three top prizes: *the Ho Fook Prize, the Chan Kai Ming Prize and the Williamson Prize.*

In 1958, I graduated with First Class Honours and a BSc(Eng) degree. The previous year, Professor Sean Mackey arrived as Head of Department and was elected Dean as Dr. S. Y. King's successor. I stayed on as a Demonstrator and MSc student under Professor Mackey and Dr. Franklin K. C. Wong. Among those that I taught as a Demonstrator was a very able student, Chan Hon Chuen, who was later to become the Head of Department (1994 - 1999). After my MSc degree, the UK Government awarded me a Commonwealth Scholarship for PhD research. I had earlier sought advice on British universities. My old Headmaster at Ying Wa College, Mr. Herbert Noble (BSc Manc) liked Manchester, Dr. Wong (PhD Lond) thought highly of Imperial College, but Professor Mackey (PhD Leeds) preferred Leeds to all others.

Looking back, it was my good fortune to have gone to Leeds University, where I worked under Professor R. H. Evans (who was also Professor Mackey's former Professor). That was in October 1960. By late 1962, I had received my PhD degree and left Leeds, but my collaboration with Professor Evans continued until his death in 1993. Besides research papers, we co-authored *Reinforced & Prestressed Concrete* in 1975 and co-edited the 2000-page *Handbook of Structural Concrete* in 1983. We were also the Series Editors of 28 books published by McGraw Hill and Longman.

In December 1962, I joined Scott Wilson Kirkpatrick & Partners, working for a year in their London office before joining their Plover Cove site in Hong Kong. In August 1965, I returned to HKU as a Lecturer. The Department then had only a small teaching staff: Professor Sean Mackey, Mr. Peter Lumb (Senior Lecturer), Dr. L. K. Chen, Dr. John J. Raftery, Mr. K. W. Leung, Dr. Franklin Wong and myself (Lecturers), and Dr. H. W. Chung (Assistant Lecturer). Among my students at the time was the bright C. F. Lee, who rose to Head of Department in January 1999, in succession to my earlier student H. C. Chan.

Starting May 1967, the reverberations of China's Cultural Revolution became increasingly felt in Hong Kong. Professor Evans encouraged me to emigrate to the UK, and arranged for a Lectureship for me at the University of Nottingham. In December 1967, my wife and I, and our three young children, left Hong Kong for Nottingham. The Department Head at Nottingham was Professor R. C. Coates, who was later to become External Examiner of HKU's BSc(Eng) degree. At Nottingham, I wrote a book with Professor Coates and Dr. Martin Coutie: *Structural Analysis,* now in its 3rd edition and translated into Spanish and Malay.

In 1972, I was appointed a University Lecturer at Cambridge University, where I later took up an additional appointment as a Fellow of Girton College. It was while at Cambridge that I heard the good news about HKU having appointed the eminent scholar Professor Y. K. Cheung to succeed Professor Mackey, who was retiring. In 1981, I left Cambridge on appointment to the Chair of Structural Engineering at the University of Newcastle. In 1988, I visited HKU in my official capacity as the External Examiner of the BSc(Eng) degree, and was impressed and deeply touched by all that the Engineering Faculty and my Alma Mater had achieved.

Two years later, an opportunity arose for me to become the first Professor and Head of the Division of Structures & Construction at the new Nanyang Technological University in Singapore. The time was just right - by then our youngest child was already at university, while the eldest had long since graduated at Cambridge and emigrated to the US. So, in September 1990, my wife and I left Newcastle for Singapore, where she also returned to work as a mathematics teacher at the International School of Singapore. After six fulfilling years in Singapore, at the age of 61, I returned to England with my wife, to start our retirement in Northumberland, a quiet and peaceful county with extensive areas of outstanding natural beauty.

F. K. Kong

Emeritus Professor Kong Fung Kew
BSc(Eng), Civil Engineering, 1958

Wong Sook Leung: First Summing Up

1. On "First Summing Up"

When one has passed the age of 60, one is entitled to do a summing up of one's thinking on various topics. To sum up is not to write a comprehensive treatise, rather, it is to highlight those points deemed significant by virtue of the writer's personal experience and at the time of writing. It is a personal exercise, not directed to any particular group of readers. By describing it as "First" it makes room for future revision, deletion or addition.

2. On Being a Leader

A leader must be pre-occupied with the goal and be able to draw the best out of the members of his team. This implies having conceived a vision and having set a goal. To be pre-occupied means to evaluate every decision against its contribution to the goal. Many desirable abilities of a leader such as that to communicate and to inspire are but means to an end of drawing the best out of his colleagues so that they can make full use of their potentials.

3. On Under-Used Hidden Asset

Inadequate resources are often given as the main reason for failing to achieve an objective. However, there is a valuable and powerful asset, possessed by many, which we often fail to make full use of. I refer to the opportunities to motivate our colleagues, especially those who work for us, by words of appreciation and encouragement.

Work, even hard work, is usually not the main factor that causes pain. It is the nagging fear and anxiety about the boss's displeasure with our efforts that eat up our emotional energy and cause frustration and depression. A genuine word of affirmation will help to allay fear and boost morale such that even hard work becomes easy. Such an "asset" available to all who hold power of any form often costs nothing in monetary terms, but can do wonders when applied in a timely and skillful manner.

4. On Being an Academic

A good academic will, through the process of studying, thinking, understanding, and discovering connections and generalisations, become a broad-minded individual, generously sharing what he/she knows, and freely admitting any lack of knowledge and understanding. Alas, this is often not the case with many academics. Many lead compartmentalised lives, hardly allowing their academic pursuits to touch the broader aspects of their lives. They remain narrow-minded, miserly and unable to generalise from their specialty to embrace life as a whole.

5. On Research and Knowledge

5.1 The biggest curse on scholarship is the notion of "publish or perish". It is said that a Nobel Laureate typically has one good original idea in his lifetime whereas a genius like Newton or Einstein will have a few. One therefore shudders at the claim by some academics of having published hundreds of papers. How much duplications or variations of the same theme are contained therein? When one talks about information explosion, referring to the doubling of the world publications in a short

number of years, one wonders if this so-called explosion is brought about by this curse of "publish or perish". Not only is this "moving of dead bones from one tomb to another" a waste of resources, it actually impedes genuine, original ideas. To the researchers involved in this paper chase, published papers become a currency. They select research topics based on the relative ease for producing publications instead of being driven by curiosity, love for learning, or application potential. More time is spent producing papers than doing research. One cannot help looking back with envy at the time of Faraday and Maxwell, when exciting research was done with "tin cans and butterfly net". With this craze for publications, the time for quiet contemplative research could be a thing of the past.

5.2 There are two kinds of knowledge. They can be depicted as follows:

1st kind: $A \rightarrow B$
2nd kind: B ?

The first kind answers the question of "how", that is, how to get from situation A to situation B. For example, how to nurse a sick person back to health; how to design an integrated circuit from given specifications.

The second kind answers the question "Is situation B worth getting into?" As they say, doing the right thing is more important than doing the thing right. Hence, before expending a lot of effort pursuing knowledge of the first kind, one should always put in enough effort to gain relevant knowledge of the second kind.

6. Concluding the "First Summing Up"

Writing the "First Summing Up" leads to more questions than answers. Fortunately, there is a deadline. Otherwise, this article will never be sent to print.

Professor Joshua Wong Sook Leung
BSc(Eng), Electrical Engineering, 1961
Former Vice-President
Hong Kong Polytechnic University
Email: vpjoshua@polyu.edu.hk

[Editor's note: Due to limitation of space, the publication committee regrets that only a portion of Professor Joshua Wong's article is published here. Interested readers may wish to contact him to obtain a full version of his "First Summing Up" or its future revision or addition.]

Norman W.M. Ko: 90 Years of Human Endeavour

I am honoured to be able to participate in the 90th anniversary of the Faculty of Engineering. In its existence of 90 years, I had the privilege of being part of the Faculty over a period of 35 years. Since its dawning 90 years ago, the University experienced two world wars, encountered the turmoil in China and eventually has developed to the present state. Its graduates did and do play important roles not only in Hong Kong, but also in the rest of the world. Its existence was and is of tremendous value for Hong Kong, for the regions and for the world.

In the history of mankind, the existence of 90 years of the Faculty of Engineering is minute when compared with the 40,000 years of human activities since the Palaeolithic time. It was due to the human endeavour of the last 40,000 years that the Faculty was formed on solid foundation. It was also based on the knowledge accumulated by man that the Faculty can bear the responsibility in acquiring further knowledge for mankind.

It was due to the endeavour of the forerunners of the Faculty, be they staff, students or every one else involved, that the Faculty has achieved what it wants to achieve. It was and is their joint effort that the Faculty has reached what it wants to reach.

Personally, I have had the fortune to be one of the individuals, who had the opportunity to contribute to such an endeavour. After my undergraduate study in the Faculty and a short trip abroad for my further study, I spent the rest of my 31 years working life in the Faculty. In 1960, I saw a class of seven mechanical engineering students in the first year. It finally reduced to four students when we graduated. Even with a very high entrance requirement, the highest in the University, the internal standard rendered promotion difficult. I was the only fortunate one in the final year, who did not suffer from referral and repeat.

My fellow classmates in the other two departments of civil and electrical engineering encountered a similar fate. It was really a hard life for engineering students working under such pressure. Now, even after 38 years, I still ponder and doubt the necessity in maintaining such high standard as the success in life depends not solely on the grade of examination. The present successes of my fellow classmates of the Faculty are gratifying indeed.

With such a small size of the class and of the department, we, the students, knew not only the classmates and the staff well, but also the students and staff of other departments. Even with such pressure, we managed to organise official and unofficial functions and to enjoy what we wanted to enjoy, not just within the department, but also within the whole Faculty and not just among the students, but also with the staff. The relationship and interaction were cordial and intimate. Now, I still remember vividly and treasure fondly these happy three years of my life.

Following the expansion, I felt that this cohesion in the Faculty gradually disappeared. This loss also occurred in the department. In recent years, I have to admit that I really did not know the colleagues of the department well, not to mention those of other departments in the Faculty. With such a large group of students, I have to further admit that I did not really know them. To my personal self, it is indeed sad.

Finally, I like to express my congratulations to the Faculty for such an important occasion and the endeavour of the last 90 years. It is my earnest hope that in the following centenary, the endeavour of the Faculty will surpass that of the present. The endeavour will not only be of a few individuals, but also of every member of the Faculty. It is my sincere hope, not a forlorn one, that the endeavour will be a cohesive one within an environment, which I did enjoy 30 years ago.

Though the endeavour of the Faculty is minute when compared with that of man, it is the accumulation of the infinitesimal contributions of every individual in the past, in the present and in the future that renders the greatness of man.

We have to strive for achievement. However, we do not necessarily have to lose our moral self.

Professor Norman W. M. Ko
BSc(Eng), Mechanical Engineering, 1963
Head of Department of Mechanical Engineering (1990-1991)

Kwong Hon Sang

It has been nearly forty years since I left The University of Hong Kong. Despite the passage of time, memories of the days at the Duncan Sloss Building remain some of my most vivid. In those days the Engineering Department was something of a 'little brother' among the Faculties; the whole Department being then just about the size of one of today's classes. All of the engineering and architecture students were housed in the four-storey Duncan Sloss Building and so everyone knew everyone else in our little community.

When I graduated in the early 1960's, the number of civil engineering graduates was just a little over a dozen each year. Despite this low figure and the fact that Hong Kong University was the only local institution producing degree level engineering graduates, it was still not easy to ensure that everyone would acquire a job. I am glad to say that over these past forty years we have witnessed a considerable growth not just in the Department and the University but also a commensurate one in engineering opportunities across Hong Kong.

I am sure that we are all aware that the success and growth of the University go hand in hand with the success and growth of Hong Kong as a whole. Now, when the Faculty is able to produce around 1,110 quality graduates each year, Hong Kong is spending over HK$20 billion each year on public works alone. If the investment made in the private construction sector is added, it is clear that our University and Hong Kong itself have grown together in strength over the years. Indeed, our construction programme is much larger even than that of many nation-states and this reflects our prodigious all-round economic growth, a growth to which our engineers have contributed significantly.

We have now in Hong Kong one of the finest civic infrastructures anywhere in the world. Our port, airport, highways, railways, bridges and tunnels are second to none. These are achievements of which we, as engineers, may feel justly proud and it is indeed gratifying that many members of our own alumni have been and continue to be key contributors to these works. The work of the Department in nurturing and encouraging the considerable successes of our graduates and, by extension, Hong Kong as a whole should be acknowledged by all.

The transfer of sovereignty was a potentially difficult period and many people outside Hong Kong were sceptical about our future. Events, however, have proved those doubters wrong and I am confident that we will continue to prosper. Our internal development will continue apace into the twenty-first century, continuing our history of high quality growth. Nonetheless, we must begin to set our sights outside of Hong Kong for it is there that our greatest opportunities and challenges will come. In particular the construction market in Mainland China should be a focus for our engineering professionals. The current infrastructural mega projects underway in the motherland, of which the Three Gorges project is just one, are but preludes to the overall economic development of the country. There is no reason why we should not be part of the team.

To become valuable assets to society and our profession, we must ensure that we never stoop to complacency. We must continue to improve the full spectrum of our skills. Further development of our technological, managerial, professional and ethical standards is essential if we are to remain as leaders in Asia and the world. I hope and believe that our undergraduates, graduates and the Engineering Faculty as a whole will continue the successes of part years and will maintain our esteemed position among the engineering fraternity.

Ir. H.S. Kwong
BSc(Eng), Civil Engineering, 1963
Former Secretary for Works, HKSAR

John Luk: Lifelong Learning

The year 2001 marks the 90th anniversary of both The University of Hong Kong and the Faculty of Engineering. I am most happy to have been invited to share my experience in continuous learning with you all.

Hong Kong is evolving quickly into a knowledge-based economy. Everyday we are facing new challenges and opportunities brought about by the globalisation of commerce and trade, rapid technological developments in various arenas and major economic restructuring in Hong Kong. We have to upgrade our skills and knowledge continuously in order to meet the ever-changing demands in this new era, and continuous learning has become one of the major concerns in our lives. I happened to have started my continuous study after office hours some 30 years ago, and would like to share my experience on this topic.

Many people are deterred from continuous study just because they lack confidence in their abilities. They worry that they cannot manage so many things effectively at the same time. My experience however tells me that this worry is not warranted, and we should not let it hinder our potential development. In my secondary school days, I loved reading martial arts fiction. Zhou Bo-tong (周伯通), a remarkable character in Jin Yong's (金庸) famous work 'Eagle and Hero' (射雕英雄傳), impressed me. He could draw a circle with his left hand and at the same time draw a square with his right hand. I also observed that when playing the organ, an organist can use his left and right hands, and both feet to play different tunes, chords and rhythms at the same time. Also I read about Leonardo da Vinci, a very talented and versatile artist, scientist and inventor in the Renaissance. I was therefore convinced that we could perform many different tasks and perform them well at the same time. All these also made me believe that human intellectual potential is much higher and more versatile than we expected. This belief is supported by scientific research and findings that indicate that human beings usually use only a few percent of their brainpower. Thus, I decided to try to use a few more percent of my brainpower. This built up my drive to challenge myself later in different areas of continuous learning.

When I first took on the challenge of working and continuous study at the same time, I was just like many young professionals wishing to get better qualifications in their professional field. I therefore chose to study for the MSc degree and PhD degree in engineering. However, in the course of my continuous study, I found that the more you learn, the more you realise that there is more interesting and useful knowledge to be gained, and it is exciting to learn about in-depth findings and broader discoveries from others.

Hu Shi (胡適) said, 'Learning is like a pyramid. It should be broad and tall' (學問要如金字塔,要能博大要能高). Thus we should not only focus on the development in our own field, but should also broaden our knowledge base by studying in other areas. In practice, different types of knowledge actually complement and/or supplement one another.

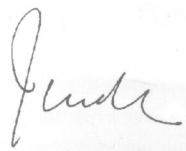
I suppose most of us are concerned about our careers. I would therefore like to share with you what Professor Sean Mackey of the Civil Engineering Department at our Alma Mater in the 1960's said Tegarding the career path of a professional engineer. The first rung on the ladder of success for an engineer is to be a competent professional in technical matters. When he acquires good leadership skills, he will be promoted to team leadership. He will then climb up to higher supervisory and management level. If he is ambitious and competent enough, he may become a partner in the firm. He can further advance to become an engineering leader in the profession and even become a leader in society at large. All these require different knowledge and skills that can only be acquired by continuous learning. What Professor Sean Mackey said is what I experienced or perceived in my career development, and I think this is also true for other professions and disciplines. In order to achieve these advancements, one needs to acquire broad-based knowledge and skills apart from the expertise in his own profession or trade, in order that he can

be fit for the role. To prepare myself for such advancements, I studied not only in areas related to engineering but also in business administration, law, finance and international relations. The knowledge and skills I acquired in different areas have all been very helpful, if not indispensable when I advanced in the path of my career development. Also, they have been very useful when I took up new challenges in other aspects in life, and made my life easier when I had to tackle new, complicated and multi-discipline problems.

Learning indeed becomes more than getting knowledge. After years of studying, I found that it had become my 'pleasure' instead of 'pressure'. Apart from its functional and practical aspects, it has become an inexpensive pastime for me with many enjoyable and happy returns. This pleasure adds value to my work and makes me understand the world much better and widens my vision in life. While this became the extra drive for my self-initiative to carry on acquiring new knowledge, setting new targets in studies from time to time helped me to keep up my stamina and competitiveness. Learning after office hours is all about management of time. Most people have the impression that engaging in continuous studies will sacrifice the enjoyment of hobbies. When I got used to managing my time well with continuous learning, I had no problem in getting spare time to develop my hobbies in singing, music appreciation and playing games and sports, in addition to a relatively busy social life. In fact, developing one's hobby is also a kind of continuous learning or perhaps life-long learning.

One of the most valuable bonuses from continuous learning is the people one meets during the learning process, particularly classmates, fellow learners and teachers. This can enlarge one's social circle, build up wider business contacts and even bring a number of great friendships for life.

To conclude, continuous learning is essential to all of us and to the future of Hong Kong. Through study, we can prepare ourselves for the challenges of the changing world, better equip ourselves for career advancement, develop our interests in various areas, understand the world better and widen our vision and horizon in life. Continuous study will also help us maintain an active mind, competitiveness and high spirits. The joy of studying is great, however it can only be experienced by those who act. After all, continuous learning, apart from its value in our careers, makes our lives more colourful and interesting and helps us to become more accomplished human beings. Finally, the ultimate development of continuous learning is life-long learning.



Ir. Dr. John Luk
BSc(Eng), Civil Engineering, 1966
Project Advisor
Sun Hung Kai Properties Ltd.

Robert Lam: High Building Research Centre of The University of Hong Kong

In the late 1960's when the cost to purchase an apartment of a thousand square feet in a good location in Hong Kong was around $60,000, a HK$4 million budget for a research project in the University was an enormous investment. Its worth today probably amounts to HK$200 million if extrapolated on the basis of real estate property price increases over the years.

Such was the budget of the High Building Research Project in the Department of Civil Engineering. The project was initiated by Professor Sean Mackey, the then Head of Department and Dean of the Faculty of Engineering, who conceived the project as far back as 1963 after attending the First International Conference on the Effects of Wind on Buildings and Structures held in London. That was the time when high-rise buildings and structures began to spring up in cities around the world, and yet the use of computer simulation and wind-tunnel modeling techniques were still in its infancy.

In the absence of powerful computers and sophisticated wind tunnels, Hong Kong, being in an area visited annually by typhoons, was an ideal place to conduct full-scale testing. The chosen experimental site was located at Cape D'Aguilar on the southeastern tip of Hong Kong Island, which was fully exposed to the gusty winds of winter monsoons as well as tropical cyclones. A significant portion of the budget went to the construction of a ten-storey glass-clad steel-framed building, four 180-ft tall steel masts, and state-of-the-art but homemade electronic instruments.

I was fortunate enough to be one of the "pioneering" student members of the research team. Upon my graduation from Civil Engineering in 1967, I was enrolled first as a Master's and then a PhD student under the supervision of Professor Mackey, Director of the High Building Research Centre established in the University for the purpose of conducting research on the characteristics of wind loading and its effects on buildings and structures. Working together with my fellow classmates Edmund Choi and Eddie Ho, our first assignment was to design the foundation of the experimental building, followed by site surveys, preparation of structural design drawings, tender documents, construction site supervision, and so on. I suppose it was a rare and valuable opportunity given to research students in that we could gain hands-on practical experience of a real engineering project to start off our academic research.

A total of 72 sensitive wind pressure cells were installed on the faces of the experimental building to record wind load distribution, while 40 quick-response anemometers were mounted on the four steel masts to form a grid to measure the distribution of wind velocities and directions in the vicinity of the building. In addition, vibration of the building under strong gusty winds was detected by two movement tracking devices. All data collected were recorded on magnetic tapes for computer analysis. Technical staffs in the Civil Engineering Laboratories were proud of their contributions to the research project as the anemometers and pressures cells were manufactured, tested, calibrated and installed by them, with the assistance of the research students.

The experimental building went into operation in the winter of 1969 and was first hit by typhoon in 1970. From that time onwards, research activities continued for more than a decade, culminating in the production of eight PhDs, five MSc(Eng)s, numerous research papers published in international conferences and refereed journals, significant contributions in re-writing the Hong Kong Code of Practice on Wind Effects, and the award of the Telford Premium by the Institution of Civil Engineers in 1983.

Dr. Robert Lam
BSc(Eng), Civil Engineering, 1967
Academic Registrar
Hong Kong Baptist University

Edmund K.H. Leung: The Good Old Days

Having graduated for some 35 years, I am in the minority group of the older generation; but in recalling my University days, it feels like last year.

I was one of 11 mechanical engineering students in my year. We only had three departments in the Faculty at that time. The distribution of students was about 38:22:11 for Civil, Electrical and Mechanical. Some may argue that Mechanical Engineering is the home for those who wanted to study engineering but could not make the grade to join the more popular departments, but I remain convinced that the Mechanical Engineering course trains general engineers, and some of the graduates, with proper training and exposure, found their ways to senior management positions in large companies.

My recent re-acquaintance with the University and Faculty leads me to attempt to compare what happened in the 1960s with what happens today.

To start with, the facilities available to students are vastly different. We attended lectures mainly in the Peel Laboratory Building, next to the Duncan Sloss Building, which was used by Architecture students. Together with the Ho Tung Workshop, the three buildings formed a cluster of old buildings on the other side of the new Haking Wong Building, a bit further down on Pokfulam Road, where the flyover is now located. They were not air-conditioned, and the facilities of the buildings were bare basic. Because the Peel Laboratory, on the other side of Pokfulam Road, was so far away from the main campus, we did not find it easy to socialise with students from other faculties. In a way, we did not feel like a part of the big family.

In addition, the engineering course, compared with arts and science courses, was more demanding. We always admired other students who had the time to enjoy life while we were making ends meet with our time. Visits to the Lily Pond and the Library were excursions.

Two particular incidents still remain fondly in my memory as part of my naughty youth days. Please read it in the context of the 1960's when we had suddenly discovered the freedom to attend or to not attend classes, a novelty in that era.

The first incident concerns the English lecture which some of us found boring and uninteresting. As the class was very large and the absence of a few persons generally would not be noticed, a few of us once decided to forego a lecture to admire one of our college-mates's newly bought car. On the pavement of Pokfulam Road outside Peel Laboratory, we lifted the bonnet and were checking the engine, just as Professor Middleton Smith, the Head of the Department of Mechanical Engineering, walked by. He naturally questioned why we were there and our quick-witted answer was that we were doing research work on a project. Whether he accepted our explanation or dismissed us as useless brats remains a mystery, but at that time we felt we succeeded.

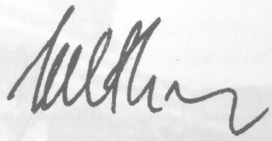
The other event was even more embarrassing, especially as the lecturer involved is still with the University and hopefully taking it in good humour. We were attending the first lecture in Electrical Engineering in a large class of both Electrical and Mechanical students and some repeaters, so we did not all know each other. Students were in a joyful mood and were playing with each other. Some naughty students took turns presenting themselves at the lectern to "play lecturer". They were shouted at and quickly returned to their seats. One youngster came in late, proceeded to the lectern and, having deposited his ring-bound file, started to clean up the blackboard with a duster (yes, in the good old days the blackboard was still the standard teaching aid). Yours truly, being righteous, shouted across and said: "Stop It! The time is up and Ah-Sir will arrive at any moment now." This person ignored my pleas and started lecturing, at which point I was politely and quietly told by my college-mates that he WAS the real lecturer, Dr. W. S. Leung (Professor Vincent Leung as you now know him). I will leave Professor Leung to let you have his version of the story.

I think I worked hard throughout my three years in HKU, except in April 1967 when I felt ill and had to miss classes for a few weeks. I came back all right for the examinations but did not have time to finish the report for my project. Observing the "free" approach in the lectures, I was told that there was no need to submit my course work. However, while I was enjoying life, my lecturer in thermodynamics (the late Dr. the Hon Samuel Wong) bumped into me and reminded me that I had to submit my project report by noon the next day, otherwise I could definitely not graduate. Up to that day in my life, I never had to study nor work later than midnight. However, having experienced my first all-night non-stop study session, I felt that I had begun to grow up!

If I were able to relive any part of my life again today, I would choose to rewind the clock and go through my university days again. It was great fun, most rewarding and extremely enjoyable.

My recent involvement in the University Engineering Advisory Committee and in other events has brought me much closer than ever to our University and our Faculty, and I now find it most invigorating to come to the campus.

In case anyone of you, undergraduates or recent graduates, does not believe this, I challenge you to keep this article, write down your present experience with the Faculty and lock it away for re-reading in 2031. If you can still find me, please prove me wrong!



Ir. Edmund K. H. Leung
BSc(Eng), Mechanical Engineering, 1967
Chairman of Hyder Consulting Limited

Leung Tin-pui

Together with all engineering graduates of The University of Hong Kong, I share a great joy on the occasion of the 90th anniversary of the Engineering Faculty, and am most gratified to see its excellent development over the years. I was admitted to the BSc (Eng) in the Mechanical Engineering degree programme in 1964. At that time, the Department of Mechanical Engineering was barely on its feet after its re-introduction four years earlier in 1960.

As a student, I really enjoyed the tranquil and scholarly environment of the University. It had a much smaller student population in those days. I can still remember walking through archways of the Main Building and passing by small courtyards on my way to the Library. The Lily Pond was most elegant and there were several camellia trees on the small grassland along the University Path. There were plenty of azalea bushes clustered on the hillsides of the campus and slopes along Bonham Road. The blossom of the flowers in early spring would convey a clear signal that the final examination was approaching.

Laboratory equipment in the 1960s was not as advanced as nowadays. Subjects related to computers and programming had just been introduced. Although research and consultancy work was burgeoning, the Faculty had already become a fertile spawning ground for such activities. For example, the Department of Mechanical Engineering carried out some consultancy work on hydraulic modelling for the Government and industry. My final year project was carried out under the supervision of the then Reader and Department Head Mr. W. Smith. The project was to investigate the flow pattern and velocity profile of cooling water discharged from the Ap Lei Chau Power Station of Hong Kong Electric Co., and to study its possible effects on the sampans and small fishing boats stationed or travelling in adjacent waters. In early 1967, the year of our graduation, Professor C. H. Gurney was appointed Head of Department. He was an internationally renowned expert on thermodynamics, fatigue analysis and crack propagation.

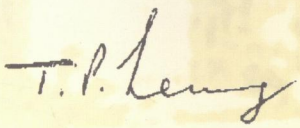
Hong Kong is well known for its harbour and its position as an international financial centre and tourist centre. Yet it is also a hub of construction and an important manufacturing services centre. In the past 90 years, the Engineering Faculty has contributed tremendously to the creation of a modern and beautiful Hong Kong with good infrastructural support and a reasonable quality of life for its people. Such endeavour and accomplishment are fully reflected in the Chinese couplet hanging at the entrance of the then Ho Tung Workshop presented as follows:

水 火 金 木 五 穀 維 修
正 德 利 用 厚 生 為 和

In view of the rapid advance of science and technology and a knowledge-based economy, the reform and development of engineering education is an issue of international concern. The community needs qualified young engineers, who think critically and creatively, equipped with a broad spectrum of knowledge, and eager to blaze new trails and break new grounds. Commitment, competence in problem solving and the habit of independent learning are vitally important. We are confident that the Engineering Faculty will continue to nurture excellent engineers, engineering researchers and leaders for Hong Kong's future success.

Finally, I would like to present a Chinese couplet that I wrote to commemorate this happy occasion:

工 學 成 家 三 千 士 共 領 風 騷 長 為 香 江 創 業
程 門 立 雪 九 十 年 高 山 仰 止 更 教 闕 里 流 芳



Professor Leung Tin-pui
BSc(Eng), Mechanical Engineering, 1967
Vice President
The Hong Kong Polytechnic University

C.F. Lee: Engineering Hong Kong and Beyond

A primary objective of The University of Hong Kong, when it was founded in 1911, was to produce high-calibre graduates to serve the needs of Hong Kong and China. In the early decades of the last century, there were periods when people moved back and forth between Hong Kong and Mainland China. Some of our early graduates were among those who subsequently relocated to the Mainland, thereby contributing to the evolution and building of Modern China. The bulk of our engineering graduates, of course, remained here and dedicated their professional careers to the building of Hong Kong. Together, they laid the engineering foundation for her economic take-off and rapid urbanisation in the past several decades. Our numerous landmark infrastructure projects and buildings testify to their invaluable contributions to the evolution of modern-day Hong Kong.

Now, some 90 years later, as a new century begins to unfold, our engineering graduates are facing a fresh and yet somewhat familiar challenge. The Mainland, as we all know, is going through a rapid process of modernisation. The economies of Hong Kong and the Mainland are now more closely linked than ever. With China's entry into WTO and an increasing globalisation of our economic system, the engineering community is seeking the opportunity to deploy our talents and expertise on projects not just in Hong Kong, but also on the Mainland and in Southeast Asia. In fact, an increasing number of our engineering graduates are already engaged in such projects as industrial production in the Pearl River Delta, equipment supply and servicing across the country, hotel and office tower construction in Shanghai and Beijing, transport infrastructure and energy projects with overseas investments, etc. Hong Kong engineering practices and project management skills are increasingly used on projects on the Mainland and in Southeast Asia. To prepare our graduates properly for this emerging and expanding engineering market, we need to address corresponding skills in our curriculum design. As such, we should encourage our students and graduates to develop a good understanding of the cultural values and business practices in these markets. This can be accomplished through study tours and travelling, the acquisition of a more global vision and international outlook as well as a genuine interest in and sensitivity to other cultures and values. At The University of Hong Kong, together with our alumni, we shall endeavor to meet this important future challenge.

C.F. Lee

Professor C.F. Lee
BSc(Eng), Civil Engineering, 1968
Head of Department of Civil Engineering (1999-2001)
Pro-Vice-Chancellor (Research)

Anthony S.K. Wong

The choice of Electronics Engineering as my major in 1970 might have been a mistake, and quite a serious one at that, considering the far-reaching consequences it has brought to my life. It is not that I have learnt nothing. It is just that I have realised that, all the while in the real world, I have had to unlearn what I have learnt in classrooms and to start afresh literally every single day.

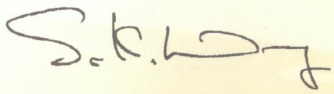
There always seems to be a conception that the Faculty of Engineering is the breeding ground for professionals who can readily secure lasting stability in terms of career development because the training that you get, people say, can be directly applied to your work. But the truth of the matter is, things like the vacuum tube or even the transistor simply vanish into naught almost in no time. And to think of those days when we launched those titanic projects using the grand central processing unit of our mother University for predicting transmitter coverage — that magnificent 64kB giant — while at this very moment, my son is complaining about the inefficiency of his laptop which bears a 128MB memory plus a 30GB hard disk.

It was a mistake. Which industry can be more unstable than this one of IT that boasts generation gaps of 3 to 6 months?

What appeared to be boring and stagnant engineering equations all of a sudden changed every face and manage every pace of our lives. People are no longer divided by physical boundaries, for in this brave new world of technology, communication has been made so easy that it has almost become a nuisance. From the first great wonders of the telex machine and the fax to the e-mail from which you simply cannot escape, to the road ahead where we can even talk to our beloved face to face over the once science-fictional 3G phone...we are almost lost in these wonder-filled shock waves of modern living.

The biggest irony perhaps lies in the fact that we thought we knew a lot when we finally marched out from the lecture halls and the labs, but were traumatised straight away at our limitations in mastering what man has created to change the world.

So indeed, there can never be stability in our dear old engineering field and there should never be. Just as the lyrics go: "Change is eternity..."



Mr. Anthony S. K. Wong
BSc(Eng), Electrical Engineering, 1971
Director - General of Telecommunications
Office of the Telecommunications Authority

Allan C.Y. Wong

There's an old saying... *"Find a job you love, and you'll never work a day in your life".*

I am a lucky man. I've been able to spend my entire life exploring my life-long fascination with electronics.

Many years before I entered the Faculty of Engineering, I spent endless hours of my youth learning and tinkering in my own homemade laboratory, dreaming of how I could one day make my mark in the field of electronics.

Naturally, as I got older, I dreamed more specifically of attending The University of Hong Kong's School of Engineering. Without doubt, it became one of the best decisions of my life.

I co-founded VTech Holdings Ltd. in 1976, only a few years after graduation. Over more than 24 years, we have stayed firmly focused on electronics technology. Today, we are one of the world's leading consumer-focused technology companies. We design, manufacture, market and sell telecommunication and electronic learning products. I am proud to say that VTech is now a global leader in electronic learning aids, and holds a dominant market share in high frequency cordless phones in the United States.

I recently had the pleasure of "tinkering" with the look and feel of our company, something the communication experts call corporate identity. It was a satisfying experience to discover that once the hours and hours of research and brainstorming had been completed, we summarised the *VTech* brand simply as *"Innovation Beyond Technology,"* supplying innovative consumer electronics products that perform beyond customer expectations.

That's really what I learned at the School of Engineering — *"Innovation Beyond Technology".* It was the place where my childhood fascinations blossomed into a deeper understanding of how technology can perform beyond our wildest expectations to enhance our lives. I've had the great pleasure to create a company where hundreds of the industry's best and brightest minds work together to launch more than 80 innovative and high quality products every year. We annually spend more than US$50.5 million in research and development in order to provide the best products to our customers.

I never lose sight of our needs – perhaps now that we are older, our obligations – to always create an environment that embraces this concept of lifelong learning. It is the greatest gift that The University of Hong Kong has given me, the one I am determined to pass on for the rest of my life.

Mr. Allan C. Y. Wong
BSc(Eng), Electrical Engineering, 1972
Chairman, VTech Holdings Ltd.

James Y.C. Kwan: Engineering a Gas Flame

Have you considered how much ingenious engineering goes into cooking a meal? When you light up your hob, are you aware of the engineers working strenuously to make your cooking so effortless and enjoyable?

After building my engineering foundation through working in the manufacturing industry for two years, I began my career in the gas industry in 1975. Here, I learned to apply fluid dynamics in analysing gas flow, and thermodynamics in the production and combustion of gas. I discovered how much engineering science goes into making these processes work in an efficient and effective way.

My early assignments involved the design and building of pipes to deliver gas from the production plant to the burners. The Company has an extensive gas network in Hong Kong, totalling 2,800 km and costing hundreds of millions of dollars. Aside from being conveyed a considerable distance before reaching the customer, the gas molecule has to go through five stages of pressure reduction, from the highest of 35 times that of the normal atmosphere. Each component within the gas network has to be carefully engineered and sized to ensure safety and reliability.

When I was appointed Chief Engineer of the Company in 1989, I became responsible for the expansion of production facilities. Gas production involves the break down of the liquid naphtha molecule. The catalytic reforming of naphtha and steam, followed by density and calorific value adjustment, finally produces Towngas. Every step is continuously monitored and controlled by a sophisticated computer system to ensure quality and efficiency.

My current responsibility is the marketing of the product. Selling gas can be greatly facilitated by expanding the range of applications. With engineering, we can make the simple gas burner function like magic. It can be programmed to automatically cook rice, to maintain boiling oil at a pre-selected temperature and steam fish for a pre-set time period. We engineer the appliance to enable perfect cooking at the simple touch of a button. Naturally, we also develop other applications that use the flame to heat water, dry clothes, or enhance indoor air quality.

All gas engineers in Hong Kong are working diligently to ensure gas is provided reliably and safely for use in the most efficient and effective way. Our high engineering standard has won worldwide recognition, and has led me to be elected the first overseas President of the Institution of Gas Engineers in the United Kingdom. It has placed the Hong Kong gas professionals firmly on the world map.

Ir. James Y.C. Kwan
BSc(Eng), Mechanical Engineering, 1973
Executive Director - Commercial
The Hong Kong and China Gas Co. Ltd.

Alex S.K. Chan: Sports and Career

Sports have always been part of our lives, particularly mine. During my undergraduate years in the late 70's, engineering students were ahead of their old rival "Medic" and the Engineering Faculty won the inter-faculty Omega Rose Bowl. I took pride as a Faculty squash team member and felt we were the best. Upon return to the University to pursue a PhD degree in the early 80's, I represented the University in the TIG squash competition. This time we were facing a much bigger challenge and I felt we were not as strong as we should be. In the early 90's, I had a different role as the manager of the Hong Kong squash team competing in the Southeast Asian Championship. The men's team came second and the women's team was crowned the champion. I said to myself that we were really something to be reckoned with.

There are lots of analogies I could draw between sports and career. As a student you are eager to learn like beginners in sports. After you graduated and started your career, you would probably feel as if you were ready to win the championship. Please note there is no easy route or "through train" to success. What you probably need is continuous coaching and training from your mentors and practice with your colleagues.

Gradually you develop your skills and emerge successful. You may find yourself competing with your colleagues in the company like different players competing for the leading role in a sports team. But remember, like most sports, teamwork is more important than individuals. When you go through difficult times and unsurmountable challenges, you may waver between quitting and staying. Always give yourself some time to evaluate what would be the best for you. Consult your mentors and seek their advice like a team or its members receiving the same from their coach. Leave or stay? Sometimes decisions are difficult and painful to make. But if you do not decide for yourself someone else may. So do take up your own control.

Perhaps, you are already a champion or on your way to become one. After winning the competition in the county, there will be the city, national, and ultimately international champion. During the process, there will be winners and losers. You have got to learn how to respond when you encounter failures before you climb to the top as champion. More importantly, you have got to know where to go when you are at the peak. Like all sports, one would not be able to stay at the top forever. Similarly, this applies to your career.

I am very fortunate in having had a very rewarding career in the engineering profession. A bit better than my squash! I am proud to have been involved in many infrastructure and development projects in Hong Kong, the mainland and overseas. Although I have not been given many trophies and awards, I consider that my fellow engineers and the profession have already done so. Now I am preparing myself to play the presidential role of the Hong Kong Institution of Engineers, I hope I would continue to receive the team support from each and every one of you.

Should you concur with my analogy between sports and career, pick up your gear, get yourself ready and show your skills and sportsmanship.

Ir. Dr. Alex S.K. Chan
BSc(Eng), Mechanical Engineering, 1977
Director
Applied Technology Integration Ltd.

Paul K.K. Mak

In the 1970s, Hong Kong's manufacturing and service industries were booming and employed almost a million people. There was a high demand for industrial engineers. I thus chose to major in Industrial Engineering (IE). Indeed, the professional training it gave me opened up abundant opportunities in both industries. Above all, it was the closeness between teachers and students that left me with a strong and sweet memory of my days in IE. Even now, vivid images of friendship between teachers and my fellow classmates can conjure up immediately the moment I think about IE. This friendship between teachers and students has been maintained years after my graduation.

Upon graduation, I started off as an Assistant Production Manager in a manufacturing company to look into the deployment of human resources and to ensure the efficiency and smooth flow along the production line. I benefited from my training in courses like Industrial Organisation and Management, Operations Research and Production Inventory and Control at this job. As an IE graduate, I saw that numerous career prospects lay ahead of me. My first job was a good source of practical training for my profession. As I had gained business connections and some hands-on experience in the industry, I reckoned that it was time to give it a go, to venture on to new possibilities.

Three years later, I went to the UK to pursue a full-time MBA programme to widen my horizons. My interest in business management originated in my learning during my first degree studies, which offered a broad perspective and wide variety of themes, management being one of them. I was also encouraged by friends and teachers of IE to go and explore more of my own potential and also more of life.

When I returned to Hong Kong, I landed a new job in a bank and became a credit analyst. In assessing loan proposals, my IE knowledge came into play when the clients were in manufacturing and other engineering or technology businesses. I am glad that I have made this decision that allowed me to move forward in my career.

I moved to the executive search business in 1986. Over the past 16 years, I have become very much engaged in senior executive appointment for my clients. I dare say that I know very well what employers look for in a senior executive.

Over the years, the IMSE curriculum at the HKU has evolved into a study of the system integration in the operation of business enterprises. It is an interesting engineering discipline in that it covers a wide range of topics in engineering and management, facilitating problem solving, innovation and communication. These are the fundamental qualities of a business leader. The study of IE during my university days helped me to understand clients' businesses as well as the requirements of their senior executives. It also provided me with a good foundation on which to develop a career.

The bond that I have developed with IE, now IMSE, has been one of the best friendships I've built throughout all these years. It is to be cherished. It improves and becomes mellower with age, just like old wine.

Ir. Paul K.K. Mak
BSc(Eng), Industrial Engineering, 1977
Director
Wilfred Chan Management Consultants Ltd.

Edmund Sung

It has been 26 years since I embarked on my study in the Industrial Engineering (IE) discipline at The University of Hong Kong. Back in 1975, the then IE Department, which was renamed as the Department of Industrial and Manufacturing Systems Engineering and is currently headed by Professor K. L. Mak, had only been established for two years as the 4th Department in the Faculty of Engineering. It was so new that no HKU IE graduates were yet available to serve the community. In other words, job opportunities and career paths were very uncertain for every student.

So why choose IE? I was convinced by the Department's recruitment campaign that the discipline would deal with a perfect integration of hard technology and soft interpersonal skills. I was further assured that I had made the right decision when Professor W. A. Reynolds, the founding head of the IE Department, taught us the "5 M" resources optimisation philosophy that became my life-long motto at work. The 5 Ms stand for Man, Machine, Materials, Money, and Management. IE is basically all about the integrated system of the 5 Ms.

In fact, my education engendered great impact on my 20 years of subsequent service with the current employer, the Hong Kong Productivity Council (HKPC).

Starting from an IE fresh graduate, later with post graduate qualifications in M.Sc. IE and Management, my 23-year career development path may be seen as quite an interesting individual case for IE career reference. I started as an Assistant Engineer and moved on to become Engineer, and Senior Engineer. Later on, my title changed through Assistant Consultant, Consultant, Senior Consultant, Principal Consultant, and progressed to Division Manager, General Manager, and my present role as a Branch Director.

Adding to the diversity in my job role was the wide spectrum of sectors that I had served with an IE background, evolving closely in synch with the economic development trend in Hong Kong over the last two decades all the way into the new millenium.

I was enthusiastic about my 1st career in the manufacturing industry. My initial career was clustered around electrical and electronics, toys and plastics, and metals and light engineering sectors. Having gained broad knowledge and experience from both local and multi-national corporations, I decided to move from the private sector engineer to the job of a semi-government consultant.

My subsequent role as a HKPC consultant to enhance the productivity and competitiveness for the Hong Kong industry was a turning point in my career. At the new job, I was able to fully utilise the IE principles to integrate people and technology with a system, be it hardware, software or management. The public mission to serve all sectors including manufacturing and service, with a major emphasis on small and medium-sized enterprises (SME), has created a good opportunity for me to enrich myself and enhance my job performance in an all-rounded manner. I really considered it both very challenging and rewarding. This could be reflected from the thousands of consultancy assignments directly handled by me throughout the past 20 years.

For one example, I had spearheaded the ISO 9000 consultancy and training services into Hong Kong since its inception in 1990. Under my leadership, over 30,000 people have been trained by HKPC and some 300 organisations have been successfully assisted by our consultancy teams in ISO 9000 certification. Among these certified organisations, most of them were first of its kind in their own sectors covering a wide range in manufacturing, construction, business and commerce, and even health care, education, government, and public utilities.

Another example was the Quality Tourism Service Scheme organised by the Hong Kong Tourism Board for the tourism industry in Hong Kong, which was developed and implemented by HKPC under my leadership. Two years into its existence, the scheme has granted its Quality Decal to over 3000 retail and restaurant outlets as a symbol of quality assurance and service excellence for tourists.

Lastly, but not the least, I consider the relationship network for engineering graduates like me the single most important success factor for a life-long career. That's why I am currently the President of the Institute of Industrial Engineers HK. The first time I realised the value of networking was through the Engineering Student Exchange Scheme between Hong Kong and Singapore during my undergraduate study. It has been snowballing ever since through the regional network such as Asian Productivity Organisations (APO) and APEC to International Benchmarking Network, as well as China Productivity Promotion Network to World Confederation of Productivity Science during my service with HKPC.

But most important of all, the Alumni Network of the Faculty is the one I treasure most. My congratulations and best wishes to the 90th anniversary of the Faculty of Engineering.

Mr. Edmund Sung
BSc(Eng), Industrial Engineering, 1978
Branch Director of Services and Business Branch
Hong Kong Productivity Council,
President, Institute of Industrial Engineers (HK) 2001-02,
Vice President, H.K.U. Engineering Alumni Association 2002-03

Yick Chi Ming, Frankie

Moving from manufacturing to public transport and then to telecommunications is a rather interesting career path for anyone. I have no idea what would be next, but one thing that I am pretty sure is the education that I have received in the Industrial and Manufacturing Systems Engineering Department (the then Industrial Engineering Department) of The University of Hong Kong has provided me with a solid foundation for my career development no matter what industry I am in.

The most important knowledge that I gained from the degree course is not the fundamental theories behind the technical know-how, but is rather how and when to apply the tools and techniques that I have learnt when they are needed. The ability to understand and analyse problems, and to devise cost effective solutions for them, is the most valuable asset that I have acquired during my university days. Of course, only knowledge from the books would not be sufficient for us to survive in this real world, interpersonal skills, communication techniques, leadership and negotiation skills, to name just a few, are equally important and these skills can only be acquired through active participation in various activities and the willingness to take responsibility to organise those functions while we enjoy our lives in the University. I was very active during my time in the university and I found that the various skills that I have developed are very useful indeed, and that they are even more useful, after more than 20 years since my graduation.

I benefited enormously from The University of Hong Kong as a whole, I therefore value very highly my time at the Industrial and Manufacturing Systems Engineering Department of the University.

Mr. Yick Chi Ming, Frankie
BSc(Eng), Industrial Engineering, 1979
Executive Assistant to Chairman (External Affairs)
The Wharf (Holdings) Limited

Chan Man Yee, Bethany

The CSIS Department was formerly known as Computer Studies and was associated with the Faculty of Science. In 1988 (nearly 13 years ago), the same year as I received my PhD, the Department joined the Faculty of Engineering to become its fifth department.

I remember the big philosophical debate at the time was whether computer science was an art, a science or an engineering discipline. It was convenient to assume that arts and sciences were disjoint and that engineering straddled the grey area in between. The argument to join the Engineering Faculty was thus reasoned: Computer Science, being a relatively new, "fuzzy" and evolving discipline seemed philosophically better suited to Engineering. Of course, other less philosophical reasons came into play, too.

That was the first time when I sat back to really consider the nature of what I had been learning and teaching - art, science or engineering? Someone once said: "Engineers think that equations approximate the real world. Physicists think that the real world approximates equations." I would add that: "Artists think that the real world should be viewed in abstraction. Computer scientists think that the real world should be viewed digitally."

... I'm quite happy that the CSIS Department has found a nurturing home within the Faculty of Engineering. At the very least, this move has given me the chance to participate in the Faculty's 90th anniversary celebrations and I look forward to participating in its 100th.

Bethany M.Y. Chan

Dr. Chan Mee Yee, Bethany
PhD 1988
Honorary Associate Professor
Department of Computer Science and Information Systems
The University of Hong Kong

Lau Man Kin, Vincent

Information Technology made the world going faster and faster. Currently a game console machine has a speed faster than a so-called super-computer in the old days, and even my mobile phone has more memory and processing power than my computer 10 years ago. Technology products are always getting outdated. Our skills acquired today would also become obsolete soon.

During the time I was studying in HKU, I took part in society activities, research assistance, different software competitions and writing hobby software, besides learning the core of computer technology. These helped me to become mature and provided me with the right attributes to face different situations. Starting from 1996, I took part in voluntary work in the Christian Pegasus Organization, and we successfully created I.T. Bus in 1998. In 2001, Pegasus opened an I.T. primary School and I was invited to become one of the directors. In the last 10 years, I have explored a great deal about commerce and society, which requires a multi-discipline skill-set and collaborative work. We are required to become a professional on demand, to survive in this challenging world.

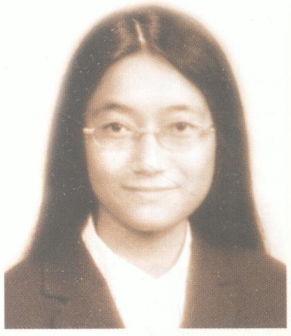
Building a career path for me was a hard but sweet process. My first job was in Chinese font development, which gave me a chance to work with Microsoft people. Then I formed my own company, and worked in my home as office. I developed Chinese and educational software for companies and institutions like TDC, China Travel Services, HKU, Polytechnic University and the HK Institute of Education. With the help of I.T. tools, I have managed to do publishing, artwork, design, programming, accounting, marketing and support at the same time. Driven by a great interest in Chinese input in computers, I developed Qcode in 1995 and later the Q9 Chinese input method together with a famous scriptwriter, Mark Leung. The products received the HK I.T. Excellence Award and Industry Award. It is a wonderful experience to see the homegrown company (Q9 Technology Holdings group) developing into a listed company in the Growth Enterprise Market of the Stock Exchange of Hong Kong. Our market is expanding from computers locally to most areas of handheld electronics globally. And I received an award as one of the Hong Kong's first Ten Outstanding Digi Youth Persons.

Without education and I.T., I would not have experienced so many aspects of life in the past. To face the future, I am now studying again and doing research at the University. "Living is a process to be learned, and learning is a process to be enjoyed".

劉文建

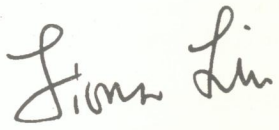
Mr. Vincent Lau Man Kin
BSc, Computer Science, 1992
Founder and Director
Q9 Technology Holdings Ltd.,
Director
Pegasus Philip Wong Kin Hang Christian Primary School

Liu Tze Kwan, Fiona



I would not call my three years in the university "honey-moon years" as some very smart students may. To me, studying Civil Engineering was challenging and tough! I had a lot of bitter experiences and yet, sweet memories! These memories are still very fresh to me. I remember how I nearly broke down and cried when a person like me, who had known nothing about computer programming before, had to write my very first FORTRAN programme; but I also remember the helping hands of my fellow classmates and the joy that I had when I finally got my programme running without any errors! I remember the frustration that my classmates and I felt when we got a three-centimetre error after an exhausted day of trial surveying exercise; but I also remember the satisfaction that we enjoyed when we managed to organise ourselves and helped each other to complete our task in the Surveying Camp! I remember how I had to go back to the wastewater laboratory at 7:00 am and to work till midnight for my Final Year Project; but I also remember the warm support that I received from my supervisor and everyone in the laboratory to accomplish the objectives of my project! I remember the effort that I put into my studies during these three years, how I looked up references in the library, how I struggled to do my assignments and how I stayed up late to complete my laboratory reports; but I also remember the smile that I put on my face all day when I learnt that I had passed all my examinations and obtained the prestigious title of "Graduate of the Faculty of Engineering of The University of Hong Kong!" ...

The biggest reward that I treasure most from these three years is the friendship that I built with my fellow classmates and the teaching staff. Without their support and encouragement, my university life would never have been so vivid and memorable...



Ms. Liu Tze Kwan, Fiona
BEng (CEEP) 1996
Engineer
Drainage Services Department, HKSAR

Wallace Lam

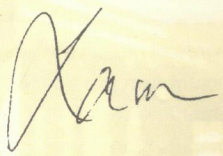
It is well known that studying in the Engineering Faculty does not hold the promise of an easy life. As a student in the Computer Science Department, I did not need "laboratory exercise". However, my life was no easier than those in other Departments. We had to fulfil numerous programming exercises on top of pursuing theoretical studies. Therefore, much of my time was devoted to various assignments. C++, graphics, network, operating systems ..... the list was endless and the work very tough.

However, after graduation, I came to realise how much I had benefited from the curriculum. My working field is not directly related to the topics that I learned in the undergraduate course, but my problem solving skills and learning skills helped me a lot. As one of my previous lecturers said, in the university studies, we "learn how to learn".

On the other hand, University life was more than studying and assignments. I had participated in the formation of student organisation of the Computer Science Department, the 3C Committee. In 1995, we, Computer Science students, wanted to form a Department Society for ourselves affiliated to the Engineering Society, forming a structure similar to the student organisations of Social Sciences. Because of the technical difficulties, the proposed structure was not formally built, but the organisation was launched anyway. Modelled after us, students of other departments started to form their student organisations. In fact, I am proud of participating in 'creating' or contributing to the history of the Faculty!

Graduation was not the end of my relationship with the Department. I was still involved in Faculty activities by way of the Alumni Association. I am currently the executive committee member of the HKU Computer Science Alumni Association. In addition to working closely with the Computer Science Department, I am also involved in the Engineering Department activities. For example, there was a career talk co-organised by the Engineering Alumni Association and CS Alumni Association for students of the Engineering Faculty. Several speakers gave career advice and shared their experiences with the students.

Engineering graduates are valuable assets of the Faculty, and the various alumni associations are the ties that link them up. The alumni bodies of the Faculty are still under growth, needing more support from the graduates. However, I believe that the alumni bodies can grow stronger, benefiting graduates, students and the Faculty.



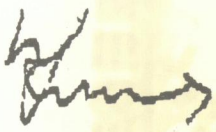
Mr. Wallace Lam
BSc, Computer Science, 1997

Vincent W.S. Leung: "Let There be Engineers — "

The transformation of Hong Kong into its present form from its rural past has been achieved with the service of professionals, among whom engineers played an indispensable role. During the first 60 years of the transformation, all the engineers in Hong Kong were expatriates, imported primarily from the U.K. The authorities in Hong Kong at the beginning of the 20th century decided that: "Let there be engineers - made in Hong Kong." As a result, The University of Hong Kong with its Engineering Faculty was born and we are celebrating its 90th anniversary this year. In the 1950's, future needs for locally produced engineers were in doubt. It was thought that with the birth of new China, engineers would be produced in China in large numbers for the country's industrialisation and it would be cheaper for Hong Kong to acquire engineers from China. That did not come to pass.

By the time I joined the University in 1960, the engineering department head and faculty dean was Prof. S. Mackey who had already "annexed" the Faculty of Architecture and formed the new Faculty of Engineering and Architecture. In 1961, the three traditional engineering academic disciplines namely civil, mechanical and electrical engineering were set up as separate teaching departments with a professor, Prof. Mackey himself, heading the Civil Engineering Department, a reader, Mr. W. Smith, heading the Mechanical Engineering Department and another reader, Dr. S.Y. King, heading the Electrical Engineering Department. By 1964, the number of engineering students doubled the 1960 figure of 20 to 40. However, 70% of the students were in civil engineering as jobs were readily available for them in the Public Works Department at the time. Prof. Mackey, who was a towering figure in the faculty, was re-elected dean three times. He is remembered for setting up the three "traditional" engineering departments and for being instrumental in establishing the Computer Centre, having secured a donation to purchase an IBM 1620 computer for the new centre. With the professor of architecture, Prof. W. G. Gregory, as dean for the three years from 1967, the progress of engineering education continued and the total number of engineering graduates rose to 108 in 1970.

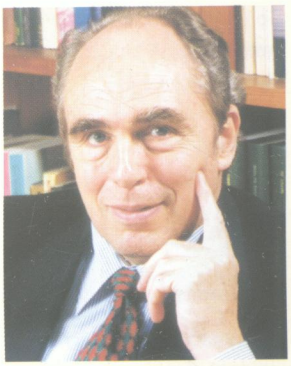
Prof. C. Gurney of mechanical engineering, who became the next dean, was very much a scholar, a philosopher and a poet. Throughout the 1960's and 1970's, manufacturing industries were booming in Hong Kong, supplying textile goods, plastics, toys, wigs, watches, radios, ceiling fans, etc. to the world markets. As there was an acute shortage of production engineers in these industries the community was clamouring for the establishment of an Industrial Engineering Department in the University. Being a theoretician and mathematician, Prof. Gurney was not keen in seeing an industrially-oriented degree course such as industrial engineering in the University and even less keen in taking the lead to establish such a department in his role as dean. Consequently, he resigned from the deanship that was passed on to me. Understandably, my election as the first local non-professorial dean became for a time the topic of conversation in the University. I played my part in establishing the Department of Industrial Engineering during my tenure as dean. At the time, since industrial engineering was still in its infancy as a university degree course in the advanced countries, there were very few well-qualified academics in this new field. The University had to be content with the appointment of a senior lecturer, Mr. A. Reynolds, to head the new department. In the meantime, the use of computers was getting more popular. As dean I secured a donation from the Hung On To Memorial Fund to set up the first computer laboratory in the faculty with a medium-sized mainframe PDP11 computer system. Meanwhile, the marriage of convenience between engineering and architecture finally broke down and my successor, Prof. Y. K. Cheung, was retitled as the Dean of Engineering in 1978. Within the limited space of this article, I thought I would cover the period during which most of the present academic staff had not yet joined the University.



Professor Vincent W. S. Leung, J.P.
Emeritus Professor
Dean of Engineering (1989-1992)
Head of the Department of
Electrical and Electronic Engineering (1980-1994)

B.J. Duggan: Past Times - A Personal Memoir

(with apologies to all the people I should have mentioned, but failed to do so)



I arrived in Hong Kong in September 1977 with my wife and four children who were met at Kai Tak by a young lecturer called Tom Ruxton. He took us to our flat in Scenic Villas (Tom is now a past President of the Institute of Marine Engineers). Through the wall of our lounge were other new arrivals, Professor Y. K. Cheung, his wife Bao and their three children. These three, we soon learned, were great table tennis players even though we never saw them play. The evidence came from the fact that we shared a wall against which they practised their forehand and backhand smashes! We all became very good friends. The Governor was Lord Maclehose, a tall, imperious man who did great things in his time for he was responsible for the development of the New Territories, setting up the ICAC and the early Sino-British negotiations. I have some very vivid memories of our time here. Vincent Leung was coming to the end of his first period as Dean; the four departments of Mechanical, Civil, Electrical and Industrial Engineering were scattered along Pokfulam Road in the Redmond (now Yam Pak) and Duncan Sloss buildings; the Peel Laboratory with the Ho Tung Workshop a hot, small place full of friendly people. The Faculty was much smaller, but, even in those days, the Mechanical Engineering Department had very lively argumentative people like Norman Ko, C. L. Chow and Joe Clarke as well as others who made Faculty Board meetings sometimes very exciting. Ted Bruges was Head of Mechanical and he was active in public service and I will mention only one aspect of this, his work on Gas Water Heaters. In the late 70s we had a number of deaths of young people during some cold winters and the cause was a particular design of hot water heaters used in bathrooms. Ted undertook to make these designs illegal and was involved in some high profile court cases, and with the help of a diligent coroner, succeeded in changing government rules. He was very proud of this, since it was his testimony in open court that won the battle.

Typhoons were bigger in the old days! The 1979 visit of Hope produced such chaos that our building in Scenic Villas turned green from grass sticking to the concrete on the side the wind came from. It is one of the wonders of nature to stand in the eye of a storm, to see bright sky immediately above and yet be surrounded by vast swirling clouds and to experience horizontal rain. I think Stanley was cut off for four days by landslips. In the 1983 typhoon, the "10" was hoisted, much damage done and all roads from Central blocked so that people had to walk home. My memory is of walking from shopping at Chi Fu after the signals were lowered and as we reached the brow of the hill to see before us hundreds of people walking both lanes of Pokfulam Road towards us on their way home to Chi Fu and Aberdeen in the half light because no streets lights were working.

In the late 70s and well into 80s we were the only University to have an Engineering Faculty and our students were extremely clever. If a student could not get into Medicine or Law, he (almost invariably a male) would pick engineering as a second choice. So even second choice students were brilliant! This made a tremendous difference to teaching and examining. I remember setting papers based on the Cambridge Engineering Science Tripos in the forlorn hope of finding something they could not do. But if you think that Faculty Boards of Examiners were shorter in those days, I can assure you that they were not. We spent all of the available time arguing over the few failures and what we should do with them, which proves that BoEs expand to fill the time allocated to them, independent of the number of problem students being considered. In the early 80s we occupied the Haking Wong Building and we were proud of it. The institution of a common room for all departments to share was a great innovation and many staff got to know each other for the first time because of this facility. Personally I am rather saddened by the fact that this room seems to be less frequently used by our newer staff members but I suppose the pressures on time are now greater now than they were in the 1980s.

My most vivid memory of the 80s is of the events surrounding the Tiananmen incident in 1989. On the Wednesday after the incident a gathering was held on the Haking Wong Podium led by the VC, Professor Wang Gung-wu. Many staff spoke, in Putonghua, Cantonese and English, and a great deal of tears were shed. At the end of the meeting we dispersed and went back to our duties. I had been advised to wear black and white. The bus stop in those days was at the foot of the Haking Wong Building and it was normal for the assembled crowd to rush forward to get on the bus, queues being unknown at that time. I joined the crowd, and when a bus came I moved forward, not in a rush, but there was no need anyway, because no one got on the bus until I did. A passenger told me that a "gweilo" showing respect to those who had obviously died should be rightly given the extraordinary privilege of boarding the bus before anyone else. Memories are what is left over after the sieve of time has allowed all the small and trivial events of life to fall away. That day is one that sticks in the memory.

Professor B. J. Duggan
Head of the Department of Mechanical Engineering (2000-2002)

Otto Poon: Engineer and the Environment

Since time immemorial, the human race has been trying to have more knowledge, more security in life, and a higher standard of living. In pursuit of these, scientists discover and engineers implement.

During the past several of centuries, engineers have been instrumental in designing and manufacturing a host of products, equipment and plants, constructing infrastructures and building many homes for the comfort and convenience of people. In the process, they consumed resources, destroyed habitats and generated pollution.

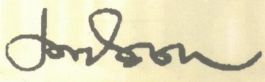
In recent decades, people are awakened to the facts that many chemicals are hurting the eco-system, burning fossil fuel causes global warming, mining minerals often produces harmful residuals, and many industrial processes are producing pollutants. Even though engineers have come up with ingenious and more resource-efficient ways to manufacture, construct and operate; yet the global environment continues to deteriorate. The problems and their causes are very well defined and solutions are within reach of the present day available technology. Do the ongoing and worsening problems have to be beyond science and technology?

The conventional wisdom is that gross domestic product (GDP) is the generally accepted way to measure progress and standard of living, rather than the reverse where the quality of life is used to judge the well being of the people. Both of these economical theories encourage indiscriminate consumption without internalising the environmental costs. With global warming, deforestation and a host of other ecological and environmental problems, it has been proven beyond reasonable doubts that economical development leveraged heavily on consumption is unsustainable.

In spite of the fact that the relationship between cause (consumption) and effect (environmental impacts) is well known, the world fails to recognise this relationship socially and economically. Values are greatly distorted. In order not to tip the balance of nature, there is an urgent need to rethink about the merits of the accepted economical fundamentals, realign the existing institutional framework, and restructure the regulatory regime for resources and consumption.

In the years to come, engineers have to be more caring so that when they produce, build and operate, embedded energy of the materials used and life cycle costs are taken into consideration to minimise the environmental footprint.

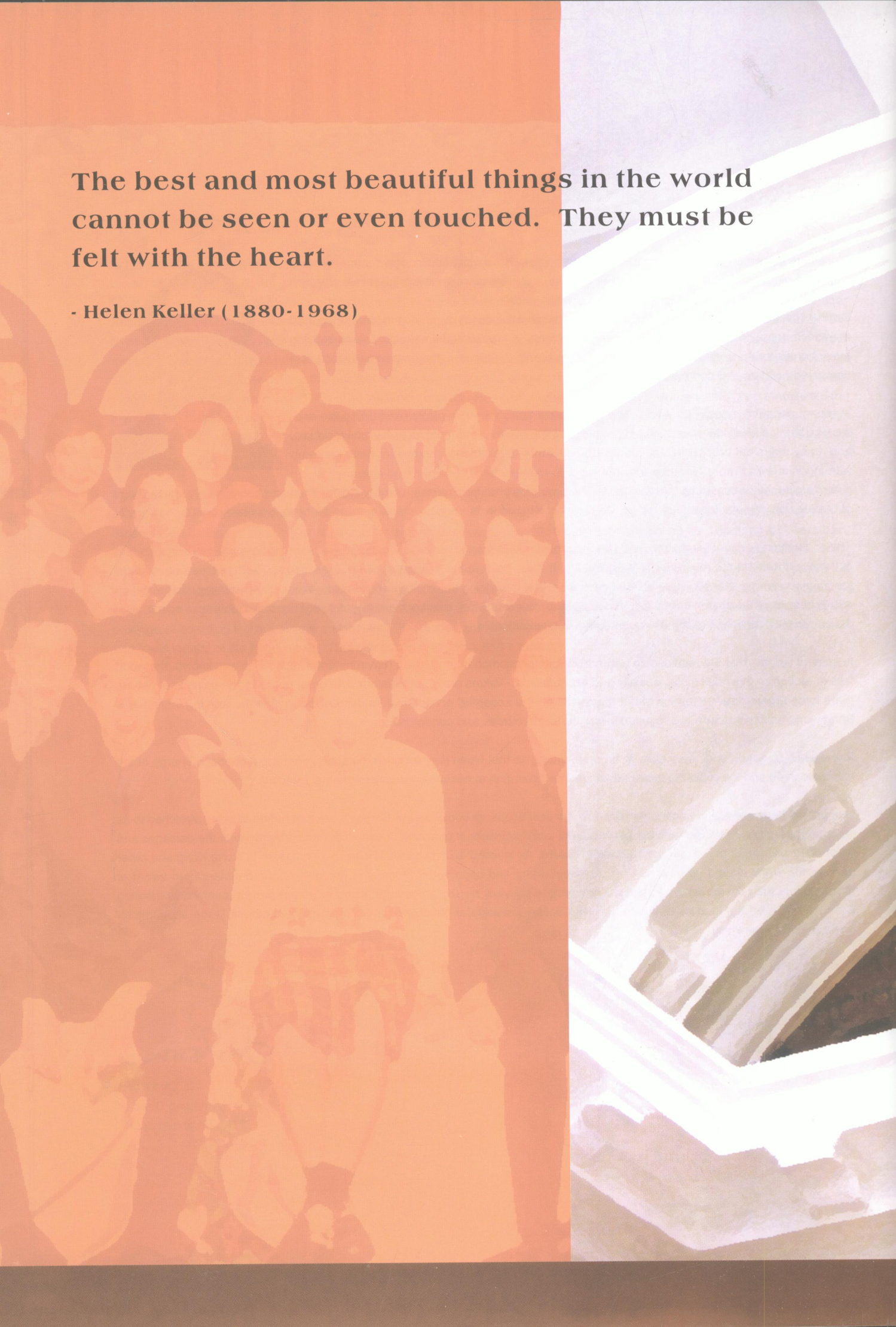
Humankind has been trying to conquer nature in the past couple of centuries but the signs are that nature is being stretched to its limits and is fighting back. Perhaps people in general and engineers in particular should in the future try to repair the damages and learn once and for all to live harmoniously with nature. As learned and responsible citizens, engineers in Hong Kong and other parts of the world should go beyond their technical arena and become more vocal in recognising the double-edged sword of progress and their stewardship of nature. Engineers in my view should go beyond giving only their professional views but also exert influence on the leaders of the community, politicians and the government for fundamental changes in the economical-environment framework.



Ir. Otto Poon
Managing Director
ATAL Engineering Ltd.

The best and most beautiful things in the world cannot be seen or even touched. They must be felt with the heart.

- Helen Keller (1880-1968)



CELEBRATION ACTIVITIES

CELEBRATION ACTIVITIES

The years from 2000 to 2002 were eventful ones for the Faculty of Engineering. A number of exciting activities have illuminated celebrations of the Faculty's 90th anniversary, including the symposium "Engineering and You" held from November 30 to December 1, 2001 and the Reunion Dinner on November 30, 2001. Other scholarly activities held in the same period in the forms of lecture, conference, seminar, and contest involved internationally renowned academics and practitioners. The Faculty also launched three initiatives focusing on student participation: the Graduate Mentor Scheme, Speaking Programme for Secondary Schools and Engineering Summer Camp.

90th Anniversary Symposium – " Engineering and You"

Ribbon-cutting at the Opening Ceremony

The Faculty of Engineering's 90th anniversary celebrations culminated in a two-day symposium entitled "Engineering and You". The symposium organising committee was honoured to have Sir S.Y. Chung, former Executive Councillor and a distinguished alumnus of the Faculty, and Dr. Victor Fung, Council Chairman, to officiate the opening ceremony.

In his keynote at the symposium, Sir S.Y. Chung emphasised the urgency of adaptation for Hong Kong universities in the face of rapidly changing community environment and needs. He said that The University of Hong Kong, being the eldest of all its counterparts in the territory, should take a leading role in this important exercise.

Addressing the audience, Dr. Fung said that the Faculty of Engineering has grown and developed with Hong Kong and at the same time contributed significantly to the building of Hong Kong, its infrastructure, industry and economy.

Following a ribbon-cutting ceremony, Professor J.H.W. Lee, Dean of Engineering, declared the Symposium open. A total of 11 speakers, who were internationally renowned academics, outstanding local engineers and distinguished alumni, delivered Distinguished Lectures on a variety of topics. They were:

Distinguished lecture by Professor Lu Yong Xiang

- **Professor Lu Yong Xiang**, President of the Chinese Academy of Sciences, on "Technology Innovation: The Last 100 Years and The Future"
- **Professor Benjamin W. Wah**, President of IEEE Computer Society, University of Illinois-Urbana Champaign, on "The Future of Multimedia in the Internet"
- **Professor Teck-seng Low**, Chairman of the Advisory Board of Data Storage Institute of Singapore, National University of Singapore, on "Nanostructures, Petabytes – Data Storage"

Toasting at the Symposium Lunch

- **Professor P. Ole Fanger**, President of International Academy of Indoor Air Sciences, Technical University of Denmark, on "Air-Conditioning in the 21st Century: Impact on Human Productivity, Health and Comfort"
- **Professor D. Roger J. Owen**, Council Member of International Association for Computational Mechanics, University of Wales, Swansea, on "Finite Elements and Engineers - A Historical Perspective"
- **Professor Jin Wu**, Former Minister of Education, Taiwan and Professor of National Cheng Kung University, on "Engineering Education in the New Millennium"
- **Dr. Ir. The Hon. Raymond C.T. Ho**, Legislative Councillor of the Engineering Constituency, on "The Engineering Profession – Innovative Force for Progress"
- **Professor Norman W.M. Ko**, Former Head of the Department of Mechanical Engineering, The University of Hong Kong, on "Interaction of Art and Engineering! Then What?!"
- **Ir. Kwong Hon-sang**, former Secretary for Works, on "40 Years of Engineering Experience and Beyond"
- **Professor Ronald M.C. So**, Head of the Department of Mechanical Engineering, Hong Kong Polytechnic University, on "Creativity in Engineering and A Possible Approach to Teach It"
- **Professor Yiu-wing Mai**, Head of the Department of Manufacturing Engineering and Engineering Management, City University of Hong Kong, on "Complexity and Commonality of Fracture Behaviours of Engineering Materials"

The symposium also featured a forum on engineering education. The discussion panel was chaired by Professor Y. K. Cheung, Member of the Chinese Academy of Sciences, and participated by Professor Jin Wu, Professor Simon S.W. Wong, CEO of The Hong Kong Applied Science and Technology Research Institute Co. Ltd., Dr. P. Y. S. Cheung, Senior Vice President (Technology) of Pacific Century CyberWorks and Dr. T. L. Ng, Managing Director, Energizer Co. Inc. and the Deputy Chairman of Vocational Training Council. At the forum, panellists and the floor exchanged views and ideas concerning the current tertiary education system in Hong Kong, student quality, problems encountered by graduates and the international trends toward future engineering education.

Ir. Lee Shing-see, Secretary for Works, and Ir. Edmund Leung, Chairman of Hyder Consulting Limited, are distinguished and active alumni of the Faculty. They joined symposium participants at luncheons and shared their thoughts on future infrastructure developments and their sweet memories as students in the Faculty.

The Symposium ended with an inaugural lecture, "From a Grain of Sand to the Service of Man – An Engineer's Journey," by Professor E. S. Yang, Director of The Jockey Club MRI Engineering Centre, The University of Hong Kong. Professor J. H. W. Lee, Dean of Engineering, closed the Symposium with a note of thanks to all parties who had played a part to make the Symposium a success.

The full text of lectures and speeches of the Symposium and Dinner can be found in Appendices A and B.

The great Reunion Dinner

Reunion Dinner for alumni and friends of the Faculty

Over the past 90 years, the Faculty of Engineering has generated more than 14,000 alumni, many of whom have become leaders in various walks of life. At the Reunion Dinner, 360 alumni and friends of the Faculty reviewed the achievements of the Faculty and reminisced over the good old days in the Faculty. The Dinner, held in the Conrad International Hotel on November 30, 2001, provided a rare and happy occasion for nostalgia and celebration.

A welcoming speech by Professor J.H.W. Lee, Dean of Engineering, kicked off the dinner. Ir. H.K. Cheng was the guest-of-honour of this special occasion. Together, Ir. Cheng,

Professor W. I. R. Davies, Vice Chancellor, and Professor Lee cut a cake in a ceremony to symbolise another milestone in the Faculty's development. Professor W. S. Leung, Emeritus Professor in Electrical Engineering of the University and former Dean of Engineering, delivered a captivating and humorous speech entitled "Those were the days" on the history of the University and the Faculty, retelling some well-known anecdotes as well as revealing some hitherto unknown stories of key figures of this Faculty and the University. A newspaper supplement and a publication entitled *Engineering at HKU: 90 Years of Dedication* were published to commemorate the Faculty's 90th anniversary. They contain articles, facts and figures about the Faculty's developments, achievements and contributions to the community over its 90 years of history.

In this unforgettable evening, engineering students and members of the HKU Engineering Alumni Association entertained guests with a show full of marvellous performances.

Faculty Distinguished Lectures / Special Seminars

Engineering is pervasive in every aspect of human life. To promote academic interflow in the discipline, the Faculty of Engineering has organised a series of distinguished lectures and special seminars in different areas.

The first Distinguished Lecture in the series was delivered by Professor Gerard Huet, Director of The French National Institute for Research in Computer Science and Automatic Control (INRIA) Rocquencourt, on May 31, 2001. He shared his research experiences at INRIA on the formalisation of programming, the tools developed and their application to the certification of safety-critical software.

On June 15, 2001, Professor Tony M. Ridley, Emeritus Professor of Transport Engineering of Imperial College, UK, delivered a Distinguished Lecture on "The Globalisation of Urban Transport". Professor Ridley discussed in his lecture the effect of competition among cities, environmental concerns, increasing communication between professionals and the growth of benchmarking on the development of urban transport policies around the world.

To introduce a new initiative in the area of educational technology, Professor Dick K. P. Yue of Massachusetts Institute of Technology (MIT), gave a special seminar on "The MIT Open Course Ware (OCW) Project" on January 7, 2002. With this new system, non-commercial users are allowed free access to the MIT course materials from the World Wide Web.

Professor Guus Stelling, Chair Professor of Fluid Mechanics at Delft University of Technology, Netherlands, spoke on "The Modelling of Environmental Flows" on February 7, 2002. In his presentation, Professor Stelling addressed the issue of how such modelling can lead to a better understanding of the natural system and can be used as a design tool for man-made constructions, analysis of water management policies and operational system.

Professor Dick K.P. Yue exchanging views on engineering education

On May 6, 2002, Professor Sinclair Goodlad conducted a seminar on "Enrichment of Technical Education at the Imperial College of Science, Technology & Medicine, University of London". In the seminar, Professor Goodlad discussed the rationale for activities designed to enrich the study experience of engineering, medicine and science students at the Imperial College.

To highlight the Faculty's development in the area of Medical Engineering, a special seminar and a distinguished lecture in bioengineering were held. The former was delivered by Professor Edmund Y.S. Chao on April 4, 2002, on the topic of "The Bioengineers Role in Limb Salvage – The Application of Tissue/Organ Engineering Principles". The distinguished lecture was given by Professor Albert I. King on May 24, 2002, on "Challenges in Bioengineering – Unresolved Issues".

William Mong Distinguished Lectures promote academic exchange

Professor R.V. Thompson receiving a souvenir from the Dean

The William M. W. Mong Engineering Research Fund was set up in 1991 with the generous donation from Dr. William M. W. Mong. Every year the Committee of Management of this research fund selects international speakers to deliver distinguished lectures. Typical topics of the distinguished lectures are of great impact and relevance to Hong Kong. In celebration of the 90th anniversary of the Faculty, seven William Mong Distinguished Lectures were held in 2001-2002. Speakers and topics of the lectures are as follows:

- **Professor A. Paulraj**, Stanford University, on "Smart Antennas for Broadband Wireless Communications"
- **Professor Robert W. Brodersen**, University of California at Berkeley, on "Wireless Systems on-a-Chip Design"
- **Professor K. C. Hwang**, Tsinghua University, on "Recent Advances on Strain Gradient Plasticity"
- **Professor R. V. Thompson**, University of Newcastle upon Tyne, on "The Supersonic Boundary Layer and Its Application"
- **Professor Vincent Chan**, Massachusetts Institute of Technology, on "Optical Networks"
- **Professor Yale Patt**, University of Texas at Austin, on "Higher and Higher Performance Microprocessors: There is still plenty we can do"
- **Professor H. Kimura**, The University of Tokyo, on "Information Technology as an Ultimate Tool for Control"

The lectures, which were open to public, attracted many students and interested individuals who attained new knowledge in the rapidly developing fields.

Symposium on Advanced MRI Applications: Non-proton MRI, Neuro MRI and MR Spectroscopic Imaging

In view of the rapid development in the area of medical engineering, The Jockey Club MRI Engineering Centre organised a Symposium on Advanced MRI Applications on May 14, 2001. The objective of the Symposium was to promote research and development of MRI by fostering interdisciplinary exchange of ideas among medical and engineering professionals. Distinguished guest speakers included Professor Fernando E. Boada, Professor A. Gregory Sorensen and Professor Michael W. Weiner, who presented their research findings in their respective areas of specialties in the Symposium.

Workshop on Geometric Computing

The Workshop on Geometric Computing was organised by the Department of Computer Science and Information Systems from June 27 to 29, 2001. The Workshop featured four lectures delivered by leading international experts on recent advances in geometric computing. There were also a number of invited talks by active researchers from Austria, Mainland China, Hong Kong, Japan, Korea, Singapore and the United States. This Workshop provided an ideal opportunity for researchers to enhance academic exchange and exposure to the frontier of research in geometric computing.

IFAC Conference on New Technologies for Computer Control 2001 (NTCC 2001)

The IFAC Conference on New Technologies for Computer Control 2001, held from November 19 to 22, 2001 at the Sheraton Hotel, was organised by the Control, Automation and Instrumentation Division of the Hong Kong Institution of Engineers and was sponsored by the Department of Mechanical Engineering of The University of Hong Kong and the Department of Building and Construction of City University of Hong Kong.

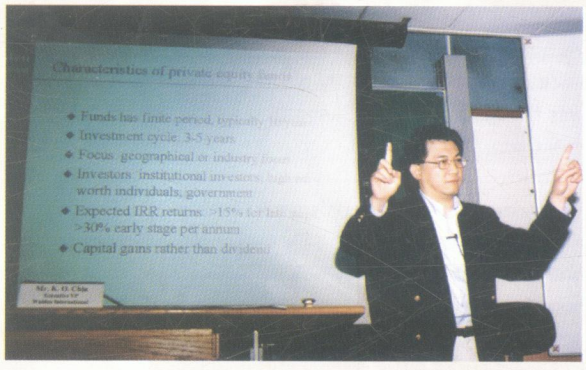
The main aim of the Conference was to work out a road map for computer control in the 21st century in light of developments in new technologies such as networking of computers, ever-increasing computer power, mechatronics and intelligent sensors that were of revolutionary proportions in computer control. More than 100 participants from over 30 countries attended the Conference to cross-fertilise their ideas and experiences.

Hong Kong-Mainland China Geotechnical Lecture Series

The Jockey Club Research and Information Centre for Landslip Prevention and Land Development of the Department of Civil Engineering was set up in 1998, to conduct formal investigations into the slopes in Hong Kong and to design preventive measures for landslides.

The Centre organised a Hong Kong-Mainland China Geotechnical Lecture Series from May 2001 to January 2002. The six lectures were geared to promote the exchange of professional information and experience between Hong Kong and Mainland China in the areas of geotechnical engineering and natural hazard prevention.

Practical Entrepreneurship Lecture Series



Renowned entrepreneurs sharing their practical experience

The Department of Electrical and Electronic Engineering organised the Practical Entrepreneurship Lecture Series from March to May 2001. It was designed for students contemplating an entrepreneurship venture. The lecture series infused participants with ideas and practical guidance on how to succeed in business. A series of nine lectures covered a wide range of topics and were delivered by renowned entrepreneurs, incubators and venture capitalists.

The lectures provided a rare opportunity for students to interact with experienced real-life practitioners. The students not only gained practical advice but also an earful of success stories in the business world.

Special Seminars by the Department of Computer Science and Information Systems

In the academic year 2001-2002, the Department of Computer Science and Information Systems had organised five special seminars delivered by internationally renowned academics and industrialists. The seminars gave students a broad exposure to the ever-changing Cyber World.

The Third International Conference on "Soft Soil Engineering"

Professor C.F. Lee addressing the conference

The Third International Conference on "Soft Soil Engineering" was jointly hosted by the Department of Civil Engineering, The University of Hong Kong, the Hong Kong Polytechnic University and the Hong Kong University of Science and Technology from December 6 to 8, 2001 in the Wang Guangwu Lecture Hall, The University of Hong Kong. The Conference was first held in 1993 in Guangzhou, China and subsequently in Nanjing, China in 1996.

The theme of this year's conference was "Soft Soil Engineering – Challenges and Solutions". Excessive settlements of ground and foundations on soft/weak soils, damages caused and potential instability have been a major concern of civil engineers around the world. The objective of the Conference was to provide a forum for engineers and researchers to share new ideas, achievements and experiences on the solutions.

The Fourteenth Southeast Asian Geotechnical Conference

As the environments in which the geotechnical professionals have to work are becoming much more diverse, the provision of quality services and application of geotechnical expertise to meet social, economic and environmental needs has become a major challenge in coming decades. To address this issue, the Fourteenth Southeast Asian Geotechnical Conference, organised by the Department of Civil Engineering, was held from December 10 to 14, 2001, in the Wang Guangwu Lecture Hall, Graduate House, The University of Hong Kong. The Conference provided an opportunity for geotechnical engineers from different parts of the world to share among themselves their experiences and technical know-how on tackling problems.

Inter-University Invitational Civil Engineering Competition

The Department of Civil Engineering organised the Inter-University Invitational Civil Engineering Competition from January 22 to 27, 2002. A total of 40 undergraduates from Tsinghua University, Tongji University, National University of Singapore, National Taiwan University and the University of Macau, joined the competition.

Competition participants were divided into 15 teams and took part in structural model fabrication and testing as well as projects on environmental and transport engineering. Students were required to produce a Millennium Tower model for load testing. The competition has fulfilled its objective in developing friendship and cultivating a better understanding among civil engineering students with different cultures and from different regions in Asia. Through this competition, closer ties and improved relationships were established among the civil engineering departments of the participating universities.

Winning team with their big work

Initiatives on Teaching and Learning

Graduate Mentor Scheme fosters whole-person development of students

In order to facilitate communication and sharing between engineering students and alumni, the HKU Engineering Alumni Association launched a Graduate Mentor Scheme for final-year undergraduates on February 24, 2001. The idea is to pair students with experienced Engineering alumni who will guide their assigned mentees on virtually all aspects of higher education academic or career. As at June 1, 2002, 26 mentors and 43 mentees participated in the scheme.

Mentors and the Mentees

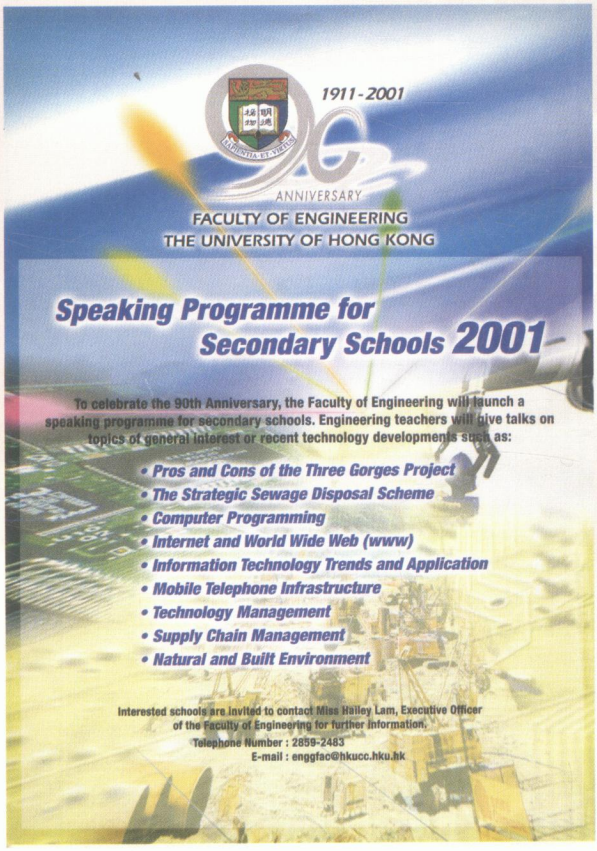
Addressing the launching ceremony of the scheme, Professor J. H. W. Lee, Dean of Engineering, said that the scheme provided a most valuable opportunity for non-academic exchange. Students could learn about the interaction of engineering and life through their mentors, who were recognised leaders in the engineering profession and shared their stories of past failure and successes. The mentors provided their mentees not only with advice on professionally related matters, but also their cumulative wisdom.

The Mentor-Mentee relationship continues after the mentees' graduation. It is common that the mentors and mentees become good personal friends.

Speaking Programme for Secondary Schools promotes understanding of engineering

In order to heighten secondary school students' interests in the engineering discipline, the Faculty of Engineering started a "Speaking Programme for Secondary Schools" in March 2001. Engineering teachers in specialised areas gave talks on topics of general interest or recent technology developments to students, such as *Pros and Cons of the Three Gorges Project, Information Technology Trends and Applications, Supply Chain Management and Computational Biology.*

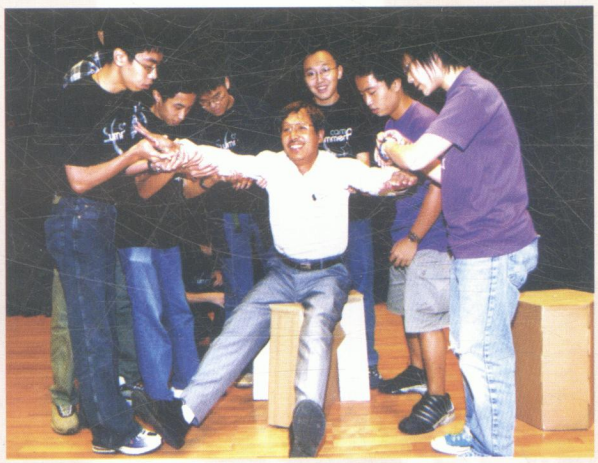
As of May 31, 2002, six schools had joined the programme and eleven talks held. Students who attended the talks found them intellectually stimulating. Through the talks, secondary school students can have a better understanding of engineering and its prevalence in every day life.



Topics of the Speaking Programme

Engineering Summer Camp

The Faculty organized the first Engineering Summer Camp for F.6 students from July 25 to 28, 2002 with the support of the Engineering Society. Over 90 secondary school students participated in the camp to have a better understanding of engineering and engineering education in the University. Participants had an enjoyable time experiencing hall life in the University, working in the laboratories, solving engineering problems and meeting students, teachers and alumni.



Testing on Cardboard Chair project

Calendar of Events

February 2001	24th	Graduate Mentor Scheme launched by the HKU Engineering Alumni Association
March 2001	1st	Launching of Speaking Programme for Secondary Schools
	6th	Practical Entrepreneurship Lecture – "Entrepreneurship: Mythunderstandings and Magic" by Dr. Joseph Champagne, Founder/ Chairman of Techmark Asia Ltd.
	13th	Practical Entrepreneurship Lecture – "A Hong Kong Entrepreneur's Story" by Mr. James Thompson, Founder / Chairman of Crown Worldwide Group
	20th	Practical Entrepreneurship Lecture – "Getting Started and Growing as an Entrepreneur: Ideas, Hard Work, Money, Intelligence, Experience, Reputation, Persistence, Success, Failure, and the Importance of Luck" by Mr. Rob Glucksman, Founder / CEO of Panda Premiums Ltd.
	27th	Practical Entrepreneurship Lecture – "Myths & Realities of Venture Capital: Type of Venture Capital Funds; How Venture Capitalists Evaluate Projects; What You Should Expect From Your Investors Beyond Money" by Mr. K.O. Chia, Executive Vice President of Walden International Hong Kong
April 2001	3rd	Practical Entrepreneurship Lecture – "The A-Z Guide of Asia's Best Kept Secrets to Successful Entrepreneurship" by Mr. Phil Kelly, Founder / Chairman of NetCel360 Ltd.
	10th	Practical Entrepreneurship Lecture – "Sa Sa International – Legend and Vision" by Mr. Simon Kwok, Founder / Chairman of Sa Sa International Holdings Ltd.
	17th	Practical Entrepreneurship Lecture – "Three Key Factors in Building A New Business" by Ms. Camille Tang Yeh, Executive Director of Harvard Business School Asia Pacific Research
Mid April 2001		Issue of 1st Newsletter
May 2001	2nd	Practical Entrepreneurship Lecture – "Learning Through Experience" by Mr. Peter Hamilton, Chief Operating Officer of ChinaDotCom Corp.
		Practical Entrepreneurship Lecture – "Industry-University Cooperation in a Knowledge-based Economy" by Ms. Marjorie Yang, Chairman of Esquel Group
	6th – 12th	Hong Kong – Mainland China Geotechnical Lecture by Professor Zhou Fengjun and Professor Zeng Xianming, Yellow River Hydraulic Engineering Technique Institute (organized by the Jockey Club Research and Information Centre for Landslip Prevention and Land Development, Department of Civil Engineering)
	14th	Symposium on Advanced MRI Applications: Non-proton MRI, Neuro MRI and MR Spectroscopic Imaging
	15th	William Mong Distinguished Lecture – "Smart Antennas for Broadband Wireless Communications" by Professor A. Paulraj, Stanford University
	31st	Faculty of Engineering 90th Anniversary Distinguished Lecture – "25 Years of Formal Methods and Tools at INRIA: An Overview" by Professor Gerard Huet, Research Director at INRIA Rocquencourt
June 2001	7th	William Mong Distinguished Lecture – "Wireless Systems-on-a-chip Design" by Professor Robert W. Brodersen, University of California at Berkeley
	8th	Faculty of Engineering 90th Anniversary Special Seminar in Computer Science (organised by the Department of Computer Science and Information Systems) – "The ER Model & XML" by Professor Peter P.

		Chen, Louisiana State University
	18th	William Mong Distinguished Lecture – "Recent Advances on Strain Gradient Plasticity" by Professor K.C. Hwang, Tsinghua University
	22nd	Faculty of Engineering 90th Anniversary Special Seminar in Computer Science (organised by the Department of Computer Science and Information Systems) – "Global-scale Computing and the GRID" by Professor Ian Leslie, University of Cambridge
	27th – 29th	Workshop on Geometric Computing (organised by the Department of Computer Science and Information Systems)
Mid July 2001		Issue of 2nd Newsletter as a feature in the Convocation Newsletter
August 2001	17th	Faculty of Engineering 90th Anniversary Special Seminar in Computer Science (organised by the Department of Computer Science and Information Systems) – "Recent Advances in Internet, Clusters, Grids and Pervasive Computing" by Dr. K. Hwang, the Internet and Cluster Computing Laboratory of the University of Southern California
September 2001	9th – 15th	Hong Kong – Mainland China Geotechnical Lecture by Professor Lu Yaoru, Chinese Academy of Geological Sciences, and Professor Lin Zaiguan, Northwest Research Institute of Engineering Investigation and Design (organised by the Jockey Club Research and Information Centre for Landslip Prevention and Land Development, Department of Civil Engineering)
	12th	Faculty of Engineering 90th Anniversary Special Seminar – "Tapping China's New Semiconductor Market: SMIC's Bold Step Into China" by Dr. Richard Chang, Founder / CEO of Semiconductor Manufacturing International Corp., Shanghai
October 2001	13th – 14th	JUPAS Open Day
	22nd	William Mong Distinguished Lecture – "The Supersonic Boundary Layer and Its Application" by Professor R.V. Thompson, University of Newcastle upon Tyne
November 2001	15th	Faculty of Engineering 90th Anniversary Distinguished Lecture – "The Globalisation of Urban Transport" by Professor Tony M. Ridley, Imperial College, UK
	16th	Faculty of Engineering 90th Anniversary Special Workshop in Information Technology – "NET vs J2EE, Changing the Landscape of the Developer" by Mr. Roger Sessions, CEO of ObjectWatch (organized by the Department of Computer Science and Information Systems and co-sponsored by Microsoft Hong Kong Ltd.)
	19th-22nd	IFAC Conference on New Technologies for Computer Control 2001 (NTCC 2001) (organised by Control, Automation and Instrumentation Division, The Hong Kong Institution of Engineers, sponsored by Department of Mechanical Engineering, HKU and Department of Building and Construction, City University of Hong Kong)
	30th	Faculty of Engineering 90th Anniversary Symposium: "Engineering and You", with exhibition
	30th	Reunion Dinner
	30th	Issue of newspaper supplement
December 2001	1st	Faculty of Engineering 90th Anniversary Symposium: "Engineering and You", with exhibition
	6th – 8th	The 3rd International Conference on "Soft Soil Engineering" (organised by The University of Hong Kong, The Hong Kong Polytechnic University and The Hong Kong University of Science and Technology)

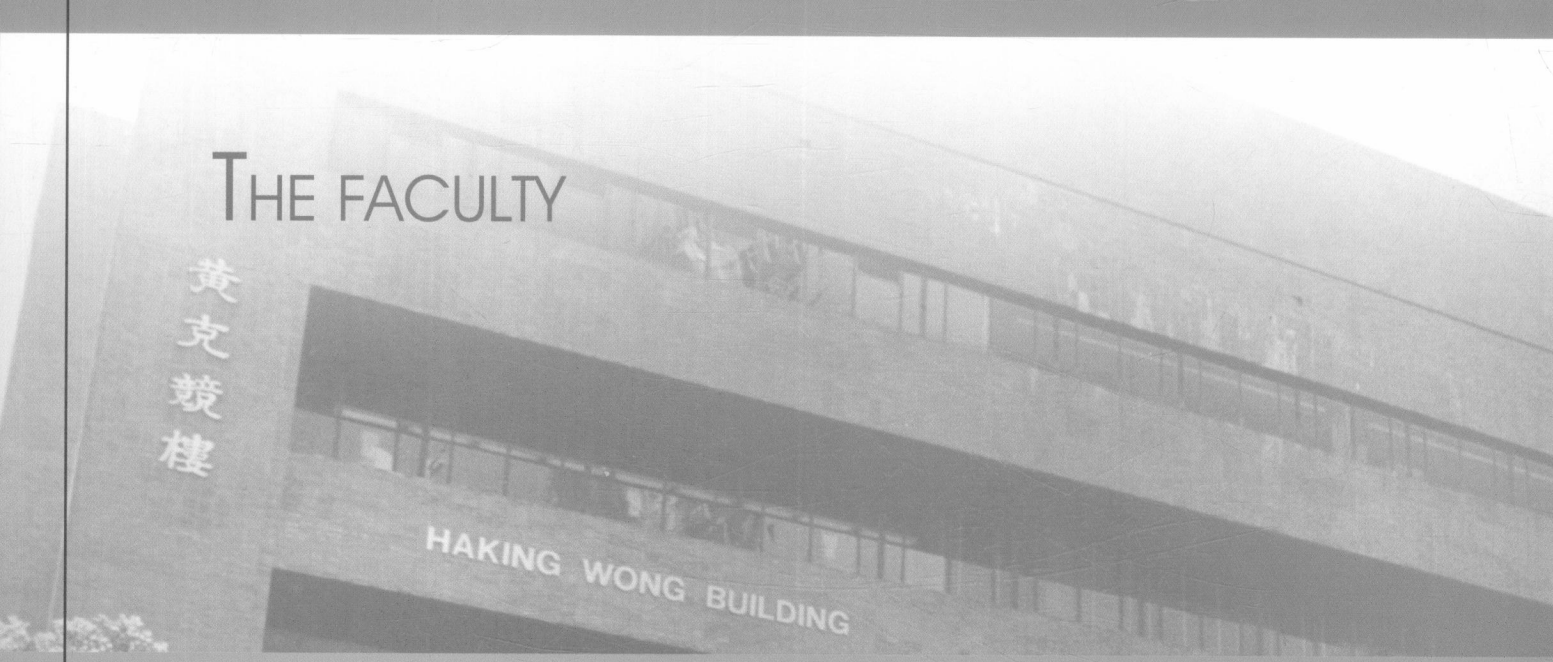
	10th – 14th	The Fourteenth Southeast Asian Geotechnical Conference (14th SEAGC) – "Geotechnical Engineering – Meeting Society's Needs"
	16th – 22nd	Hong Kong – Mainland China Geotechnical Lecture by Professor Qian Quhu, Polytechnical University of PLA and Chinese Academy of Engineering, and Professor Chen Zuyu, China Institute of Water Resources and Hydropower Research (organised by the Jockey Club Research and Information Centre for Landslip Prevention and Land Development, Department of Civil Engineering)
January 2002	7th	Faculty of Engineering 90th Anniversary Special Seminar – "The MIT OpenCourseWare (OCW) Project" by Professor Dick K.P. Yue, Massachusetts Institute of Technology
	17th	Faculty of Engineering 90th Anniversary Special Seminar in Computer Science – "Pattern Discovery and Exploratory Data Mining" by Porfessor Andrew K.C. Wong, Hong Kong Polytechnic University (organised by the Department of Computer Science and Information Systems)
	22nd - 27th	Inter-university Invitational Civil Engineering Competition (organised by the Department of Civil Engineering)
	22nd	William Mong Distinguished Lecture – "Optical Networks" by Professor Vincent W.S. Chan, Massachusetts Institute of Technology, USA
February 2002	7th	Faculty of Engineering 90th Anniversary Special Lecture – "The Modelling of Environmental Flows" by Professor Guus Stelling, Delft University of Technology, Netherlands
March 2002	8th	William Mong Distinguished Lecture – "Higher and Higher Performance Microprocessors: There Is Still Plenty We Can Do" by Professor Yale Patt, The University of Texas at Austin
April 2002	4th	Faculty of Engineering Special Seminar – "The Bioengineers Role in Limb Salvage – The Application of Tissue/Organ Engineering Principles" by Professor Edmund Y.S. Chao, Johns Hopkins University, USA
May 2002	2nd	William Mong Distinguished Lecture – "Information Technology as an Ultimate Tool for Control" by Professor H. Kimura, The University of Tokyo
	24th	Faculty of Engineering Distinguished Lecture in Bioengineering – "Challenges in Bioengineering – Unresolved Issues" by Professor Albert I. King, Wayne State University, USA
June 2002	6th	Faculty of Engineering Special Lecture – "Enrichment of Technical Education at the Imperial College of Science, Technology and Medicine, University of London" by Professor Sinclair Goodlad, Imperial College, University of London
	24th	Faculty of Engineering Special Lecture – "Compression of Space: Patterns and Pathways for Hopping Between Optima" by Professor Tony C. Woo, University of Washington, USA
July 2002	25th - 28th	Engineering Summer Camp

The great thing in this world is not so much where we stand, as in what direction we are moving.

- Oliver Wendell Holmes (1809-1894)

THE FACULTY

THE FACULTY



The Dean of the Faculty is Professor J.H.W. Lee, Redmond Professor in Civil Engineering. Professor S.T. Tan (Department of Mechanical Engineering), Professor A.K.H. Kwan (Department of Civil Engineering) and Dr. T.W. Lam (Department of Computer Science and Information Systems) serve as Associate Deans.

The Faculty consists of five Departments: Civil Engineering, Computer Science and Information Systems, Electrical and Electronic Engineering, Industrial and Manufacturing Systems Engineering and Mechanical Engineering; the Heads of Departments are Mr. P.K.K. Lee, Dr. F.C.M. Lau, Professor T.S. Ng, Professor K.L. Mak and Professor S.T. Tan respectively. The Faculty offers 14 undergraduate programmes, 13 taught master programmes and postgraduate research programmes to over 2,800 students. The annual intake is over 550 for undergraduate programmes, 470 for taught master programmes and 95 for postgraduate research degree programmes. There are about 120 teachers, over 50 Teaching Consultants, Post-Doctoral Fellows and Research Assistant Professors and a team of 150 technical, executive and clerical staff.

The Faculty of Engineering aims to:

- develop and sustain the position as a leading engineering faculty in Asia which contributes prominently to the discovery and transmission of knowledge;
- contribute to the solution of national needs through applied research and training of high quality manpower to complete in the global knowledge-based economy;
- contribute to transformation of Hong Kong into a centre of innovation and technology;
- attract the best staff and students.

The five departments in the Faculty occupy the Haking Wong Building, the Chow Yei Ching Building, the Composite Building and the Yam Pak Building (former Redmond Building), with a total floor space of 35,000 m^2. The facilities are comparable to those of the top universities in the world with over 110 well-equipped laboratories, hundreds of workstations and personal computers.

Members of the Faculty actively interact with the local community, external organisations and industry. Collaborative work with industry and the government is undertaken and research projects are carried out which are directly applicable to Hong Kong and are partially or fully funded by companies or by government departments. Collaboration between the Faculty and industry also takes place through consulting work and customised training courses and seminars. Close collaboration with industries is established and maintained throughout the projects, from determining project objectives to reporting progress, to discussing results and applications of the work accomplished. Students come in direct contact with industry through summer training at the end of their second year of study and through the integrated Study-Work-Programme, a one-year training programme in industry.

The Faculty has 12 academic centres or units of study: Centre for Asian Tall Buildings and Urban Habitat, Centre for Earthquake Engineering Research, Centre for Electrical Energy Systems, Centre for Environmental Engineering Research, Centre for Information Security and Cryptography, Jockey Club Magnetic Resonance Imaging Engineering Centre, Jockey Club Research and Information Centre for Landslip Prevention and Land Development, Centre for Nonlinear Mechanics, Rock

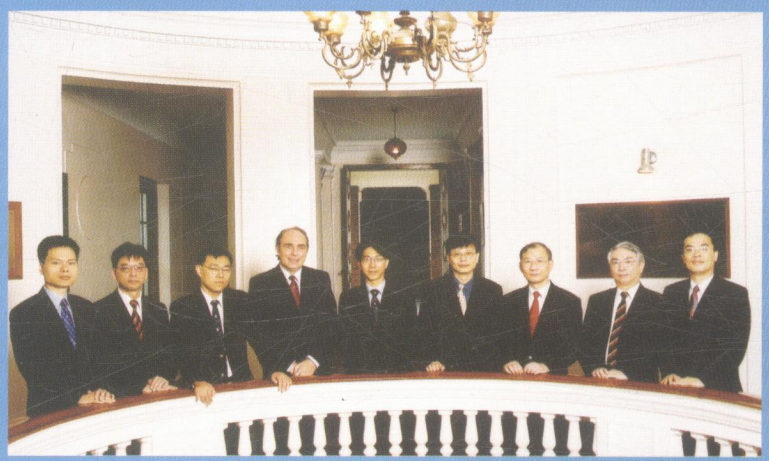
Engineering Research Centre, Centre for E-Commerce Infrastructure Development, Centre for Advanced Product Development Technologies, and Centre for Infrastructure and Construction Industry Development.

The Faculty is also actively involved and closely affiliated with three independent research centres: International Research Centre for Electric Vehicles, Centre of Biomedical Engineering, and E-Business Technology Institute.

The Faculty won a University Grants Committee (UGC) Area of Excellence (AoE) in Information Technology in collaboration with the Chinese University of Hong Kong (CUHK) and the Hong Kong University of Science and Technology (HKUST) in 1998. In the 2000 UGC Area of Excellence (AoE) bidding exercise, two of the 16 finalists were from this Faculty: the AoE on Wireless Communications was proposed by EEE researchers; and the inter-disciplinary AoE on Water Environment Engineering was led by Civil Engineering in collaboration with Ecology, Chemistry, Statistics, and Computer Science.

Most of the staff publish the research work in international journals in the respective disciplines. In the year 2000-2001, the Faculty published 446 scholarly books, monographs, refereed journal publications and book chapters.

The Faculty has conducted significant research work and consultation services on numerous projects to help improve the quality of life in Hong Kong; an overview of the recent projects can be found in the section "Engineering and You". Significant funding has been secured from Research Grants Council (RGC) and the Innovation and Technology Fund (ITF) to carry out applied research on a wide range of projects of particular significance to Hong Kong and the Region.



Deans and Heads of Departments, (Left to right) Dr. T.W. Lam, Prof. A.K.H. Kwan, Prof. S.T. Tan, Prof. B.J. Duggan, Prof. J.H.W. Lee, Prof. T.S. Ng, Prof. K.L. Mak, Mr. P.K.K. Lee, Dr. F.C.M. Lau

The Organisation of the Faculty of Engineering

Council

Senate

Dean

Faculty Board

Heads of Departments

- Department of Civil Engineering
- Department of Computer Science and Information Systems
- Department of Electrical and Electronic Engineering
- Department of Industrial and Manufacturing Systems Engineering
- Department of Mechanical Engineering

Major Faculty Committees

- Admissions Committees for BEng and BSc(CSIS)
- Committee on Course Enrolment
- Committee on Engineering Training
- Engineering Accommodation Committee of Management
- Engineering Curriculum Review and Development Committee
- Engineering JUPAS Open Day Committee
- Faculty Development Committee
- Faculty Higher Degrees Committee
- Faculty Sub-Committee on Resources Allocation
- Faculty Teaching Quality Committee
- Faculty Research Committee
- Faculty Review Committee
- Faculty Sabbatical Leave Committee
- Faculty Timetables Committee
- Faculty Outside Practice Committee
- Programme Committees for the following joint programmes:
  - Computer Engineering
  - MSc(Eng) in Building Services Engineering
  - MSc in Internet Computing and Electronic Commerce
- Working Group on Curriculum Reform
- Working Group and Sub-Group on BEng Programme on Medical Engineering
- Working Group on Examinations Procedures
- William M.W. Mong Engineering Research Fund Committee of Management
- University Engineering Advisory Committee

Boards of Examiners of respective study programmes

- Board of Examiners for the Degree of BEng
- Board of Examiners for the Degree of BSc(CSIS)
- Boards of Examiners for Higher Degrees (MPhil/PhD)
- Board of Examiners for the Degree of MSc(Eng)
- Board of Examiners for the Degree of MSc(Computer Science)
- Board of Examiners for the Degree of MSc(ECom & IComp)

Staff of the Faculty 2001-2002

Dr. C.O. Ng, Dr. K.Y. Sze, Dr. M.G. Sainsbury, Dr. I. Gibson, Dr. P.L.Y. Chan, Dr. G.Q. Huang, Dr. A.T.Y. Chan, Dr. K.W. Chow, Dr. T.I. Yuk, Dr. W.L. Cheung

Dr. C.W. Chan, Mr. D. Sculli, Dr. T.N. Wong, Dr. L. Wang, Prof. A.T.Y. Chwang, Dr. Y. Tsui, Dr. T.S.T. Ng, Mr. P.C. Chui, Dr. A.K. Soh, Dr. X.Y. Li

Dr. K.W. Chan, Mr. W.S. Sze, Dr. A.H.W. Ngan, Dr. L.K. Chu, Dr. J. Lam, Dr. H.J. Pam, Dr. M.H. Pong, Dr. D.Y.C. Leung, Dr. Y.H. Chen

Mr. L.N. Bakountouzis, Dr. Y. Li, Dr. K.C. Cheung, Mr. H.N. Lam, Dr. K.H. Pun, Dr. L.C.K. Hui, Dr. C.L. Yip, Dr. V.H.Y. Lo, Dr. S.H. Choi, Dr. H.Y.K. Lau, Dr. F.T.S. Chan, Dr. J.W.C. Ng, Dr. Q.Z.Q. Yue

Dr. F.T.K. Au, Dr. L.G. Tham, Dr. C.L. Wang, Dr. Q. Huo, Dr. T.L. Lau, Dr. N.H.C. Yung, Dr. F.K. Lam, Dr. K.L. Ho, Dr. Y. Ni, Dr. M.M. Kumaraswamy

Dr. K.W. Tse, Dr. K.T. Chau, Dr. A.K.K. Wong, Dr. L.K. Yeung, Dr. S.C. Chan, Dr. Y.S. Hung, Dr. T.W. Lam, Prof. F.Y.L. Chin, Dr. C.M. Shen

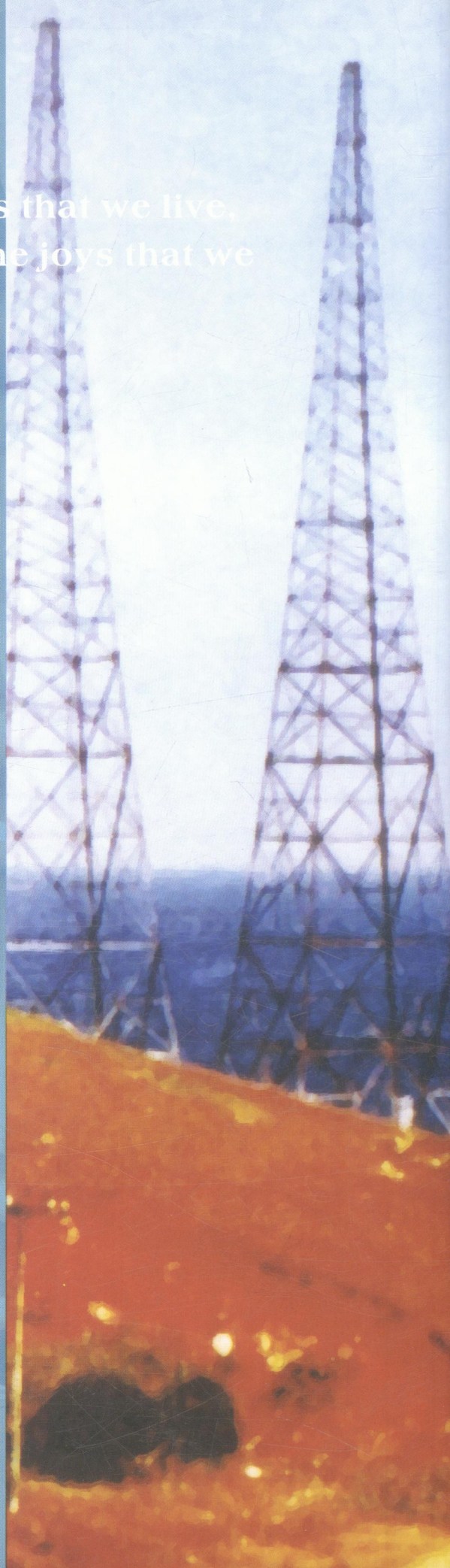
Dr. S.W. Cheung, Mr. H.B. Lo, Dr. C.H. Leung, Dr. K.M. Hong, Mr. W.K. Lee , Dr. A.W. Jayawardena, Dr. D.W.L. Cheung, Ms. F. Tong

Prof. B. Porter, Prof. F.H.Y. Chan, Prof. V.O.K. Li, Prof. H.H.P. Fang, Prof. A.K.H. Kwan, Prof. S.T. Tan, Mrs. A. Tsang

Prof. K.L. Mak, Prof. T.S. Ng, Prof. C.F. Lee, Prof. J.H.W. Lee, Dr. P.Y.S. Cheung, Mr. P.K.K. Lee, Dr. T.H. Tse, Dr. F.C.M. Lau

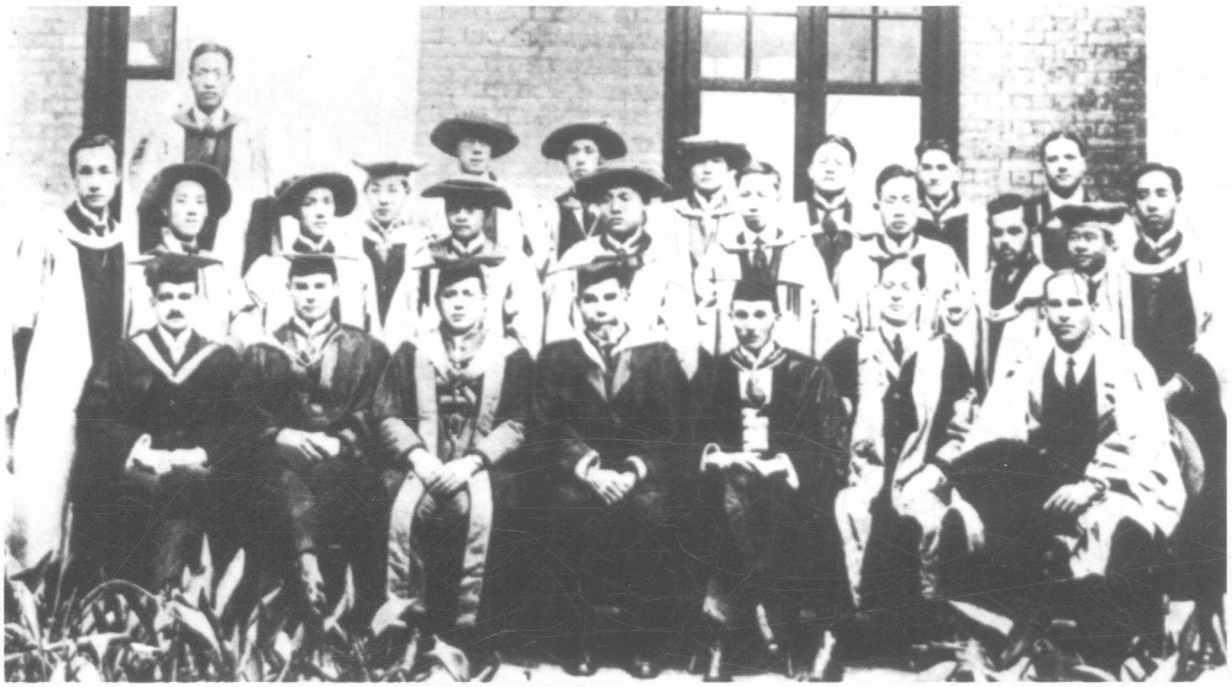
Time is not measured by the years that we live, but by the deeds that we do and the joys that we give.

- Helen Steiner Rice (1900-1981)



History and development

HISTORY AND DEVELOPMENT (1911 TO 2001)



Graduation Day, May 1916

The history of the Faculty of Engineering at The University of Hong Kong dates back to the very foundation of the University in 1911 and the appointment of the first Chair of Engineering in 1912. This account attempts to present some important aspects of its development with reference to degree programmes (undergraduate and postgraduate), accreditation and buildings, academic leaders, and more recent research developments and achievements.

1. UNDERGRADUATE DEGREES IN ENGINEERING

1.1 The Bachelor Degree in Engineering and Classifications

The first degree in engineering was called Bachelor of Science in Engineering, BSc(Eng) and was awarded from the beginning of the Faculty until 1988. Since 1989, it has been changed to Bachelor of Engineering, BEng. The first degree in computer science, launched in 1982, was called the Bachelor of Science in Computer Studies, BSc(CompStud), but was renamed the Bachelor of Science in Computer Science, BSc(CompSc) in 1988. Since 1998, the degree has been called the Bachelor of Science in Computer Science and Information Systems, BSc(CSIS).

From 1916-1941 and from 1955-1967, there were three grades in the bachelor degree classifications, namely, first class, second class and pass. During 1949-1954 only war-time degrees and ordinary degrees were awarded. From 1968-1979, the second class was split into two sub-grades: second class (division I) and second class (division II). In 1980, a third class grade has been created, resulting in five grades in the degree classifications: namely first class, second class (division I), second class (division II), third class and pass.

The numbers and classifications of BSc(Eng) graduates (from 1916 to 1988), and BEng and BSc(CSIS) graduates (from 1989 to 2000) are shown in Tables 1A, 1B, 1C and 1D. It is of interest to note that during the last 12 years more degrees were awarded than during all the previous years. During the same short period, the proportion of female graduates increased tenfold from a meagre 2-3% to over 20%. These two figures alone testify to the tremendous expansion of the Faculty over the last decade.

Table 1A BSc(Eng) graduates (1916-1941, inclusive)

Year	Accumulative Total	Degree Classifications			Annual Total	5-Year Subtotal	No. of Female Students
		1st	2nd	Pass			
1916		1	2	9	12		0
1917		-	4	11	15		0
1918		1	7	7	15		0
1919		-	1	7	8		0
1920	54	1	1	2+	4	54	0
1921		2	1	8	11		0
1922		4	3	14	21		0
1923		1	1	6	8		0
1924		1	2	11	14		0
1925	113	1	-	4	5	59	0
1926		2	-	3	5		0
1927		1	-	9	10		0
1928		1	4	4	9		0
1929		-	1	4	5		0
1930	151	1	1	7*	9	38	1
1931		-	2	10	12		0
1932		2	5	5	12		0
1933		2	3	7	12		0
1934		2	3	9	14		0
1935	216	1	4	10	15	65	0
1936		-	3	15	18		0
1937		-	6	26	32		0
1938		-	-	7	7		0
1939		1	-	29*	30		1
1940	319	1	3	12	16	103	0
1941	340	1	2	18	21	21	0
30 Yrs	-	27	59	254	340	340	2

+ One War Degree, i.e., Jack, J.M. (1920)

* Female Students, viz., Miss Tsang Tin Chien (1930) and Miss Wong Yuet Lan (1939)

Table 1B BSc(Eng) graduates (1949-1970, inclusive)

Year	Accumulative Total	Degree Classifications			Annual Total	5-Year Subtotal	No. of Female Students
1949	366	War Time Degrees			26+		0
1950	375	Ordinary Degrees			9	35	0
1951		Ordinary Degrees			11		0
1952		Ordinary Degrees			17		0
1953		Ordinary Degrees			13		0
1954		Ordinary Degrees (Total: 90 War Time and Ordinary Degrees)			14		0
		1st	2nd	Pass			
1955	438	3	4	1	8	63	0
1956		2	5	6	13		0
1957		-	7	3	10		0
1958		1	5	10	16		0
1959		1	9	10	20		0
1960	516	2	8	9	19	78	0
1961	Division of	4	10	4	18		0
1962	Departments	2	9	6	17		0
1963		3	5	23	31		0
1964		2	16	22	40		0
1965	672	6	13	31	50	156	0
1966		5	17	33	55		0
1967		3	22	32	57		0
			Division I	Division II			
1968		10	19	25	14	68	0
1969		5	15	25	18	63	0
1970	1029	11	32	44	27	114	357	0
22 Yrs	-	60	290		249	689	689	0

+ One Posthumous War Time Degree, Kossakowski, Z.A.

Table 1C BSc(Eng) graduates (1971-1988, inclusive)

Year	Accumulative Total	Degree Classifications					Annual Total	5-Year Subtotal	No. of Female Students
		1st	2nd		Pass				
			Division I	Division II					
1971		19	42	40	30		131		0
1972		12	46	50	30		138		0
1973		11	55	46	23		135		3
1974		8	48	57	27		140		3
1975	1712	12	40	64	23		139	683	1
1976		8	37	68	45		158		2
1977		10	46	96	55		207		4
1978		15	78	73	46		212		0
1979		18	67	104	49		238		4
					3rd	Pass			
1980	2769	19	70	103	38	12	242	1057	5
1981		24	78	112	28	18	260		2
1982		13	86	112	20	-	241		7
1983		18	95	128	31	14	286		9
1984		20	100	107	21	9	257		6
1985	4065	21	82	107	27	15	252	1296	6
1986		29	104	125	37	13	308		11
1987		26	115	98	30	21	290		11
1988	4969	19	115	132	29	11	306	904	8
18 Yrs	-	302	1304	1622	712		3940	3940	82

Table 1D BEng, BSc(CompSc) and BSc(CSIS) graduates (1989-2000, inclusive)

Year	Accumulative Total	Degree Classifications					Annual Total	5-Year Subtotal	No. of Female Students
		1st	2nd		3rd	Pass			
			Division I	Division II					
1989		32	133	153	29	12	359		9
1990	5715	31	133	164	48	11	387	746	11
1991		36	124	196	25	13	394		14
1992		30	137	169	46	13	395		17
1993		38	154	176	25	10	403		23
1994		46	195	197	27	15	480		55
1995	7895	64	208	182	38	16	508	2180	54
1996		77	218	199	37	10	541		67
1997		77	211	204	28	17	537		72
1998		103	204	170	44	11	532		84
1999		92	199	190	20	20	521		102
2000	10603	110	222	196	36	13	577	2708	133
12 Yrs	-	736	2138	2196	403	161	5634	5634	641

Faculty of Engineering Graduation Ceremony 2000

War-time BSc(Eng) Civil Graduates in 1949

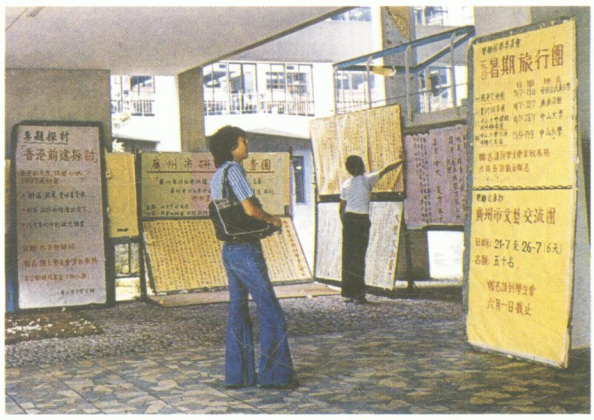
1.2 The Issue of "3 Years or 4 Years"

The issue of whether a basic university first degree programme should last three or four years has been the subject of debate in Hong Kong from time to time over the last half century.

Before the Second World War and immediately after, the basic degree programmes in the University were four years. In the early 1950s, the Hong Kong Government, following the proposed education reform in the UK, pushed some of the subjects normally taught in the first year of degree programmes in universities to be taught in Upper Form Six or Form Seven in high schools so as to shorten the length of degree programmes in universities by one year. The main reason was cost efficiency since obviously it was less expensive to teach students in high schools than in universities. While the 4-year degree programme was still in effect, there was a transition period during which the First Year in the University and Form Seven in high schools operated simultaneously. For engineering, Form Seven students satisfying University Entrance Requirements with four Advanced Level subjects in Physics, Chemistry, Pure Mathematics and Applied Mathematics might apply to enter the Second Year directly (with exemption from First Year). According to this "A-level system", students who passed only two A-Level subjects could still get into the university but could only be admitted into the First Year. The last intake of students for the 4-year programme was in 1956. Since 1957, the engineering degree programme has been a 3-year one.

When Professor Wang Gungwu took up the position as Vice-Chancellor of the University in 1986, one of the main tasks he wanted to take on was to persuade the Government to change the 3-year basic first degree programme back to a 4-year one and to admit students after they had completed their studies of Form Six. He argued that the University was operating under a severe handicap by having only a 3-year degree. Professor Wang Gungwu contended that 4-year degree courses would have provided a much broader education than the current A-level system offered. In addition, the A-level system required that secondary schools be able to teach university-level courses in the last two years, while unfortunately many of the newer Hong Kong secondary schools had no established tradition of preparing students for university. Therefore he strongly supported proposals that would have led to students spending more time in universities with 4-year degrees, which he believed was superior to seven years in secondary school followed by three years in university. He asserted that "The proposals for the Foundation Year and the Joint Admissions Scheme are both matters of importance to the University and to the community it serves. The University remains firm in its conviction that measures are needed to protect the academic standards of its degrees". Unfortunately, the Government was not willing to provide more funding to re-install the 4-year programme. Without additional funding, the University was unable to implement the 4-year programme in 1991 as had been originally planned.

However, engineering technology has been expanding so rapidly and the demand for broader and more in-depth



The entrance to the Library and the Students' Union in the 1970s.

education for engineering undergraduates has been so real that the number of critical topics or areas to which engineering students could profitably be exposed is continuously increasing.

Because it was not easy to convince the Government to approve an overall university-wide change to four years, the Faculty of Engineering in 1989 and 1996 proposed a 4-year first degree programme in engineering, MEng, on its own, disregarding the university-wide situation. "The Board would support the introduction of a broadening 4-year degree course. Initially this might be for a selected number of students but these should be chosen for their academic ability and qualities for future potential industrial leadership."

The plan was that at the initial stage only 25% to 30% of the students completing the second year studies in engineering would be allowed to switch to the broadening 4-year degree course. The Faculty would absorb the extra cost of the 25% to 30% of students for one additional year with the normal 3-year grant and would not request the University Grants Council (UGC) for extra funding. However, the plan did not get the green light from the authorities.

Meanwhile, the work on university-wide curriculum reform continued. In December 1996, the Vice-Chancellor's Curriculum Reform Task Force (CRTF) issued the White Paper No.1 in which the general policies on curriculum reform were established. The reform was to provide:

- a flexible curriculum structure to cope with changes quickly;
- a broader curriculum to produce graduates with qualities desired by the community, industry and commerce;
- a credit-based system which fits into our framework; and
- a flexible system to implement a 4-year degree programme cost-effectively.

The proposed reform was still based on a 3-year programme after Form Seven but it was designed to be sufficiently flexible and easy to extend to a 4-year programme. Students may plan their pace of study according to their own wish but basically the duration of the degree programme is three years and it must be completed within six years at most.

This curriculum reform and change to the credit-based system was quickly implemented in the entire University in 1998.

Recently, in response to the need to better prepare our students for the advent of the knowledge-based economy, the Education Commission has set up a working group in 2000 to review the academic structure for senior secondary education and the interface with tertiary education. The issue of providing four years of university education was brought up again. The latest opinion of the Government seems to favour a change of the present 3-year university degree to a 4-year one to conform to the international norm. There are indications that tertiary institutions in Hong Kong may go back to four years by the turn of the decade, after the system was changed half a century ago.

1.3 Practical Industrial Training

Are our students averse to practical work?

"... There seems to be no doubt as to the intelligence of the majority of the students, or of their ability to take advantage of an academic course, and at least some of the graduates appear to have gained a good reputation of the extent of their academic knowledge. But we found that it is altogether a different story when it comes to work of a practical and responsible nature. Most of the students are averse to practical work, or work where they would get dirty or wet, or would be put to any personal inconvenience, or which may be unpleasant according to their various individual interpretations of that word; and they look for the easy clean path that leads only to mediocrity. Thus it is that when they graduate they know so little about practical work – the work for which they have been educated – and show so little enthusiasm for it, that prospective employers show a corresponding lack of enthusiasm about putting them on the salary list. The marked disinclination to take up vacation work and make some sort of effort to acquire some practical knowledge while still at the University is well illustrated by the result of the recent effort to provide it for them. Out of 56 students only 20 accepted the opportunity given to them, and all of those wanted paid temporary posts with the Public Works Department regardless of the nature of the work they would be put to do. ... This apparent aversion to practical work is undoubtedly a great weakness in many of the students, but we believe that it probably could be corrected, or perhaps eliminated, if the University persists in its effort ... that vacation work should be made compulsory. ..."

Excerpt from "University of Hong Kong: Report of the Committee on Engineering Education", July 1954, by Brigadier G.B Gifford Hull et al. on the September 1953 Report concerned with the Faculty of Engineering by Sir Ivor Jennings, Q.C., M.A., Litt.D., Vice-Chancellor of the University of Ceylon, and D.W. Logan, Esq., B.C.L., M.A., D.Phil., Principal of the University of London (Jennings-Logan Report). Hong Kong University Engineering Journal, Vol. XVIII December 1954.

This above highlighted comment made nearly 50 years ago on the attitude of the engineering students towards practical work may still be generally true today. However, the Faculty of Engineering, together with the University's Technology Support Centre, has been making great efforts to reverse such aversion to practical work. Students have to go through courses in workshop training and summer training organised for them. Besides summer jobs offered by local industries and firms, students may also choose to join training schemes in Singapore, Beijing, Xi'an, and at theThree Gorges.

The NUS-HKU Engineering Student Exchange Scheme, established in 1974, is an exchange programme jointly organised by the Engineering Club of the National University of Singapore (NUS) and the Engineering Society of The University of Hong Kong (HKU). About eight to 12 HKU engineering students go to Singapore for practical experience every summer and an equal number of Singapore students come to Hong Kong in April. This annual event has been highly appreciated by student participants who feel that they have acquired valuable technical knowledge from the work training, especially the more practical aspects on design, and thought the exchange scheme was "a splendid experience to explore the outside world and culture".

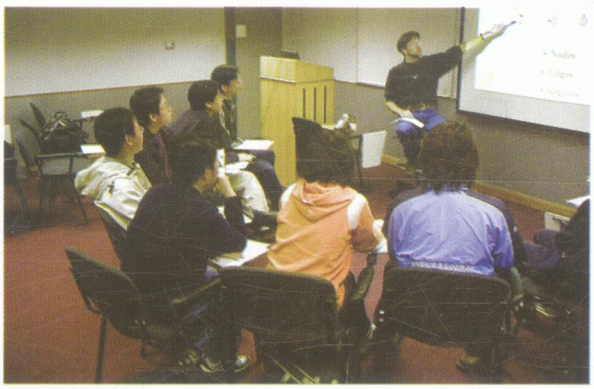
In recent years, the Faculty also cooperated with universities in Mainland China such as Tsinghua University, Beijing University of Aeronautics and Astronautics, Xi'an Jiaotong University, as well as with the China Yangtze Three Gorges Project Development Corporation to organise summer vacation practical training for students. Each year, over a hundred engineering students undertake Summer Industrial Training in different parts of China in their second year of study. Students under the supervision of senior engineers from the host institutions will carry out industrial-based projects on topics including computation and programming, design or design modification, laboratory work, site investigation and quality control. These projects are designed to enable students to gain some hands-on experience in the fields of engineering and technology. Particularly, the training in Yangtze Three Gorges provided invaluable opportunity to students participating in this monumental project in China. Furthermore, the provision of an enviornment to students to learn more about the Chinese culture and practice Putonghua is a definite bonus. Such exposure and experience are particularly important as China has become a member of the World Trade Organization and is playing an increasingly salient role in the global economy.

Summer Industrial Training in China

1.4 Engineering Design and Communication — An Example of Problem-Based Learning

Another effort to provide students with real life working experience is the "Engineering Design and Communication" course, first introduced in September 1997 in the BEng programmes offered by the Department of Civil Engineering. This course comprises a comprehensive design project of interdisciplinary nature with particular emphasis on project appraisal, feasibility study, preliminary design and the overall management of the design process. A small group of students will work together and operate as a "consultant firm" under the supervision of a staff tutor and an industrial tutor who play the dual role of "client" and supervisor. There will be interaction between the "client" (the tutors) and the "consultant firm" (the group of students). The "consultant firm" must maintain a project file containing records of correspondence, meetings and progress reports. The students are required to give oral presentations and submit written reports on the progress of the project regularly. Towards the end of the project, the students are required to make a final submission and give a final oral presentation. This is a kind of "Problem-Based Learning and Teaching" activity pioneered by the Faculty of Engineering to encourage the students to think laterally and to work independently in teams. The course also helps to improve their management and communication skills in gathering and presenting engineering information. Similar industrial-based group design projects are conducted by all final year Mechanical Engineering students.

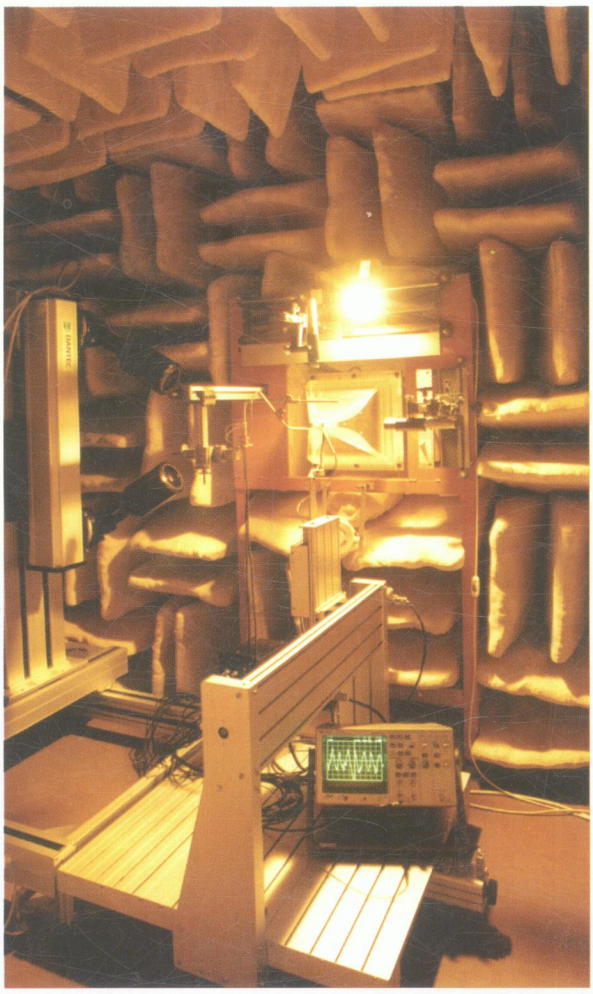
In fact, problem-based learning has been adopted in the Faculty of Engineering for over 25 years in the form of final year project work. The subject **Project** was introduced in the curricula of the engineering departments as early as 1976. The project work usually requires a student to solve a problem through self-learning. In the final year, each student is given a topic to work on individually and independently under the guidance of a supervisor and a moderator. The topic may involve analytical/computational work, critical exploration, experimental investigation, overall design work or management planning. The student has to explore the essential elements of the topic and tries to solve all the interrelated problems in his/her project study and report. On completion of the project, the student has to give an oral presentation to the supervisor, the moderator and some classmates on how he/she has tackled the problem, what has been learned and what has been achieved. The project is a fairly in-depth study of a topic. By going through the project work the student learns how to identify the important elements of a problem and find possible solutions for the problem.



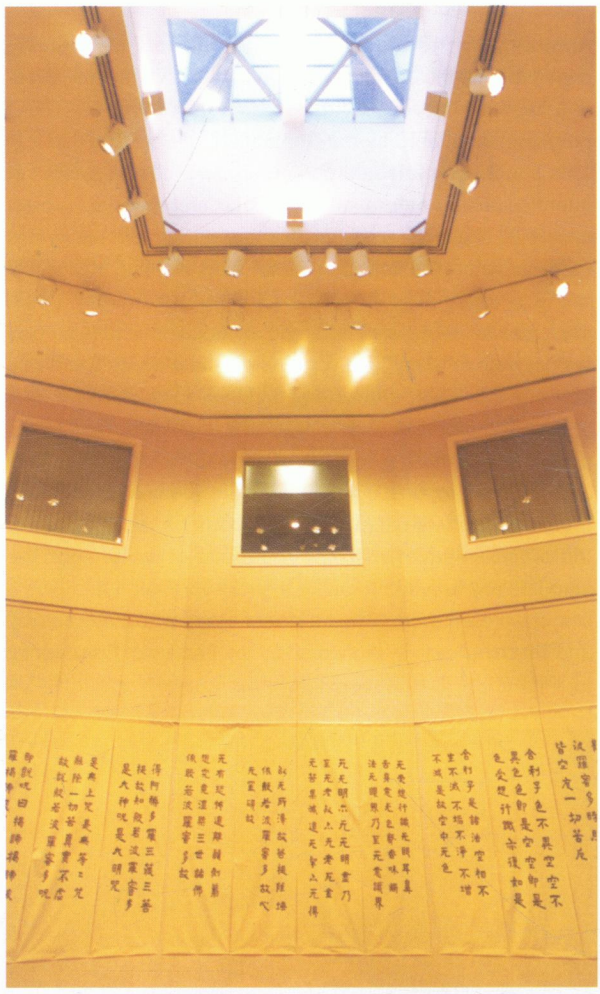
Problem-based Teaching and Learning

Designing and making a cantilever

2. HIGHER DEGREES IN ENGINEERING



Anechoic Chamber



University Museum and Art Gallery

2.1 PhD and MSc(Eng) by Research

Before the Second World War, the only higher degree available in engineering was Master of Science in Engineering by research and thesis. In the early years, very few students pursued higher degrees in engineering at HKU.

Our very first MSc(Eng) degree was awarded to S.B. AHMED in 1929 for his thesis *Theory of Earth Pressures as Applied to Retaining Walls*. He also sat for a written examination. The second MSc(Eng) graduate was WEI Wing Hon in 1938, who presented a thesis *High Pressure Steam Power Generation*. He first entered the University in 1912 and was awarded the BSc(Eng) in 1916 with the first group of HKU graduates. Mr. Wei then had a distinguished career as a mechanical and electrical engineer in China, having been involved in many power station projects and meriting AMIEE and AMIMechE. The third master degree was awarded after the war in 1954 to John, HUANG Wei Hong. These were the only three engineering master degree graduates in HKU since the opening of the University until the mid-fifties.

However, the scarcity of higher degree engineering graduates at HKU does not indicate that HKU engineering graduates lacked research interests and the desire for higher degrees during that period of time. In fact, there were quite a number of HKU graduates who were dedicated to research and to earning higher degrees. These students often went to the UK or North America to pursue their higher degrees. The most well-known ones include KING Sing Yui, 1940 BSc(Eng), who obtained a PhD degree in Electrical Engineering from the University of London in 1947, and CHUNG Sze Yuen, 1941 BSc(Eng), who was awarded a PhD degree in Mechanical Engineering by the University of Sheffield in 1950.

Among our first group of BSc(Eng) graduates after the war (1950) with ordinary degrees in civil engineering, three obtained PhD degrees in 1954 at Imperial College, University of London. They were CHAN Wai Lee, YU Chan Wah and Ernest LOW. The former two were internationally renowned pioneering researchers in plastic theory and ultimate limit state design for concrete structures. Franklin K.C. WONG, 1953 BSc(Eng), was also admitted to Imperial College and obtained a PhD degree in Structural Engineering from the University of London in 1957. He returned to HKU to be an assistant lecturer and later lecturer, but in 1968 he emigrated to Canada and became a consultant engineer there.

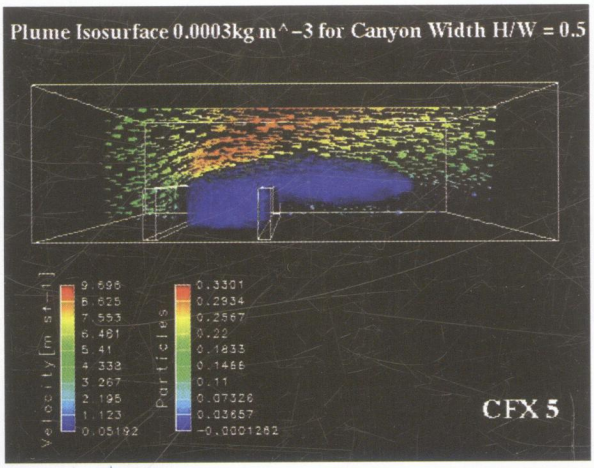
The trend for HKU engineering graduates to go abroad, mainly to UK, for PhD degrees was greatly boosted with the introduction of Commonwealth Scholarships and Li Po Chun Scholarships in 1960 in addition to other scholarships, which were established specifically to enable Hong Kong graduates to study for higher degrees at overseas universities. Quite a number of engineering graduates of the early 60s benefited from these scholarships or other awards. They include:

KONG Fung Kew	BSc(Eng)	1958 CE
	MSc(Eng)	1960
WONG Kai Kit	BSc(Eng)	1959 CE
CHAN Hon Chuen	BSc(Eng)	1960 CE
Lloyd YAM Chung Pong	BSc(Eng)	1961 CE
WONG Sook Leung	BSc(Eng)	1961 EE
TSO Shiu Kit	BSc(Eng)	1961 EE
CHEUNG Shing Tai	BSc(Eng)	1961 ME
CHUNG Hung Wan	BSc(Eng)	1961 CE
	MSc(Eng)	1963
KO Hon Yim	BSc(Eng)	1962 CE
Ronald SO Ming Cho	BSc(Eng)	1962 ME
Raymond HO Chung Tai	BSc(Eng)	1963 CE
Norman KO Wah Man	BSc(Eng)	1963 ME

Most of them became academics while others became consultants after obtaining their doctorate degrees.

It was not until 1957, when Professor S. Mackey arrived to head the Department of Civil Engineering, that research and higher degrees in engineering really began to bud at HKU. He enlisted three 1958 graduates, KONG Fung Kew, WONG Ka Ching, YUEN Bing Chiu and a staff member, Mr. LEUNG Kew Wai, a 1939 BSc(Eng) graduate, to do research under his guidance and they were each awarded an MSc(Eng) degree in 1960. Since then, many more masters degrees were conferred to electrical, mechanical as well as civil engineering graduates.

Professor Mackey also started to enrol PhD students in engineering. The first PhD candidate was a member of teaching staff, CHAN Lok Kwan. He was awarded the degree in 1963 for his thesis *Analysis of Indeterminate Frames by Method of Influence Moments*. The second candidate was CHUNG To Kay, BSc(Eng) 1963, who was awarded the PhD



Pollutant dispersion and wind flow in an urban street canyon

Table 2A MSc(Eng) by research graduates (1929-1965) and PhD graduates (1963-1977)

MSc(Eng)	1929	Ahmed, Sheikh Basheer
	1938	Wei Wing Hon
	1953	John, Huang Wei Hong
	1960	Leung Kui Wai
		Kong Fung Kew
		Wong Ka Ching
		Yuen Bing Chiu
	1961	Chang Tai Hon (Civil)
	1963	Chung Hung Wan (Civil)
		Tao Wing Fai (Civil)
		Huey Chung Tow (Mechanical)
	1964	Robin, Chan Bing Fun (Civil)
		Ma Wing Fat (Electrical)
		Yu Ping Kong (Electrical)
	1965	Shen Chun Ming (Electrical)
PhD	1963	Chen Loh Kwan (Civil)
	1966	Chung To Kay (Civil)
	1970	Ko Jan Ming (Civil)
		Choi Cheung Chuen (Civil)
		Robert Lam (Civil)
		Poon Kwan Leung (Mechanical)
	1971	Ngan Ka Mok (Mechanical)
		Ho Chun Fai (Electrical)
	1972	Cheung Wood Nang (Electrical)
		Nicholas Andrew Halfter (Electrical)
		Ko King Lim (Civil)
		Louis, Lam Chi Hung (Civil)
		Luk Chi Ming (Civil)
		Mai Yiu Wing (Mechanical)
	1973	Ronald Alan Coffee (Electrical)
		Tadeusz Gabriel Kowalski (Civil)
		Nip Kam Fan (Civil)
	1975	Foo Pik Yue (Electrical)
		Andrew, Kwan Siu Hei (Mechanical)
	1976	Michael Collier (Electrical)
		Ralph Kingsley Edgley (Electrical)
		Ho Kar Chung (Civil)
		Lau Kwok Jing (Mechanical)
	1977	Ho Chung Fai (Industrial)
		Wong Kai Yiu (Civil)

degree in 1966 for his thesis *Analytical Investigation of the Behaviour of Rectangular Rafts Resting on Elastic Soils*. He was, in fact, the first HKU engineering graduate to receive a PhD from HKU and was the first to do research work with the first computer in HKU, an IBM 1620 model. After obtaining his PhD, he was immediately recruited by IBM in Hong Kong and began a fruitful career in computer related business.

In 1970, three more PhD degrees were conferred to civil engineering candidates: KO Jan Ming, CHOI Cheong Chuen and Robert LAM. In the same year, the first PhD in Mechanical Engineering was conferred to POON Kwan Leung. A year later, in 1971, the first PhD in Electrical Engineering was conferred to HO Chun Fai, a staff member. The first PhD in Industrial Engineering was conferred to HO Chung Fai in 1977.

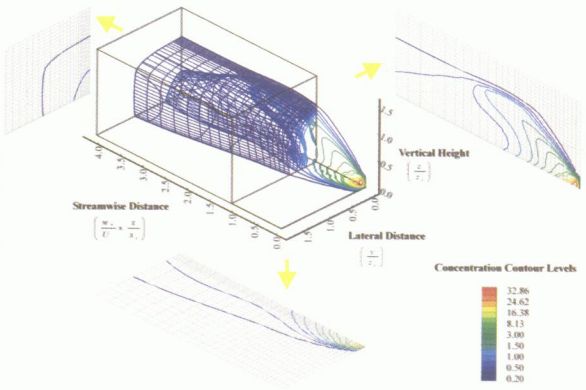
Table 2A lists the names of MSc(Eng) by research graduates up to 1965 and the names of PhD by research graduates up to 1977.

2.2 MPhil and MSc(Eng) by Coursework

In the 1960s, there was great demand for advanced studies after the first degree in engineering. Many people desired to enhance their education with postgraduate studies leading to further diplomas. Some postgraduate study programmes were so intensive that they were worthy of master degrees. Thus, another type of higher degree was considered necessary: the MSc(Eng) by coursework and examinations. In order to distinguish between the master degree by research and the one by course work, the MPhil degree was introduced.

The MPhil degree was first introduced in HKU in 1971 by a change of University Regulations concerning higher degrees. The MPhil degree denotes a master degree by research work with a thesis or dissertation. This was, after a couple of transition years, to replace the MSc(Eng) by research, which would become a higher degree by coursework. The first lot of MPhil degrees in engineering was conferred in 1972.

At the initial stage of implementing the MSc(Eng) by coursework, it was viewed that as this was a higher degree some element of training in research should be retained.



Predicted pollutant concentration under a convective atmospheric boundary layer using a three-dimensional air dispersion model

Because of this, a small research project with a dissertation was included in the curriculum in addition to lectures and coursework. The degree was designed as a part-time course normally lasting two years so as to accommodate practising engineers who had to work during the day but were still eager to further their education.

The first programme leading to the degree of MSc(Eng) by coursework was offered by the Department of Industrial Engineering in 1976. This was followed by the Department of Electrical Engineering in 1977 and then by the Departments of Civil Engineering and Mechanical Engineering in 1978. The Department of Computer Science offered its first MSc(CS) by coursework in 1991. Furthermore, they introduced an additional curriculum involving only coursework, without the small research project and dissertation, so as to appeal to students who were more interested in being exposed to a broader range of engineering subjects.

Over the past two decades, the demand for higher degree programmes by coursework has grown so rapidly that more and more specialised courses are offered and more graduates are produced each year. To meet the needs, each department offers more than one programme and there are also programmes offered jointly by two or three departments. As of today, the Engineering Faculty offers 13 MSc programmes by coursework and examination which are listed below:

Department	Master degree by coursework
Civil	MSc(Eng) in Environmental Engineering MSc(Eng) in Geotechnical Engineering MSc(Eng) in Infrastructure Project Management MSc(Eng) in Structural Engineering MSc(Eng) in Transportation Engineering
EEE	MSc(Eng) in Electrical and Electronic Engineering MSc(Eng) in Communication Engineering MSc(Eng) in Computer and Information Technology
IMSE	MSc(Eng) in Industrial Engineering and Industrial Management
ME	MSc(Eng) in Mechanical Engineering MSc(Eng) in Building Services Engineering
CSIS	MSc in Computer Science MSc in Electronic Commerce and Internet Computing

The number of higher degree students by research also increased dramatically over the last two decades. This reflected to a large part increased research funding, but also an increased influx of research students from Mainland China and other Asian countries. Table 2B shows the total number of higher degree graduates of the Faculty from 1929 to 2000.

Table 2B PhD, MPhil, MSc(Eng) and MSc(CS) graduates (1929-2000, inclusive)

Year	MSc(Eng) by research	PhD	MPhil	MSc(Eng) & MSc(CS) by coursework
1929	1	NA	NA	NA
1938	1	NA	NA	NA
1953	1	NA	NA	NA
Accumulative Total	3	0	0	0
1960	4	NA	NA	NA
1961	1	NA	NA	NA
1963	3	1	NA	NA
1964	3	0	NA	NA
1965	1	0	NA	NA
1966	6	1	NA	NA
1967	3	0	NA	NA
1968	9	0	NA	NA
1969	4	0	NA	NA
1970	8	4	NA	NA
Accumulative Total	45	6	0	0
1971	4	2	0	NA
1972	2	6	4	NA
1973	NA	3	3	NA
1974	NA	0	9	NA
1975	NA	2	2	NA
1976	NA	4	5	0
1977	NA	2	8	0
1978	NA	1	9	11
1979	NA	2	7	15
1980	NA	2	7	10
Accumulative Total	51	30	54	36
1981	NA	2	8	35
1982	NA	5	8	33
1983	NA	3	7	55
1984	NA	4	8	26
1985	NA	4	6	65
1986	NA	3	7	23
1987	NA	6	8	82
1988	NA	13	7	57
1989	NA	5	25	72
1990	NA	12	12	113
Accumulative Total	51	87	150	597
1991	NA	5	16	81
1992	NA	15	17	93
1993	NA	11	11	124
1994	NA	14	13	168
1995	NA	9	15	144
1996	NA	18	36	178
1997	NA	19	18	203
1998	NA	36	35	193
1999	NA	27	33	205
2000	NA	42	47	247
Total (72 years)	51	283	391	2233

NA - Not Available

That means, the Faculty of Engineering has, in the course of 90 years, produced:

No. of graduates	Degree	Period
51	MSc(Eng) by research	1929-1972
391	MPhil	1972-2000
283	PhD	1963-2000
2233	MSc(Eng) & MSc(CSIS) by coursework	1978-2000

The number of PhD graduates has increased from a few to over 30 a year. The most notable expansion is in the MSc(Eng) and MSc(CSIS) by coursework programmes, with over 200 graduates in the year 2000.

A debate contest at the Sun Yat-sen Place

3. STUDENT FEES

Inscription on the front of the Eliot Hall

Tertiary education has never been free of charge in Hong Kong. The University of Hong Kong always charged a tuition fee common to all faculties. While the fee increases appeared modest until the early 1980s, an almost ten-fold increase has taken place since then (Table 3A). This is more related to Government policies on the degree of self-financing of University education and is not intended to recover the full cost of operating the University. At present, the tuition fee is set at 22% of cost.

Table 3A Annual Composition Fees in various periods 1913-2000

Period / Year	Bachelor degrees in Eng	Coursework MSc degrees in Eng (Full-time)	Research MSc (Eng) / MPhil / PhD degrees (Full-time)
1913-1920	$300 *	NO	NO
1931-1941	$400	NO	NA
1951-1955	$1,150	NO	NA
1961	$1,150	NO	$400
1966	$1,500	NO	$400 !
1971	$1,500	NO	$400/$650 !
1976	$1,750	$1,750	$1,750
1981	$2,300	$2,300	$2,300
1986	$4,800	$4,800	$4,800
1991	$10,000	$10,000	$10,000
1996	$37,350	$37,350	$37,350
2000	$42,100	$42,100 #	$42,100

Eng – Engineering
$ – HK$
* – In addition to the composition fee, every student had to pay $240 for board and lodging. Besides, they might be requested to pay for books and materials in laboratories, and subscriptions to the University Union and to Clubs. Therefore, it would be safe for an intending student to calculate on $650 as the basic amount to cover his/her University expenses.
! – Graduates of other universities were required to pay supervision fee in addition to the laboratory and workshop fee listed above.
– Students reading for self-funded MSc programmes were charged differently.
NO – Programme not offered
NA – Information not available

4. EXTERNAL ASSESSMENT, ACCREDITATION AND RECOGNITION OF ENGINEERING DEGREES

Students taking their degree examinations in the Loke Yew Hall in the old days

Since the beginning of the Faculty, the engineering examination papers have always been sent to the UK to be assessed by external examiners, mainly well-known professors; and every year since 1916 a statement was received that certain graduates of Hong Kong had reached the standard that was required for the honours BSc(Eng) in the University of London. After the war, this arrangement continued and the standard of the BSc(Eng) degree in Civil Engineering was reckoned to be comparable to that of the UK universities. In July 1955 full recognition of the BSc(Eng) degree in civil engineering was accorded by the Institution of Civil Engineers (ICE), and soon after the Institution of Structural Engineers (IStructE) also gave recognition in February 1956.

The BSc(Eng) degree programmes in Mechanical and Electrical Engineering, which were reinstated in 1958, were also recognised by the Institution of Mechanical Engineers (IMechE) and the Institution of Electrical Engineers (IEE) respectively in 1963, though before the war full recognition had been given to the degrees in mechanical and electrical engineering by the professional institutions in London.

The BSc(Eng) degree in Industrial Engineering was recognised by the Institution of Production Engineers (IProdE) in 1985.

The recognition would normally be reviewed every five years with the institutions in the UK sending a team of moderators to accredit the degree programmes.

In 1984, the decision to revert the sovereignty of Hong Kong to China was made. By 1988, the Hong Kong Institution of Engineers (HKIE) was anxious to gradually build up its experience and to develop its own credibility in the process of accreditation of local engineering qualifications. Both IEE and ICE had indicated that there would be no objection to HKIE's observers participating in their 1988 accreditation visits in Hong Kong, in order that HKIE could gain experience in accreditation. In 1995, HKIE joined the Washington Accord, gaining the same recognition rights to graduates of the degree programmes accredited by HKIE as the other participating countries, which at present include Australia, Canada, Ireland, New Zealand, South Africa, the United Kingdom and the United States of America in addition to Hong Kong. Since then the HKIE has taken over entirely the responsibility of accreditation of engineering degree courses in Hong Kong from the UK institutions.

Besides the accreditation visits by the professional institutions, the programmes of our Bachelor Degree in Engineering and all programmes for MSc(Eng) by coursework and examinations are subjected to review by external examiners to ensure that our academic standard is comparable to the international standard and our graduates meet the basic theoretical and practical training requirements of the professional bodies. Even after 1997, the external examiner system has been going on as usual, though new ideas for changes are under consideration.

The standard and quality of all higher degrees by research (MPhil or PhD) is safeguarded by the use of international experts as external examiners. The process is monitored by the Faculty Committee on Higher Degrees and more recently also by the newly established Graduate School.

In addition, in the 1990s, a number of Faculty and Departmental Engineering Advisory Committees comprised prominent local engineers have been established. These committees meet regularly and contribute greatly to relevant curriculum and research development.

Students taking their degree examinations in the Loke Yew Hall in 2000

5. RELATIONSHIP BETWEEN THE FACULTY AND THE HONG KONG INSTITUTION OF ENGINEERS

THE HONG KONG INSTITUTION OF ENGINEERS
香港工程師學會

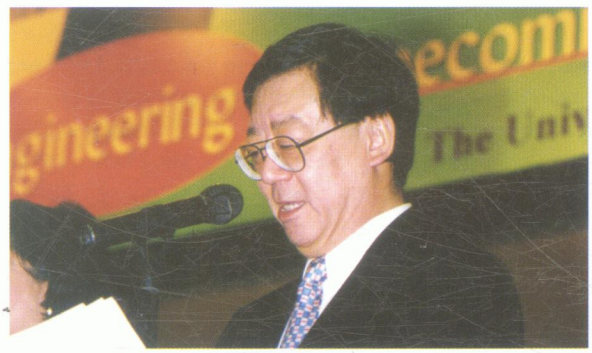
The relationship between the Faculty and The Hong Kong Institution of Engineers (HKIE) is much more than accreditation of degree programmes and professional assessment. The Hong Kong Institution of Engineers, formerly known as The Engineering Society of Hong Kong, was founded in 1946. Since its foundation, many of the Faculty's staff members and alumni have rendered services to HKIE in various capacities, such as professional interviewers, division chairmen, chairmen or members of various committees including disciplinary panels, Council members, and moreover as Vice-Presidents and Presidents.

Over the years, at least 13 of alumni or faculty members have served as President of HKIE or its former body known as Engineering Society of Hong Kong (1947-1975), as listed in Table 5A.

Table 5A Faculty members and alumni as Presidents of HKIE

1958-1959	S. Y. King*
1960-1961	S. Y. Chung
1964-1965	S. Mackey*
1976-1977	S. Y. King*
1987-1988	R. C. T. Ho
1989-1990	S. P. W. Wong*
1990-1991	James Chiu
1993-1994	T. P. Leung
1995-1996	Edmund K. H. Leung
1997-1998	Francis S. Y. Bong
1999-2000	C. C. Chan*
2000-2001	John W. K. Luk
2001-2002	Joseph M. K. Chow

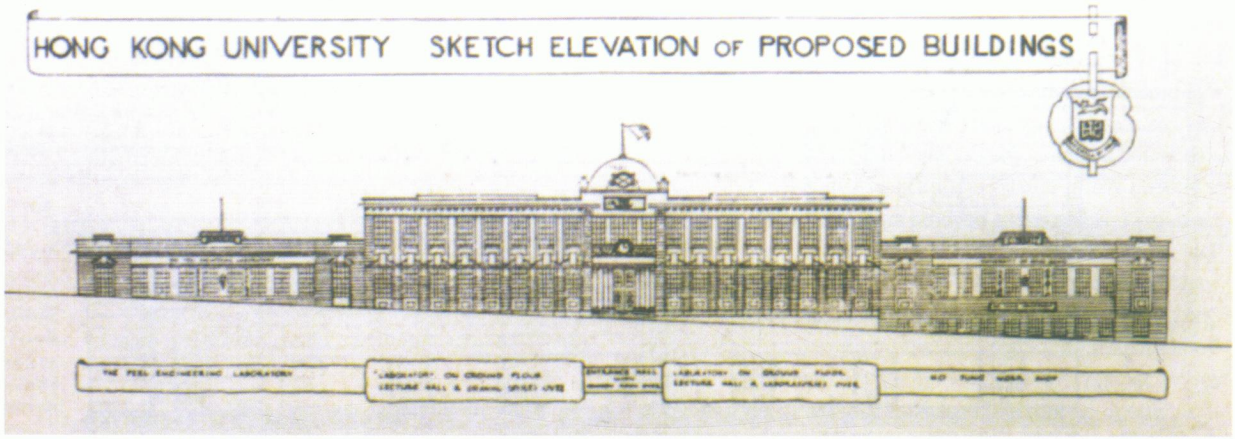
* Faculty member



Ir. Dr. Joseph M.K. Chow at the Engineering Homecoming Dinner 1997.

Ir. Dr. The Hon. Raymond C.T. Ho (right) chatting with a guest and Dr. Y.S. Cheung, the former Dean of Engineering (centre) at a cocktail party of the Faculty, September 1999

6. ENGINEERING BUILDINGS



Before 1960 the major engineering buildings to provide accommodation for laboratories, workshop, lecture-hall and staff and office rooms were Ho Tung Workshop (1925), Peel Laboratory (1934) and Duncan Sloss Building (1950). The floor areas of the three buildings were 2,053 m^2, 2,137 m^2, and 2,903 m^2, respectively, altogether 7,093 m^2.

With the re-instatement of the Departments of Electrical and Mechanical Engineering in 1960, accommodation and space for engineering became very tight. An Electrical Machinery Laboratory, opened in 1961 with generous contributions of many engineering firms, occupied the basement of the Duncan Sloss Building. Mechanical laboratories were provided on the ground floor of the Ho Tung Workshop.

Around 1964, Building 17, originally occupied by the Medical Faculty, was handed over to the Engineering Faculty and used primarily by the Electrical Department. Annexes had been erected, false floors constructed, and extensive use was made of partitioning; all to fully utilise the available accommodation.

Not until 1971 when the Redmond Building was completed at a cost of about HK$860,000 was there further relief of space. It was a 5-storey building with a total floor area of 1,672 m^2. At first it housed the Department of Mechanical Engineering as well as a radioisotope laboratory. In 1996 it was renamed Yam Pak Building, to honour the famous Cantonese Opera artists Yam Kim Fai and Pak Suet Sin for a generous donation to the University.

The next major capital programme for an engineering building involved the site of the old Digby Building, which was demolished in 1977 to make way for the Haking Wong Building at a gross cost of approximately HK$71 million. The building was named after Dr. Haking Wong for his contributions to the University. Dr. Wong was a well-known entrepreneur and industrial leader and a pioneer in Hong Kong to manufacture and export optical lenses and cameras. He gave a generous donation of HK$6 million to HKU. The Haking Wong Building was opened by Dr. Haking Wong, the Hon. Sir Albert Rodrigues, and Dr. the Hon. Rayson L. Huang, then Vice-Chancellor of HKU, on October 6, 1983. It is a 10-storey building with a covered area of 2,910 m^2. and a total floor area of 17,264 m^2. When it opened in 1983 it housed all departments in the Faculty and the floors were roughly used as follows:

8/F Electrical and Electronics Department offices and labs
7/F Mechanical Engineering Department (ME)
6/F Civil Engineering (CE)
5/F Industrial Engineering and Faculty Office
4/F Podium - Open Space
3/F Computer labs and light labs
2/F Drawing Offices, CE Materials lab, Soil lab
1/F Industrial and Mechanical Engineering labs
GF Workshop
LG CE and ME heavy labs

After all the departments and most laboratories had moved into Haking Wong Building, the three old engineering buildings, Ho Tung Workshop, Duncan Sloss Building and Peel Laboratory were handed over to the Highways Department. They were eventually demolished in 1990 to make way for a slip road and widening of Pokfulam Road.

The Composite Building (1985) consists of a 6-storey carpark, two floors of classrooms, three floors of students' amenities centre (Hsu Long Sing Amenities Centre with a large canteen

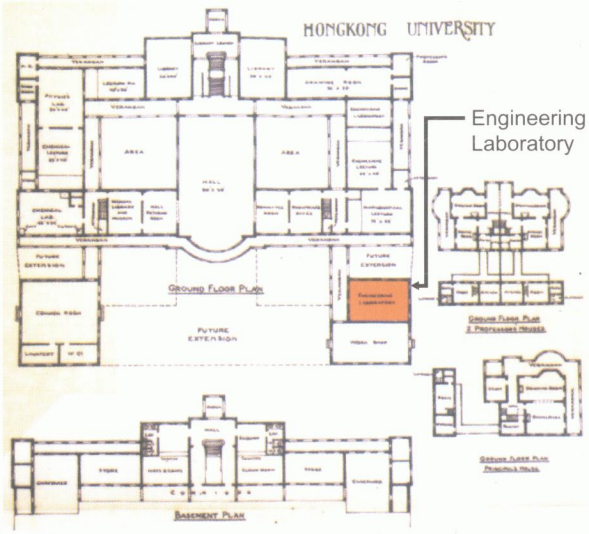
The Ho Tung Engineering Workshop

which occupies almost the entire frontage of the Centre at its lower "ground floor" level) and the 10-storey student residence — Simon K.Y. Lee Hall. Engineering just occupies the two floors of classrooms and workshops in the Composite Building.

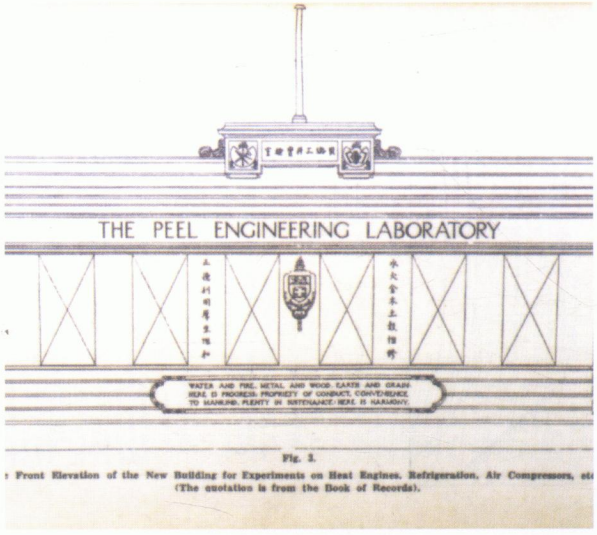
With the rapid expansion of teaching and research activities in the 1990s, the accommodation for the Faculty of Engineering was grossly inadequate again and a new engineering building was required. The Chow Yei Ching Building was constructed adjacent to the west side of Simon K.Y. Lee Hall which is next to Haking Wong Building. The Chow Yei Ching Building is a 13-storey building with a covered area of 1,300 m^2 and a total floor area of 13,941 m^2. It was completed in 1995. Dr. Chow Yei Ching, after whom the Building is named, is the Founder, Chairman and Managing Director of the Chevalier Group of Companies, and a distinguished entrepreneur. Dr. Chow is very actively involved in a number of community services, charitable and industrial organisations. Dr. Chow's motto is "From society, to society". Every year, Dr. Chow and Chevalier make donations to different projects that are beneficial to the Hong Kong community as a whole. In 1995, Dr. Chow made a donation of HK$ 40 million to the University of Hong Kong Foundation for Educational Development and Research. To demonstrate in tangible fashion the University's appreciation of Dr. Chow, the new engineering building was named Chow Yei Ching Building to record his generous beneficence. The Building was officially opened by him and Professor Wang Gungwu, the then Vice-Chancellor on November 9, 1995. Chow Yei Ching Building mainly accommodates the Department of Electrical and Electronic Engineering (EEE) and the Department of Computer Science and Information Systems (CSIS). One floor is used by the Department of Civil Engineering to accommodate a 487 m^2 hydraulics laboratory.

After the Department of EEE moved out from the Haking Wong Building, the Department of Industrial and Manufacturing Systems Engineering (IMSE) moved up to the 8/F to occupy the whole floor. The space left behind by the Department of IMSE on the 5/F was shared by other engineering departments.

Table 6A summarises the total floor area occupied by the Faculty. Compared to the 1960s, the total available floor area increased by over four times (Table 6B) illustrating the phenomenal physical growth of the Faculty as a result of increases in student population and research activities.



Architectural Drawing of Main Building (1910) indicating Engineering Laboratory



Main Building

The former Electrical Engineering Building (converted from Anatomy and Physiology Building)

Table 6A Summary of Available Floor Area of Engineering Buildings

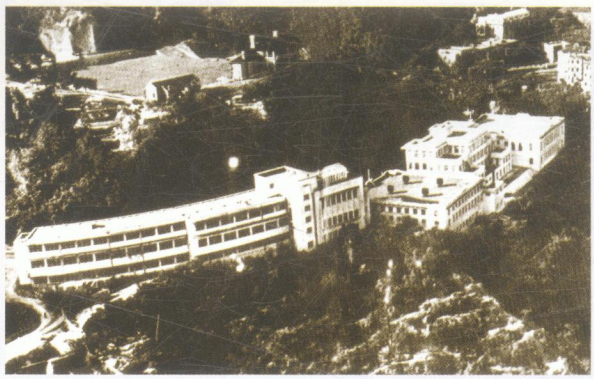
Building	No. of Storeys	Covered Area (m^2)	Total floor area (m^2)
Haking Wong Building	10	2,910	17,264
Chow Yei Ching Building	13	1,300	13,941
Yam Pak Building	5	365	1,672
Composite Building	20 *	1,550	2,955
Total	-	6,125	35,832

* only two storeys occupied by Engineering

Table 6B Comparison of the Total Available Floor Areas of the Former and the Current Engineering Buildings

	Former	Current
Buildings	- Ho Tung Workshop - Peel Laboratory - Duncan Sloss Building (shared with Architecture) - Redmond Building	- Haking Wong Building - Composite Building (two floors) - Chow Yei Ching Building - Yam Pak Building
Total Area	8,765 m^2	35,832 m^2

Haking Wong Building (left) and Chow Yei Ching Building (right)



Bird's eye view of the three former engineering buildings: Peel Laboratory, Duncan Sloss Building and Ho Tung Workshop

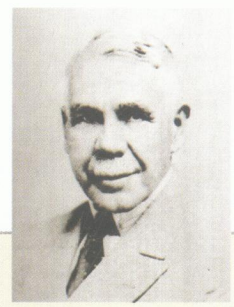
7. ACADEMIC LEADERS

The head of the procession from Congregation to the Duncan Sloss Building in March 1950, peacefully making its way from the Main Building along Pokfulam Road.

This section is not meant to be an exclusive or exhaustive account as more details of individual departments and staff can be found in departmental publications.

7.1 Engineering Faculty before the Second World War

From the birth of the University until the Second World War, the Engineering Faculty had been led by a couple of professors in engineering and a few professors in science. As there were very few research students in engineering, their contributions were mainly in teaching and administration during this era.



Professor C.A. Middleton Smith

a mechanical engineer by qualification, was Taikoo Professor since the foundation of the Faculty in 1912 and retired in 1939.

"The Invitation in 1912. ...When the cable from Hong Kong, inviting me to occupy the Chair of Engineering there, reached me in London, it came as a great surprise, for it had seemed certain that, for the rest of my working life, my destiny was in the University of London. ...Various [other] people, including Sir Edward Stubbs, who subsequently became governor of Hong Kong, advised me to refuse. Then a long talk with Sir James Cantlie, teacher, rescuer and revered friend of Dr. Sun Yat Sen, made me decide to accept, a decision never regretted. ...

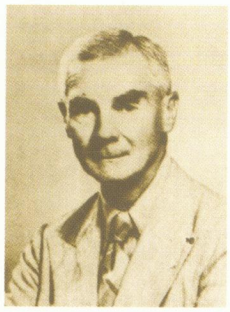
First Impressions of Hong Kong. ...The beauty of the scenery of Hong Kong was a delightful surprise, but the University was a disappointment. The most encouraging fact about that centre of learning was that Sir Charles Eliot, a famous scholar in countries besides Britain, was its first Vice Chancellor. He had made a great reputation as a scholar at Oxford University; he spoke twenty-seven languages fluently; he had knowledge of several others and he had been famous as a diplomat. He was extremely kind to me, but he disliked the work of engineers, which he said made cities filthy with smoke ... It was curious that, although Sir Charles had a giant intellect, he had great difficulty in adding up a column of figures of pounds, shillings and pence....

For the first year of work in the University the only full time members of the staff were Sir Charles Eliot, Mr. Hinton (Registrar and lecturer in economics) and myself. The finances of the University appalled me ...The contrast in our knowledge of mathematics may explain the fact that Sir Charles did not worry about the finances of the University, but my anxiety, during that first year, made me at times almost regret resigning my work in London. However, the finances rapidly improved. ... These successes were largely due to the diplomacy and great influence of Sir Charles Eliot. Much as he disliked mechanization – he would never use a telephone and he wrote all communications himself – yet he gave me great help in the development of the Engineering laboratories and workshops. ...

Excerpt from "Engineering in the Far East 1912-1949" by Professor C.A. Middleton, M.Sc., M.I.Mech.E., LL.D. (Honoris causa), Hong Kong University Engineering Journal, Vol. XIII, November 1949.

Professor T.H. Mathewman

became the first Professor of Electrical Engineering in 1914. He served until 1918. Professor A.G. Warren, the first Professor of Physics in the University, was the Ellis Kadoorie Professor and became Professor of Electrical Engineering in 1918. He resigned in 1921 to be succeeded by Professor M.H. Roffey who served until 1941.



Professor F.A. Reamond

in 1920 became the first Professor of Civil Engineering. After the retirement of Professor Middleton Smith in 1939, Professor Redmond became the Taikoo Professor of Engineering until the outbreak of war. He and his wife were interned as P.O.W. for three and a half years and then went back to Ireland for a brief period.

Other Professors who served in the Engineering Faculty were:

1914-18	Professor T. Stuart of Mathematics
1918-41	Professor W. Brown of Mathematics
1919-41	Professor G.T. Byrne of Chemistry
1920-23	Professor D.C.H. Florence of Physics
1924-41	Professor W. Faid of Physics

7.2 Engineering Faculty after the Second World War

Department of Civil Engineering

In 1948, at the urgent request of the University, Professor Redmond returned to Hong Kong for two years to re-establish the Department of Civil Engineering and the Engineering Faculty. Thereafter the Department of Civil Engineering was headed by three different academics each for a very brief period of two years: Professor K. Billig 1950-52; Professor R.C. Vaughan 1952-54 and Dr. S.Y. King 1955-57 (see under the Department of Electrical and Electronic Engineering).

Professor F.A. Redmond

(1914-1942 ; 1948-1950), further to his contributions before the war, did a great service to the University by re-establishing civil engineering and producing the first batch of post-war engineering graduates in 1950.

Professor K. Billig

(1950-1952) obtained a Doctor of Technical Sciences degree from Vienna Technological University and was a specialist in pre-stressed concrete. He organised a course lasting six weeks on his specialty for 100 graduate engineers and architects and introduced a post-graduate research course necessitating the purchase of considerable amounts of modern equipment for experimental testing. A pre-tension yard and some high tensile wire, which were still lying in the Peel Laboratory in the late fifties, probably indicated that he might have been planning to do more work on pre-stressed concrete, but he left the University after serving only two years.

Professor R.C. Vaughan

(1952-1954) complemented his predecessor and did much to re-organise the curriculum and syllabuses of the civil engineering degree programme with the objective of an honours degree course recognised by the Institution of Civil Engineers.

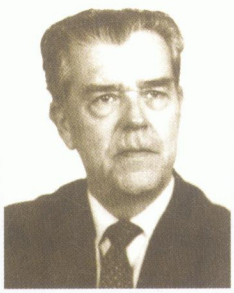
The period of unstable short-term headship in civil engineering ended with the arrival of Professor Sean Mackey.

Professor Sean Mackey

(1957 - 1976 retired) joined the University in 1957 as Taikoo Professor and Head of the Department of Civil Engineering. He quickly promoted research activities and introduced PhD degree programmes in engineering. Seeing that buildings in Hong Kong were getting higher and higher and there was no local data for wind loading in their design, he acquired financial support from the British and Hong Kong Government, as well as the private sector to establish an experimental wind research station at Cape D'Aguilar (see photo at page 106). The station was equipped with four 180-foot tall towers erected for the measurement of wind speed and wind profiles. There was also a 10-storey full-scale steel frame building purposely built for the study of the response of tall building structures under typhoon conditions. Subsequent to the acquisition of a large amount of valuable data, the Centre of High Building Research was established in May 1969, providing a platform for the exchange of expertise in tall building design. This was the first large-scale research project ever undertaken in the Faculty; in many ways this project was similar to a present day "Area of Excellence" in scope, funding, and impact

(Editor's note: Since 1998 the University Grants Committee has been inviting proposals for funding strategic areas with demonstrated research strength, with a view of making a mark internationally). He supervised several PhD candidates on this project. The famous ones are the "3 aces in wind engineering": Drs. Edmond Choi, Robert Lam and Louis Lam, who are still serving in academic institutions. The most serious working hours for the research team were the time when Typhoon Signal No.10 was hoisted and they had to go out to the wind station at D'Aguilar to collect data under the threat of the storm. The research project had put Hong Kong on the international map as a centre for the study of wind effects on structures. Besides his well-known wind engineering research work, Professor Mackey also made significant contributions in steering the course of the Faculty of Engineering as Dean from 1957 to 1967. He was awarded DSc by the National University of Ireland in 1974 and HonDSc by The University of Hong Kong in 1977. He was honoured as a Knight of the Order of St. Gregory the Great, Civil Class by the Pope in 1979 for his service to the Catholic church and in public affairs.

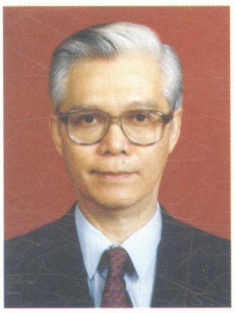
Professor Mackey retired from the University in 1976 and returned to Dublin, Ireland. However, his expert opinion was still very much sought after by the construction industry in the following years. He was then a frequent visitor to Hong Kong and continued to contribute to the local community. Professor Mackey passed away in June 1997 in Dublin. He was greatly respected by his former staff and students.



Professor Peter Lumb

(1954 - 1986 retired) joined the University in 1954 as Lecturer in the Department of Civil Engineering. He was promoted to Senior Lecturer, Reader and Professor respectively in 1963, 1966 and 1976. His pioneering research work on residual soils, rain-induced slope failures and geotechnical reliability gained international recognition. He was also a specialist in soil engineering in Hong Kong as demonstrated by his appointment by the Hong Kong Government for the investigations into the cause of settlements of buildings (1964) and landslide disasters (1976) and his contributions in the 'Geotechnical Manual for Slopes' published by the Geotechnical Engineering Office (GEO). He was awarded DSc by the University of London in 1977 and the Rupert H. Myers Medal by the University of New South Wales in 1980 for his significant contributions in geotechnical engineering.

He supervised many students for master degrees by research. Many of them continued to pursue a PhD degree abroad and became outstanding academics and consultants in the field of geotechnical engineering. To name a few: Dr. Paul Y.L. Tong, Dr. H.Y. Wong, Dr. Greg C.Y. Wong, Dr. K.K. Tsui, Professor C.F. Lee, Dr. Peter K.K. Wong, Professor K.T. Law and Dr. Victor K.S. Li. He retired from the University in 1986 and moved to Sydney, Australia. Unlike Professor Mackey, he never did any more consultancy work after retirement and just enjoyed life and played golf. He travelled between Hong Kong and Sydney from time to time to enjoy the most comfortable weather in each place. He passed away in December 1998 in Melbourne, Australia. He had groomed many geotechnical engineers in Hong Kong and had won great respect from his former students. With their kindness and generous donations, the "Professor Lumb Trust Fund" was set up and a distinguished lecture series known as "The Lumb Lectures" was established in 1999 to commemorate his contributions.



Professor T.C. Liauw

(1968 - 1992 retired) joined the Department of Civil Engineering as Lecturer in 1968. He was promoted to Senior Lecturer, Reader and Professor respectively in 1975, 1980 and 1988.

His earlier research interest was stress analysis and photo-elasticity. Later on, he extended his research to cover various types of building structures and became very active in both fundamental and applied research. His research work on infilled-frame structures won him a DSc degree from Southampton University in 1985. The model test of the Hong Kong Stadium, which helped to solve many of the design problems, was one of his famous applied research projects. He supervised several PhD and MPhil students, namely Dr. John W.K. Luk, Dr. Albert K.H. Kwan and Mr. K.W. Leung, who later became outstanding academics and practising engineers. Professor Liauw retired from the University in 1992.

Professor Y.K. Cheung

(1977 - 2000 retired) joined the University in 1977 as Professor and Head of the Department of Civil Engineering. He is an internationally renowned researcher and scholar, well-known in particular for his research in engineering mechanics and his pioneering contributions to the finite element and finite strip method for solving engineering problems. Under his academic leadership, the Department has rapidly become the main focus of Computational Mechanics in this part of the world. A number of postdoctoral fellows and visiting research scholars have come here to work under him on many interesting projects. He has supervised nearly thirty PhD students: Drs S. Swaddiwudhipong, S.L. Lau, L.G. Tham, Fan Sau Cheung, V.P. Iu, Chen Shu Fai, F.T.K. Au, to name just a few. All have become professors and top academics in Hong Kong, Macau, China and abroad. He has definitely promoted the Department to an internationally renowned level with the pioneering research work on computational methods.

His close friends and former students organised the "Y.K. Cheung Symposium" held on 15 December 1994 in Hong Kong at his 60th birthday and 30 years of contribution in engineering to pay tribute to his achievements and success. He was awarded DSc by the University of Wales Swansea in 1973 and DE by the University of Adelaide in 1982. He is a FREng of the prestigious Royal Academy of Engineering (1987), the first FREng in the Faculty of Engineering, and an Academician of the Chinese Academy of Sciences in China (2000). He was elected President of the Hong Kong Academy of Engineering Sciences in 2001. He won numerous honorary awards, including an OBE in 1995, and the China National Natural Science Prize in 1989 and 1999. He held the title of Taikoo Professor (1977 - 2000) and was Dean of the Faculty of Engineering (1978-1987), Pro-Vice-Chancellor (1988-2000), Acting Deputy Vice-Chancellor (1996-2000) and Acting Registrar (1996-1998).

Though he retired from the post in the Department in 2000, he has been re-appointed by the University as Special Advisor to the Vice-Chancellor and Honorary Professor and is still very active in the administrative duties of the University and in research matters. In 2001, he was awarded an Honorary DSc by The University of Hong Kong and an Honorary LLD by the University of Wales.

Professor J.H.W. Lee

(1980 -) joined HKU in 1980 as a Lecturer and was appointed Chair Professor in 1995. He is an internationally recognised expert in hydraulics and environmental engineering. He has edited five books and published over 100 technical articles in international journals and books. His particular contributions include methods for predicting initial mixing of buoyant wastewater discharges which are used internationally for ocean outfall design and environmental impact assessment. He is an Associate Editor of the ASCE Journal of Hydraulic Engineering, China Ocean Engineering, Water Quality and Ecosystem Modeling, and Korea International Journal of Water Engineering Research. For his contributions to the theory of buoyant jets, he was awarded the Alexander von Humboldt Research Fellowship by the German Government in 1991 and the Croucher Foundation Senior Research Fellowship in 1998. He is also Consulting/Advisory Professor of Tongji University and Hohai University.

Over the past two decades, Professor Lee has trained the first generation of "high tech" environmental hydraulic engineers in Hong Kong, and is also the principal architect of a recently established inter-disciplinary Area of Excellence in Water Environment Engineering. Professor Lee has served as expert advisor to international consultants and the Hong Kong Government on many local and overseas projects that include the UK Marine Outfall Design Guide, River Indus Hydraulic Model Study, Sydney Deepwater Outfall Modelling Study, Hong Kong Strategic Sewage Disposal Scheme, Shanghai Sewage Project, Tai Hang Tung Flood Storage Scheme, and the European Economic Community Harmful Algal Bloom Expert System (HABES 2001) research project. He is the Chairman of the Fluid Mechanics section of the International Association for Hydraulic Engineering and Research (IAHR) and Vice-Chairman of the IAHR Asian-Pacific Division. He has also served on the Engineering Panel of the Hong Kong Research Grants Council from 1993 to 1999, and also as the Chairman of the University Grants Committee Research Assessment Exercise (1999) Built Environment Panel. He is currently Dean of Engineering.

Professor H.H.P. Fang

(1987 -) joined the Department of Civil Engineering in 1987 after 12 years of industrial research in the US. He is an expert in water and wastewater treatment technologies, including anaerobic degradation, nutrient removal, membrane separation and biofilms. Professor Fang is the recipient of several research awards, including the Senior Research Fellowship of Croucher Foundation (1999-2000) and the HKU Outstanding Researcher Award (1999-2000). He has trained at HKU 11 post-doctoral fellows, six PhD and eight MPhil students. His present research interests include biofilm and biocorrosion, degradation of recalcitrant pollutants and hydrogen production from wastewater treatment.

Professor Fang was a member of the HKIE Environmental Division Committee (1989-1997), and has served on the Engineering Panel of the Hong Kong Research Grants Council since 1998. He is currently an Editorial Board Member of the journal of *Advances in Environmental Research* (Elsevier, Oxford). He is also Visiting / Adjunct Professor of the National Taiwan University and six universities in China.

Professor C.F. Lee

(1994 -) joined the Department of Civil Engineering in 1994 as Reader and became Professor in 1998. He was Head of Department from 1999 to 2000. Since December 2000 he has been serving as Pro-Vice-Chancellor of the University. His current research interests include slope stability and landslide hazard mitigation, rock mechanics, seismic hazard analysis, dam engineering and feasibility evaluation of large infrastructure projects.

Department of Mechanical Engineering

As mentioned before, Professor C.A. Middleton Smith, a mechanical engineer by qualification, was appointed the Taikoo Chair of Engineering, the first Chair of Engineering founded in the University, in 1912 until his retirement in 1939. Then Professor Redmond took up the Taikoo Chair until the outbreak of the war.

Professor H.C.H. Gurney

(1967 - 1973 retired) joined the University in 1967 and remained in HKU until 1973 when he retired and returned to live in the UK. During his tenure he oversaw the first phase of expansion of the mechanical engineering programme. Not only did he revise and update the syllabuses of the course but he had also hired a number of excellent academic staff, who were later to become professors at the University, to implement these changes. Until his arrival research was minimal in the Department of Mechanical Engineering. He gradually established the research culture and ethos, and by the time he left, the department was already gaining international recognition in the areas of noise and fluids, fracture mechanics and automation.

Professor Gurney was a man of many talents: engineer, poet and philosopher. His poems and research ideas would have been conceived during his frequent weekend walks in Lantau Island. He had a passion for classical thermodynamics and continuum mechanics and it was during this period in HKU that Professor Gurney developed and nurtured some new and exciting research work on fracture. These included: the energetic approach to non-linear fracture mechanics, crack stability and R-curves, size effect and beam-on-elastic-foundation model. The evolution and confirmation of his many ideas and concepts were developed independent of parallel work done elsewhere.

Professor E.A. Bruges

(1973 - 1982 retired) joined the University in 1973 as Professor and Head of Mechanical Engineering after holding similar positions in UK and Singapore. He used his enormous energy to double the size of the Department and gained full accreditation for its degree programme from the Institution of Marine Engineers. Professor Bruges had a broad view of Mechanical Engineering and assembled a team of excellent staff with wide professional experience and diverse academic expertise in areas such as tribology, naval architecture and marine engineering. He also set up a marine engineering stream within the Department to support the then flourishing shipping industry in Hong Kong.

Professor Bruges was very active in public service and his work on the safety of gas hot water heaters and his court testimony in the late 70s helped to change the relevant government rules. After his retirement in 1982, Professor Bruges stayed in Hong Kong and continued to practice as an engineer to serve the needs of the local industry until his recent death in 2000.

Professor C.L. Chow

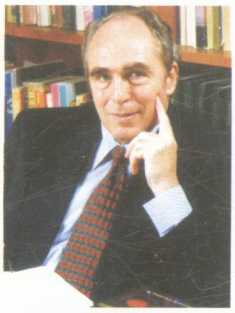
(1968 - 1977 and 1982 - 1990) first joined the Department of Mechanical Engineering in 1968 and was promoted to Reader in 1976. After 10 years of academic career at the University, he moved back to the US in 1978 and worked with the BF Goodrich Company for four years. Professor Chow re-joined HKU in 1982 and was appointed as Professor and Head of the Department of Mechanical Engineering, The University of Hong Kong, and he served in that capacity until 1990, when he went back to the US to be Professor and Chair of the Department of Mechanical Engineering, University of Michigan-Dearborn.

He is the Editor-in-Chief of the International Journal of Damage Mechanics and member of the editorial board of the Journal of Mechanical Engineering Science. He also has served as a member of the International Council on Pressure Vessel Technology and has published over 200 technical papers and presented over 100 invited lectures and seminars. Professor Chow's research interests include fracture and damage mechanics, creep, fatigue, impact mechanics and mechanics of materials.

Professor Norman W.M. Ko

(1969 - 2000 retired) joined the Department of Mechanical Engineering in 1969 as a Lecturer and was appointed Chair Professor in Fluid Dynamics in 1987. In 1995, Professor Ko was awarded the DSc by The University of Hong Kong for his original and outstanding contribution in research. Professor Ko was active in research and has published in a large number of international journals and conference proceedings, specialising in the areas of noise, acoustics and fluid mechanics.

Besides his academic pursuits, Professor Ko is also a renowned artist, having received numerous awards for his sculptures, paintings and underwater photography, with many of his sculptures on public display in Hong Kong. Professor Ko is a Fellow of the Royal Society of Arts in the United Kingdom, and had been a Visiting and Honorary Lecturer in the Department of Fine Arts of HKU for a number of years.



Professor B.J. Duggan

(1977 -) was educated at the University of Birmingham where he obtained his PhD in Industrial Metallurgy in 1972. Following this he became a Fellow in High Voltage Electron Microscopy until he joined the Department in 1977 as a Lecturer. He rose through the ranks and was appointed Chair Professor in Materials Science Engineering in 1995. His research interests are in the links between microstructure and mechanical properties, especially texture aspects. He and his co-workers solved the "texture transition" problem, introduced the modern Microgrowth Selection Theory and the Deformation Induced Grain Subdivision model, and for this and his other contributions he is a permanent member of the International Committee responsible for the International Conferences on Textures of Materials (ICOTOM). He has published many papers in international journals, as well as giving invited and guest lectures. In 1995, Professor Duggan was granted a higher doctorate from the University of Birmingham and in 1997 was awarded one of the first four Croucher Senior Fellowships of the Faculty. He has been concurrent Professor of Nanjing University since 1997, a member of the Engineering Panel of the RGC for the past six years, and has served twice as a member of UGC's Research Assessment Panel. Professor Duggan was Head of the Department from 2000 to 2002.

Professor Allen T.Y. Chwang

(1991 -) joined The University of Hong Kong and took up his current post as Sir Robert Ho Tung Chair of Mechanical Engineering in 1991, and was Head of the Department from 1991 to 1999.

Professor Chwang is an Honorary Fellow of the Institute of Mechanics, Chinese Academy of Sciences, and Fellow of the Hong Kong Academy of Engineering Sciences. He is also Honorary Professor, Advisory Professor, and Guest Professor of a number of leading universities in Mainland China, including Tsinghua University, Shanghai Jiaotong University, Fudan University and Xi'an Jiaotong University. Professor Chwang has published over 250 technical papers and presented over 100 invited lectures/ seminars. His current research interests include low-Reynolds-number flow, nonlinear water waves, two-body interaction hydrodynamics, flow past porous media, and innovative harbour design and research. His investigation into the effect of navigation and reclamation on waves in Victoria Harbour will help to pacify the bumpy water in Victoria Harbour. Recently, Professor Chwang won an Outstanding Researcher Award from HKU.

Department of Electrical and Electronic Engineering

Professor S.Y. King

(1948 - 1980 retired) is a pre-war HKU electrical engineering graduate of 1940. After the war, he joined the Engineering Faculty in 1948 as an assistant lecturer, teaching electrical engineering to Civil Engineering students since there was only a Civil Engineering programme then. He was promoted to Senior Lecturer in 1955 and appointed Head of Department 1955-57. When the Department of Electrical Engineering was re-established in 1960, he was promoted to Reader and appointed the first Head of the Department of Electrical Engineering (EE). He became a Professor in 1966 and remained Head of the Department till he retired in 1980, apart from a three-year spell (1974-77) when he was Pro-Vice-Chancellor of HKU. After retirement, he was honoured with the HonDSc and the title of Emeritus Professor.

Professor King is an expert on underground power cables, especially the field aspects, and has published two books on the subject. He has supervised many research students, including some very senior engineers from the power utilities such as Dr. N.A. Halfter, Dr. R.K. Edgley, Mr. S.K.L. Poon. He was the President of the Engineering Society of Hong Kong in 1958 and again President of the Hong Kong Institution of Engineers in 1976. Professor King is a devoted Christian and after retirement he became a full-time evangelist in Canada. He is generally considered as the "father" of the EE Department of HKU.

Professor Vincent W.S. Leung

(1960 - 1994 retired) received his electrical engineering education and training in England, and worked briefly in Switzerland before returning to Hong Kong to take up a lectureship in The University of Hong Kong in 1960. He was promoted through the ranks to professorship in 1977 and succeeded Professor King as Head of the Department of Electrical Engineering in 1980. He held that post for 14 years before his retirement from the Department in 1994 when he was awarded the title of Emeritus Professor by the University. He also served as Dean of the Faculty of Engineering and Architecture for six years and again as Dean of the Faculty of Engineering for three years. Since retirement, he has been serving the University as the Master of Robert Black College. He is one of the longest serving members of HKU.

Professor Leung is an expert in special electric machines, and in the two-axis and axial-field theories. He has supervised many research students and acted as consultant to many local firms. He served as the Overseas Representative of the British Institution of Electrical Engineers (IEE) in Hong Kong for six years from 1981. He is well known for his "youngish look" and is a popular dinner speaker for his humour and wit.

Professor Y.C. Cheng

(1978 - 1990) is an HKU science graduate of 1963. He received his further education in Canada and worked in Bell-Northern Research and Xerox Research Centre of Canada before he joined HKU in 1978 as a lecturer. He was soon promoted to Reader in 1980 and then appointed Chair in Electronic Engineering in 1981. He served as Dean of the Faculty of Engineering in 1987-89 and left the University to take up the Directorship of the then City Polytechnic of Hong Kong in 1990. He returned to HKU as Vice-Chancellor from 1996 to 2000.

Professor Cheng has a strong industrial background. He invented and developed the "HCl-Oxidation" technique, which has been adopted worldwide as a simple method to grow ultra-clean oxides for silicon-based electronic devices. He also pioneered investigation to understand the transport mechanism for surface mobility which critically controls the MOS field-effect type electronic devices. Soon after he joined HKU, he established a very successful research team in microelectronics in the Department of Electrical Engineering and initiated collaboration with many famous universities in China. Many of his research students, such as Dr. P.T. Lai and the late Dr. E.H. Li, have become active researchers in their own areas of expertise. He is a Member of the Chinese Academy of Sciences.

Professor C.C. Chan

(1981 - 2002 retired) joined the Department of Electrical and Electronic Engineering in 1981 as a lecturer, was promoted to Honda Professor of Engineering in 1992 and was Head of the Department for the period 1994 –2000. He is a Fellow of the Royal Academy of Engineering UK, and the first Academian of the Chinese Academy of Engineering in Hong Kong. He has been a Visiting Professor at several well-known universities around the world, including Cambridge University, the University of California at Berkeley and MIT. He was President of the Hong Kong Institution of Engineers for the session 1999-2000 and is presently holding over 20 posts in international committees. He also serves as consultant to several organisations in Hong Kong and the USA.

Professor Chan pioneered electric vehicle (EV) research in Hong Kong. He established a research group on electric vehicle technology and the International Research Centre for Electric Vehicles (IRCEV) in HKU in the early 1980s, in collaboration with the University of Hawaii and with the support of the US Department of Energy and Electric Power Research Institute. Over the years, the IRCEV has developed into a leading intellectual centre for research, development, technology transfer and international promotion of EVs, especially serving China and the Southeast Asia region. In particular, the Centre has pioneered the research and development of ac motor drives and battery management system for modern EVs. A number of patents were obtained, numerous papers have been published and the research findings are summarised in the monograph Modern Electric Vehicle Technology published by Oxford University Press in September 2001. He was awarded the Honorary Degree of Science and elected an IEEE Fellow for his contributions to the advancement of electric drives and electric vehicles. He is also a Fellow of IEE, HKIE, the Hong Kong Academy of Engineering Sciences and the Ukraine Academy of Engineering Sciences. He was elected a Distinguished Lecturer of IEEE, IAS, and IES.

Professor T.S. Ng

(1990 –) graduated from the Department of Electrical and Electronic Engineering, The University of Hong Kong in 1972 and received his further education in Australia. He started his academic career with the University of Wollongong, Australia in 1977 and was a reader there before he took up the appointment of Chair Professor of Electronic Engineering at HKU in December, 1990. He is now Head of the Department of Electrical and Electronic Engineering.

Professor Ng is an expert in mobile communication technologies, especially in CDMA which uses spread spectrum techniques. He has edited a book on 3G mobile communications and published five book chapters, over 200 international journal and conference papers and has six US patents pending. He was an editor of the International Journal - Engineering Applications of Artificial Intelligence (Pergamon Press) from 1988 to 2000 and is currently an associate editor for IEEE Transactions on Mobile Computing. Over the years his research group has received over HK$25 million from the Hong Kong Research Grants Council and the Industrial Support Fund to support projects on wireless and spread spectrum communications.

Professor Ng is very active in international professional engineering activities and has served the IEE and IEEE in various capacities. He was the Vice President of Region 10, IEEE Circuits and Systems Society in 1999 and 2000; a member of the IEE President's Strategic Working Party on future governance and developments in 1999; and is currently a member of the IEE Informatics Divisional Board and Executive

Committee and an Ordinary Member of IEE Council. He was awarded the Doctor of Engineering, honoris causa, by the University of Newcastle, Australia in August 1997 for his services in Hong Kong's higher education in general and in engineering education specifically. He was awarded the Senior Croucher Foundation Fellowship in 1999 and the IEEE Millenium Medal in February, 2000. He is a Fellow of IEE, HKIE and IEEE.

Professor Felix F. Wu

(1995 –) was a Professor in UC Berkeley before he joined the Department of Electrical and Electronic Engineering as a Chair Professor of Electrical Engineering in 1995. He established the Centre for Electric Energy Systems (CEES) in the Department with funding from the Research Grants Council soon afterwards to promote the application of advanced technologies and management sciences to future electric energy systems developments in Asian countries. The CEES has also established, jointly with the National Key Power System Laboratory of Tsinghua University, an HKU and TsinghuaU Power System Research Institute (Shenzhen PSRI) at Shenzhen in 1999. The Shenzhen PSRI is currently working on a number of key research projects in China. Professor Wu was Pro-Vice-Chancellor (1997-2000) of the University.

Professor Wu was elected an IEEE Fellow in 1989 for his contributions to the development of theory and computation methods for power system planning and operation. He was also the TEPCO (Tokyo Electric Power Company) Chair of "Frontier Technology for the Future Electric Energy System" in 1991. He has been a Visiting Professor in many well-known universities in the world, such as Tsinghua University, University of Tokyo, and the Universita Degli Studi di Cassino. His research interest covers many areas and his current research interest is in electric energy industry restructuring. In addition to his academic work, Professor Wu is also actively engaged in consulting services for electrical engineering industry including the Pacific Gas and Electric Company in San Francisco.

Professor K. Hwang

(1996 - 2000) had joined the Department of Electrical and Electronic Engineering for a brief spell of three years as Professor of Computer Engineering when he was on sabbatical leave from the University of Southern California (USC). He was responsible for the setting up of the High Performance Computer Research Laboratory in the Department which supports research activities in the field of scalable clusters and parallel computing.

Professor Hwang has engaged in computer research and higher education for 25 years. He has published over 140 scientific papers and five books, mostly related to computer architecture and parallel processing. He has lectured worldwide and provided research and consulting services to US National Science Foundation, AFOSR, ONR, DOT, National Academy of Sciences, MIT Lincoln Lab., Caltech JPL, IBM, AT&T, Motorola, and Intel, GMD in Germany, ETL and Fujitsu in Japan, Academia Sinica and ETRI in China. He has served as a Distinguished Visitor of the Computer Society, the ACM SIGARCH Board of Directors, and is the founding Editor-in-Chief of the Journal of Parallel and Distributed Computing since 1983. He is an IEEE Fellow.

Professor E.S. Yang

(1997 –) was a Professor in Columbia University before he joined the Department of Electrical and Electronic Engineering of HKU as Chair Professor of Microelectronics Engineering in 1997. Soon afterwards, he established the Jockey Club Magnetic Resonance Imaging (MRI) Engineering Centre with a generous donation of HK$30 million from The Hong Kong Jockey Club Charities Trust. Currently, the Centre is focusing on three research projects on different aspects of MRI technology. The first is to design a Radio Frequency (RF) coil using High Temperature Superconductor (HTS) thin film technology. The second is to design a low-cost, low-field mobile MRI system for the imaging of extremities. Finally, there is the project to establish the correlation between visual-, somatic sensory- and speech-related acupoints and their corresponding brain cortices with conventional and electro-acupuncture using functional MRI. As a supporting complement to the last project, a tongue acupuncture research clinic was set up in May 2000.

Professor Yang was Chairman of the Electrical Engineering Faculty at Columbia University for six years and had been responsible for the development of world-class research programmes in Microelectronics, Telecommunications and Photonics in Columbia University. He was also affiliated with IBM in Poughkeepsie (1961 - 1963) and Yorktown Heights (1970 - 1991), N.Y. In addition to two textbooks in semiconductor devices (McGraw-Hill 1978 and 1988), he has published over 150 articles and has made original contributions in semiconductor and superconductor electronics. He is an EEE Fellow.

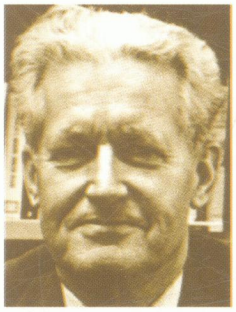
Professor Victor O.K. Li

(1997 –) received his undergraduate and postgraduate education at MIT and was a Professor of Electrical Engineering and Director of the USC Communication Sciences Institute at the University of Southern California (USC) before he joined the Department of Electrical and Electronic Engineering of HKU as Chair Professor of Information Engineering in 1997. He was also appointed the Managing Director of Versitech Ltd., the technology transfer and commercial arm of the University.

Professor Li's research interests cover information technologies, high speed communication networks, personal communication systems and distributed multimedia systems. He is Director of the Area of Excellence in Information Technology, a multi-university project funded by the University Grants Committee of the HKSAR. He has published over 200 technical articles, and has lectured and consulted extensively around the world. He has chaired many technical committees as well as international conferences and symposiums. He has served as an editor of IEEE Network and of Telecommunication Systems, guest editor of IEEE JSAC and of Computer Networks and ISDN Systems, and is now an editor of ACM Wireless Networks and IEEE Communication Surveys. He was a Distinguished Visitor of the IEEE Computer Society, a Distinguished Lecturer at the University of California at San Diego, at the National Science Council of Taiwan, and at the California Polytechnic Institute. He was elected an IEEE Fellow in 1992.

Locally, Professor Li serves on the Engineering Panel, Research Grants Council, HKSAR, Technology Advisory Panel, Hong Kong Industrial Technology Centre Corp., Task Force for the Hong Kong Academic and Research Network (HARNET) Development Fund, University Grants Committee, and the HKPC-University Board, Hong Kong Productivity Council. Recently, Professor Li was awarded the Senior Research Fellowship of the Croucher Foundation (2002-2003).

Department of Industrial and Manufacturing Systems Engineering

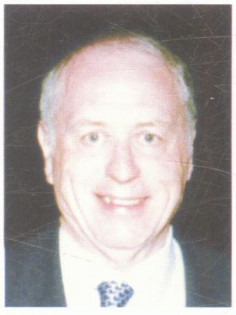


Professor W.A. Reynolds

(1973-1981 retired) The IMSE Department was established in 1973 (then called the Department of Industrial Engineering). In 1978, Professor W.A. Reynolds became the first Chair Professor in the Department. He may be regarded as the pioneer of industrial engineering education in Hong Kong, and his research interests mainly centred on work study and time measurement. Professor Reynolds retired in 1981.

Professor N.N.S. Chen

(1981-1994) was one of the founding members of the Department. He became Chair Professor in 1985. He had extensive research interests in the fields of production technology and, in particular, hot machining. He was also interested in plastics and adhesives technologies. He left the Department in 1994.



Professor B. Porter

(1995-2000 retired) took up the Chair of the Department in 1995. Prior to joining the Department, Professor Porter had earned a worldwide reputation in intelligent automation. Professor Porter has travelled widely at the invitation of various international agencies and organisations, and has presented research papers in USA, China, Canada, Sweden, Denmark, Germany, France, Belgium, Switzerland, Israel, Italy, Brazil, Yugoslavia, India, Indonesia, Japan, New Zealand and Russia under the auspices of such bodies as the US Office of Aerospace Research and Development, the Chinese Ministry of Aerospace Industry, the Organization of American States, the British Council, the Japanese Ministry of Education, the Royal Society, and the Academy of Sciences of the USSR. Professor Porter has also held Visiting Professorships in Belgium, Brazil, France, Japan, Kuwait, USA and Yugoslavia. Currently, he is leading a team of talented researchers in pursuing state-of-the-art research in evolutionary optimisation of complex industrial systems. Professor Porter was awarded a DSc degree by the University of Durham for his outstanding achievements in engineering research.

Department of Computer Science and Information Systems

Professor Y.L. Chin

(1985 -) received his BSc degree from the University of Toronto, Canada, in 1972, and MS, MA and PhD degrees from Princeton University, in 1974, 1975 and 1976, respectively. He is Chair of the Department of Computer Science, The University of Hong Kong and was Head of the Department since its establishment until December 31, 1999. In 1995 and 1996, Professor Chin was elected HKIE Fellow and IEEE Fellow respectively. He has also served on the IEEE Fellow Evaluation Committee in 1998. During January-June 2001, he was the founding CEO of the Hong Kong Domain Name Registration Company Ltd.

Professor Chin's research area is in the design and analysis of algorithms. He is currently serving as Manager Editor of the International Journal of Foundations of Computer Science, a member of the editorial board of the Information Processing Letters, the Computer Processing of Oriental Languages and the Chinese Journal of Advanced Software Research.

Professor Chin has served on many government policy and advisory committees, including the Innovation and Technology Fund (Information Technology Project) Vetting Committee, the RGC Engineering Panel of the University Grants Committee (UGC), the Engineering and Information Technology Research Assessment Exercise (RAE) Panel, University Grants Committee, 1993-94 and 1996-97 (Convenor), and the Information Infrastructure Advisory Committee (IIAC) of the Information Technology and Broadcasting Bureau.

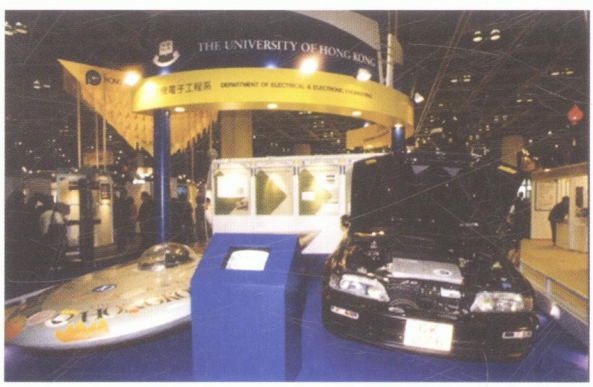
Professor Chin is a recipient of the HKUSU's 80th Anniversary Best Teaching Award in 1991 and the Department's 1999-2000 Teaching Excellence Award.

8. RESEARCH DEVELOPMENTS AND ACHIEVEMENTS

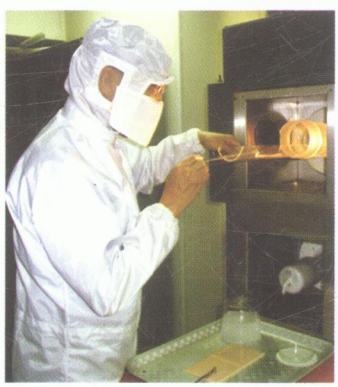
The frame building at Cape d'Aguilar for measurement of wind during typhoons

Before the war and in the decade after, the Faculty of Engineering was much concerned with curriculum development and practical training for students and there was little research work carried out in engineering. The 1960s and 70s saw the budding of research activities in engineering. These relied mainly on the effort of individual departments and teachers as research funding was very minimal. Nevertheless, this era did witness a few areas of research which reached the mark of international recognition or excellence (e.g. in jet noise/ aeroacoustics, geotechnical engineering and wind engineering). Greater emphasis was also placed on research after Professor Y.K. Cheung assumed Deanship in 1977. In the early 80s, a typical research grant amounted to something of the order of HK$30,000; and yet many colleagues produced high quality research with the resources at hand. It has to be said that there were considerably less administrative duties for academics then, who therefore could devote most of their time to purely academic pursuits. In those days, academics benefited greatly from private foundations such as the Croucher Foundation that funded relatively large projects on a merit basis with grants amounting to HK$0.5 million or more.

The scene changed significantly in the late 1980s and the 90s when the University Grants Committee (UGC) started to substantially increase research funding in universities, and with the accelerated expansion of tertiary education. The



Solar car and electric car on display at Hong Kong Technology Week 97, January 1997



Inside the high-temperature furnace, high-quality silicon dioxide is grown for the transistors on the silicon wafers, which consist of hundreds of micro-chips apiece.

then University and Polytechnic Grants Committee (UPGC) started to fund research in strategic areas on a competitive basis in the late 80s. In 1991, The Research Grants Council (RGC) was formally established with its subject panels. Since then invitations to apply for competitive research funding have been issued annually to all eligible academics in Hong Kong; in addition, many other sources of funds for research were also set up, such as the Industry Support Fund (the predecessor of the Innovation and Technology Fund (ITF)) and the Jockey Club Charitable Fund. In the past decade research projects became bigger and more complex; hence several teachers in similar fields would join together to form research groups and teams to deal with larger and more comprehensive projects. Nowadays, it is common for specialists from a department or different departments and faculties to establish research centres to coordinate and pursue common research interests.

Over the past three decades, the Faculty has conducted significant research work and consultation services on numerous projects to help advance knowledge and, equally importantly, improve the quality of life in Hong Kong. The contributions to the finite element method, the finite strip method, and their applications to engineering by our structural engineers have enjoyed an excellent international reputation. The contributions to the physics and technology of metal-oxide-silicon (MOS) devices by our electronic engineers also represented a breakthrough. Our work in electrical cars has gained prominent international visibility. The election of Professor Y.K. Cheung and Professor Y.C. Cheng, our former Vice-Chancellor, to the Chinese Academy of Sciences in 1999, and Professor C.C. Chan to the Chinese Academy of Engineering in 1998 attest to their outstanding achievements. Members of the Faculty have also won the much coveted Telford Premium from the UK Institution of Civil Engineers four times (Professor Peter Lumb, Dr. Robert Lam, Dr. Louis Lam, Professor Y.K. Cheung, Dr. Albert Kwan); this is probably a record for any Asian engineering faculty.

As an example of a piece of frequently cited research of vital importance in the numerical solution of engineering problems, the Advancing Front Approach (AFA) proposed by Dr. S. H. Lo in 1983 is now widely adopted by the mesh generation community, and numerous commercial software and industrial applications are developed from AFA.

Another example. Professor Y.C. Cheng invented the HCl-oxidation technique which solved the stabilisation problems due to variation in the characteristics of MOS transistors and microchips, thus greatly enhancing their function, reliability and yield. He was the first to develop the theory of surface-roughness scattering on the charge carriers in the conduction channel of MOS transistors. As MOS microchips enter into the sub-micron region, this physical mechanism has become the major factor controlling the mobility of the charge carriers, and is indeed a landmark in the development of MOS device physics. Professor Cheng is also one of the pioneers in the technology of nitrided silicon dioxide for improving the reliability of scaled-down MOS devices.

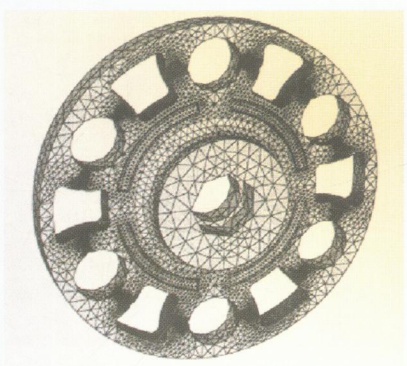
In recent years, the high quality research of the Faculty based on long-term sustained work in Hong Kong has also received notable recognition. Five academics from this Faculty have won Croucher Foundation Senior Research Fellowships since 1998. They are Professor B.J. Duggan (material science), Professor H.H.P. Fang (water and wastewater technology), Professor J.H.W. Lee (environmental hydraulics), Professor T. S. Ng (wireless communications) and Professor V.O.K. Li (Information Engineering). The prestigious competitive fellowships are awarded each year to scholars whose work is assessed to be of critical importance to science and technology in Hong Kong, enabling the recipients to take a year's leave to concentrate on research.

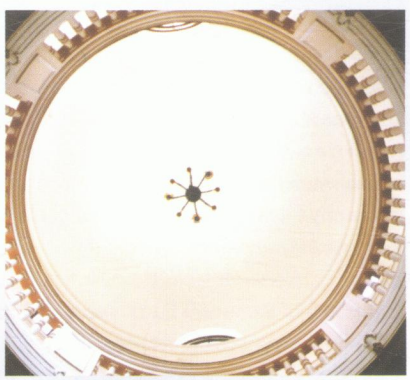
Engineering and You

The research developments and achievements of the Faculty are too many to enumerate. Below we highlight only a few of these research and consultancy projects to illustrate the connection between the work of the Faculty and many facets of our daily life. In line with the theme of the 90th anniversary, they are grouped into various categories concerning "Engineering and You".

Water

If you ride on a ferry in the Victoria Harbour in Hong Kong, you will no doubt find the ride more bumpy than it was a decade ago because of the bigger waves which are related to wind, navigation, and possibly the much changed coastline. The hydrodynamics team in the Department of Mechanical





FEM mesh of car wheel

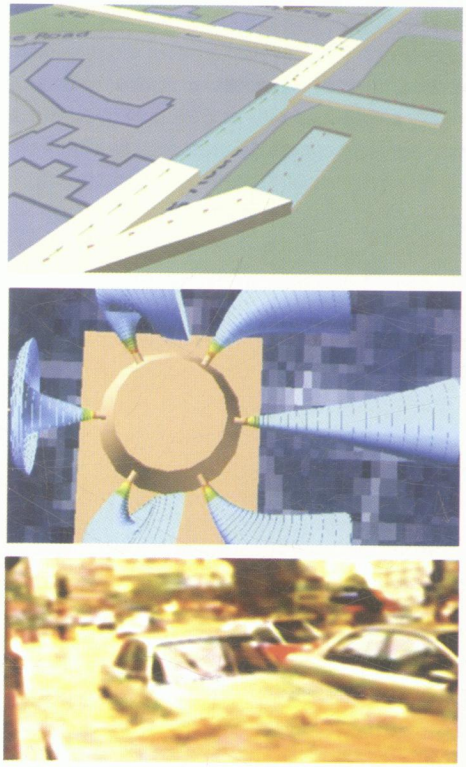
Engineering led by Professor A.T.Y. Chwang was commissioned by the Government to conduct a study of the **inner harbour waves and their reduction**. This study was completed in 1998. For the first time, the significance of the ship-generated waves in the harbour is understood; the study also resulted in a recommendation to use porous breakwaters as an effective means of damping the big waves. A 100-meter porous sea wall to dissipate waves is now under construction in the Victoria Harbour.

The 114-meter long porous seawall is being constructed at Yau Ma Tei typhoon shelter in Victoria Harbour

Due to urbanisation, population increase and change of land use, flooding problems in the West Kowloon area have become severe in recent years. To solve the chronic flooding problems, one can open the ground and widen the stormwater drains; the construction works will cause a lot of disruption to traffic and affect business in the area. An innovative and economic solution is to provide a two-pronged approach upstream: i) divert part of the stormwater flow underneath Waterloo Road, through a 4m diameter underground tunnel to Kaitak nullah (**Kai Tak Transfer Scheme**); and ii) construct a large underground storage tank underneath the Tai Hang Tung Sports playground, to temporarily store the flood waters and reduce the flood peak (**Tai Hang Tung Storage Scheme**). Our hydraulics research team led by Professor J.H.W. Lee has been commissioned by the Government to study this challenging flood control problem, and provide the design of these two schemes which are now under construction. When the schemes are in operation by 2004, they will lower the flood levels near Mong Kok by nearly one meter. The innovative solution won the "HKIE Innovation Award for Construction Industry 2001/02".

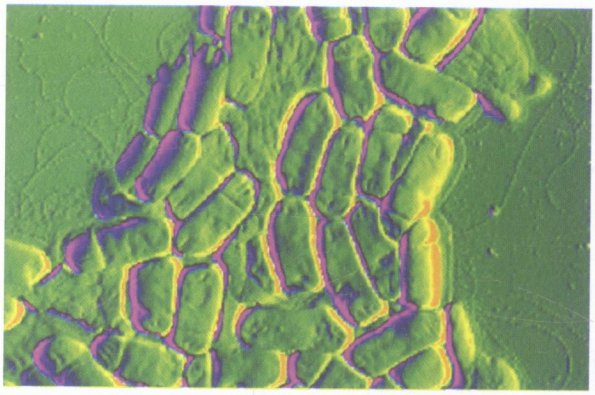
A pioneering venture that integrates proven, locally developed cutting-edge hydraulic and computer visualisation research efforts to develop software for effective environmental impact assessment has received a $5.5 million grant from the Innovation and Technology Fund. This is a collaborative project between our civil engineers and computer scientists; **two internet-based training softwares on impact assessment and flooding** have been developed to provide interactive learning and design tools on environmental sustainability and flood control.

A hallmark of the recent Faculty research is its interdisciplinary nature, involving collaborations not only between traditional and nouvelle engineering disciplines, but also with other Faculties. Led by a group of staff in Civil Engineering, research



Virtual reality software for environmental assessment and urban drainage systems

in **Water Environmental Engineering has been shortlisted by the UGC as an Area of Excellence (AoE) in 2001**. This interdisciplinary team has successfully developed a number of RGC/ITF projects with colleagues from Ecology, Chemistry, Statistics and Computer Science. The Civil Engineering environmental group has received $5.7 million from the RGC Central Allocation Group Research Grant and the Environment Conservation Fund to study the **dynamics of algal blooms in sub-tropical coastal waters**. The aim is to make use of our engineering predictive tools and work with ecologists and biologists to develop a red tide early warning system with a view to improve mariculture management and disaster mitigation. Using advanced measurement techniques and biotechnology, Professor H.H.P. Fang has also been working with our chemists on a substantial RGC-funded project on **Biofilm corrosion of metals in polluted seawater**. The aim is to study the fundamentals of biofilm formation in seawater and assess bio-corrosion in Victoria Harbour which can result in estimated annual damages of over $7 billion.

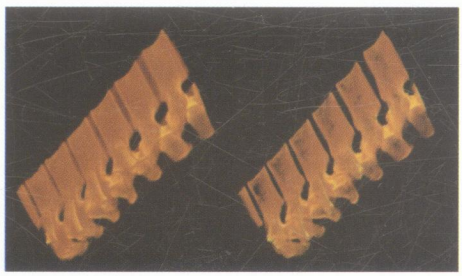


Formation of a sulfate-reducing bacteria biofilm with corrosive extracellular polymers

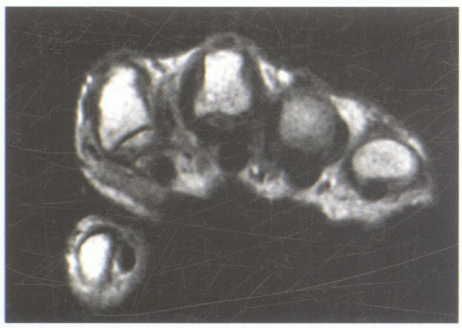
Health

A tongue acupuncture clinic has been set up in **The Jockey Club Magnetic Resonance Imaging (MRI) Centre** to look into the use of functional MRI in relation to traditional Chinese medical treatments, specifically on tongue acupuncture therapy for stroke patients. The data gathered so far is very encouraging. The MRI Centre was established with a donation of $16.5 million from the Jockey Club and has received $12 million from the Innovation and Technology Fund to develop high sensitivity probes. Its research activities span an array of disciplines: engineering, medicine, physics, cognitive science and psychology. The MRI research team has successfully completed two key project tasks: the development of a high-temperature superconductor (HTS) MRI coil; and the building of a low-cost, low-field mobile MRI system for human and animal imaging. The MRI Centre has also successfully mounted joint RGC projects in medical imaging and cognitive science in collaboration with the Faculty of Medicine and the Faculty of Social Sciences.

The Graphics Team of the Department of Computer Science and Information Systems (CSIS) has been working closely with the Department of Orthopaedic Surgery on a project known as **VISBONE — A Visualisation System for Planning Screw Insertion in Orthopaedic Surgery**. This is a Teaching Development Grant project to develop a computer system to visualise and measure bone structure and bone mineral density based on the CT (computer tomography) data of live patients. Surgeons will use the system in planning orthopaedic surgery involving screw insertion. The distribution of bone mineral density affects the location of screw insertion and therefore the success of the operations.

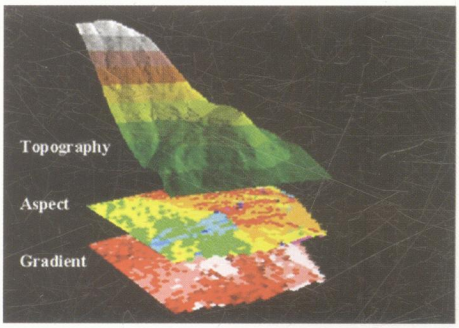


VISBONE: A computerized bone visualization system



Hand Image of the knuckles obtained with MRI

Land



Three-dimensional hillside terrain modelling, hazard mapping and landslip risk assessment using geographical information system (GIS) and aerial photograph and satellite images

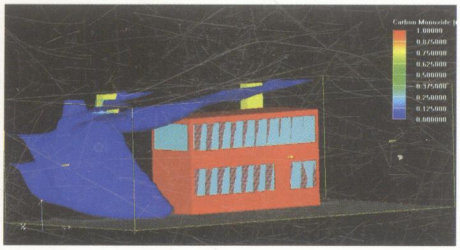
A hub of digital geotechnical and utility information for facilitating slope safety management and land development planning is now being collated and compiled by **The Jockey Club Research and Information Centre for Landslip Prevention and Land Development**, which was established with a $25 million grant from the Jockey Club. The information will be made available to the public at a modest charge. The Centre also carries out research on slope safety and land stability issues including landslip risk assessment and management and early warning, prevention and mitigation measures. Jointly with HKUST, the Geotechnical group has recently been awarded an RGC Central Allocation Group Research Grant to study the behaviour and stabilisation of slopes.

Landslip prevention with soil nails and Drilling Process Monitor (DPM)

Air

Air pollution problems in Hong Kong mainly come from road transport. The Department of Mechanical Engineering has, in collaboration with the Environmental Protection Department (EPD) of the Hong Kong government, launched a programme to study **the feasibility of using biodiesel as a motor fuel in Hong Kong** as a measure to reduce emissions from

vehicles. Another project was undertaken with the New World First Bus Services Ltd. to study **the performance and emission characteristics of double-decker EURO II buses** with the use of normal diesel, ultra low sulphur diesel and exhaust after treatment devices, with the aim of reducing emissions.



Pollutant dispersion study in public transport interchange

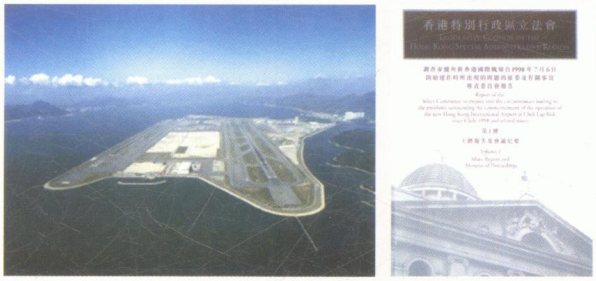
Information Technology and E-Commerce

Information technology (IT) is an Area of Excellence in the Faculty. In collaboration with CUHK and HKUST, this AoE is one of the first that received a substantial funding of $50 million from the University Grants Committee in 1999. The purpose of an AoE is to develop areas of existing strength into significant centres of regional and international prominence. The mission of the AoE-in-IT is to assist the transformation of Hong Kong into an IT society and a strong value-added economy through R&D and education. The IT group is actively involved in multi-media, networking, communications and computer technologies.

The CSIS Department also provides IT-related consultancy to the community. For example, the software team of HKU was commissioned by a Select Committee within the Legislative Council to study the problems involving the single most important software/hardware system — **the Flight Information and Display System (FIDS)** – installed at the passenger terminal building at Chek Lap Kok, which, when the new airport began service to the public in July 1998, caused the disastrous confusion and delay. By design, FIDS was placed at the heart of all electronic activities, providing vital information for both passenger handling and baggage handling, the two essential functions of airport terminal operations. Failure of this "heart", without proper contingency plans, could bring the airport terminal operations down to a standstill.

The HKU team, led by Professor F.Y.L. Chin of the CSIS Department and consisting of Dr. D.W.L. Cheung (CSIS), Dr. M. C. Pong (Computer Centre), Dr. B.M.Y. Chan (CSIS) and Mr. H. F. Hung (CSIS), was chosen to tackle the problem. They were given only three weeks to go through a van-load of confidential documents and to complete a report. Trying to find out what had gone wrong in the software development process was like detective work or reconstructing a 10,000-piece jigsaw puzzle. The team managed to detect some of the major problems in the project. Measuring the system against what are commonly considered to be good software engineering practices, the team found the problems to be a) lax project control causing substantial overrun, b) failure to uphold high quality standards during testing of the software, and c) insufficient attention to a good contingency plan.

The study was, all in all, an interesting experience as well as a good chance for the academics to use their expert knowledge in serving the community.

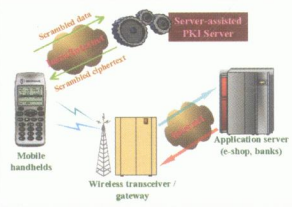


Chak Lap Kok Airport

The Centre for Information Security and Cryptography (CISC) has developed advanced encryption software which enhances the cryptographic capacity of common browsers – **the Strong Cryptographic Library Client Suite (SCL-CS e-Cert Edition)**, and has agreed to let the Hong Kong Post bundle and distribute the software at no royalty charge. With this software plugged-in to the browser, holder of the 1024-bit digital certificate issued by Hong Kong Post will be able to send and receive digitally signed e-mail messages under a 1024-bit encrypted environment. Besides SCL-CS, the **Digital Evidence Search Kit (DESK)**, jointly developed by the Centre and the Hong Kong Police Force, provides support to the Police for collecting evidence and forensic information related to computer crime. Funded by an industrial grant of $7.3 million from the Innovation and Technology Commission, the Centre is also engaged in the Secure Preservation of Electronic Documents (SPED) project, which is to develop new technologies for secure preservation of electronic documents. These technologies will address the technical issues in proving the authenticity and integrity of electronic documents. Such issues are especially acute for electronic documents, as any security measure used at the time a document was created is likely to be circumvented with the advance in technology.

Education is well acknowledged as one of the major issues in Hong Kong. In order to improve the education quality of the community, the Department of Computer Science and Information Systems and the Computer Centre proposed the **UFIA (User-friendly Flexi-IT Approach for Education)** project which introduces a quality learning and teaching environment to primary schools in Hong Kong based on the state-of-the-art web-based learning technologies. The project is supported by a Quality Education Fund (QEF) of more than $10 million from the Government of Hong Kong Special Administrative Region. Completed in June 2000, the project has successfully demonstrated, through a pilot study in 13 local primary schools, ways to integrate the use of IT with the existing well-designed curriculum materials.

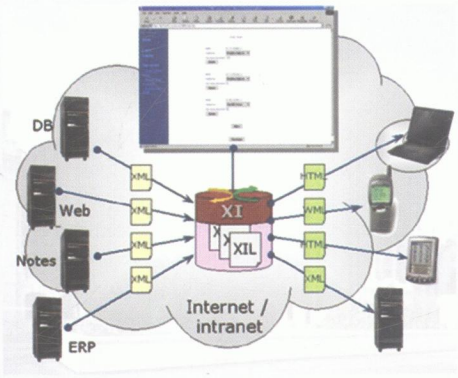
The Department of Computer Science and Information Systems (CSIS) together with the E-Business Technology Institute of HKU have been awarded a $4.4 million ITF grant to work on the **Server-Assisted Wireless Public-Key Infrastructure project**, which is to design and implement a wireless security scheme based on the public-key concept. The results of the project will benefit many parties, including network operators, device manufacturers, solution providers, and online merchants.



The concept of Server-Assisted Public Key Infrastructure (PKI)

The E-check Demonstration

The CSIS Department, under the leadership of Dr. D.W.L. Cheung, has developed a tool called **XI (XML Integrator)** which is the first XML-based Enterprise Application Integrator ever developed for e-commerce and supply chain management in Hong Kong. Our computer scientists' expertise is recognised in a recent $9.5 million ITF award to study **ebXML software infra-structure in Hong Kong** – the only one out of 20 applications in the subject area to obtain funding in 2001. This project is in collaboration with the E-Business Technology Institute.



XML Integrator Interface and System Design for U-Freight

Telecommunications and Electronics

3G Video Phone

3G Watch Video Phone

Mobile phone has changed the way we use the telephone in the last 10 years. The next wave of change will be in data communications which is being initiated by 3G mobile systems. The Department of Electrical and Electronic Engineering (EEE) is the co-owner of a **shortlisted Area of Excellence in Wireless Communication** with sister institutions in 2001. Several projects based on research results in the EEE Department with funding totalling $20 million from the Innovation and Technology Fund, are being developed into prototypes and products. These projects include spread spectrum transmitter and receiver, digital imaging technology for low-cost digital camera, multi-media personal communicator for 3G CDMA 2000, information broadcasting using infra-red, and ad hoc networking cores for bluetooth wireless technology.

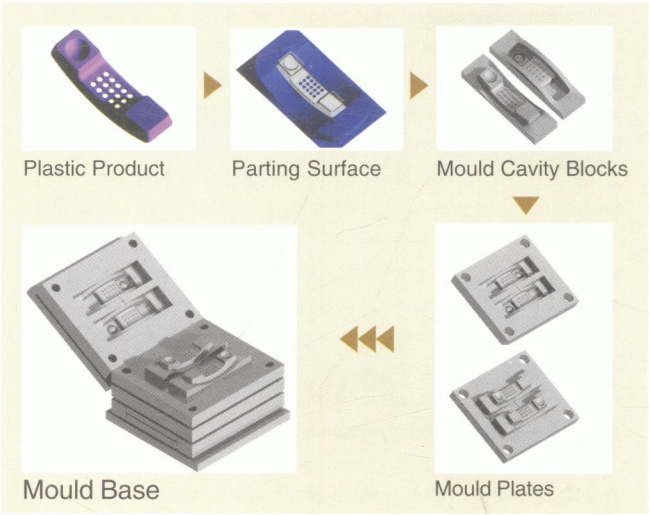
To reduce the weight and size of portable devices such as notebook computer and CD players, the EEE Department, with $8 million support from the Innovation and Technology Fund and the industry, is developing **low-voltage and high-current switching power converters**, a key accessory of portable devices.

Manufacturing Technology

Modern manufacturing relies heavily on computer-controlled machinery. Developing control software for complex machinery, however, is a difficult and time-consuming process. The Department of Computer Science and Information Systems, supported by an industrial grant of $3.55 million from ASM Assembly Automation Ltd. and the Innovation and Technology Commission, is addressing these problems with the **VITAMIN (a VIsual authoring Toolset with Automatic code generation capability for ManufacturIng automatioN)** project. Using the VITAMIN toolset, a product engineer may specify complex control systems visually, in the form of diagrammes – the control software will be generated automatically from the visual specification. This will free the engineer from the tedious and error-prone task of constructing software line-by-line. Shorter development cycles and improved software quality are just two of the many anticipated benefits.

The **Professional Injection Mould Design System (PIMDS)**, supported by the Innovation and Technology Fund (ITF), is a $4.32 million joint project between the Department of Mechanical Engineering and Smartech Solutions Ltd. The project aims to develop a computer-aided "semi-automatic and interactive" mould design system to enhance significantly the

productivity of mould-making operations. The PIMDS is an add-on application on a three-dimensional (3D) solid-based computer-aided design (CAD) system. It provides a set of interactive, semi-automatic or automatic tools for speeding up the activities in injection mould design process so that designers and manufacturing engineers create injection moulds for plastic products with complex geometry in shortened development time and improved quality. Standard Libraries containing 3D assembly models of the mould bases of well-known manufacturers (American, Japanese, Hong Kong and Chinese) will be embedded in the system. The user can integrate the designed mould cavity blocks and the associated cores into a mould base with simple operations. The figures show the process by which a mould for the given telephone receiver may be established from the 3D CAD model, getting the parting line and parting surface, then the mould cavity and core blocks, the mould plates and the completed mould assembly.



A flow chart showing the process by which a mould may be established from a 3D CAD model

9. OUTLOOK (by Professor J.H.W. Lee, Redmond Chair of Civil Engineering and Dean of Engineering)

"We sincerely feel that no good purpose can be served by the University of Hong Kong modifying its policy to fit in what possibly might take place in Singapore....
We believe that it would be better policy to concentrate on remedying the few shortcomings in Hong Kong, and try to make it the leading centre of Engineering Education in the Far East; and we think this could be done."

Excerpt from "University of Hong Kong: Report of the Committee on Engineering Education", July 1954, by Brigadier G.B. Gifford Hull et al. on the September 1953 Report concerned with the Faculty of Engineering by Sir Ivor Jennings, Q.C., M.A., Litt.D.,Vice-Chancellor of the University of Ceylon, and D.W. Logan, Esq., B.C.L., M.A., D.Phil., Principal of the University of London (Jennings-Logan Report). Hong Kong University Engineering Journal, Vol.XVIII December 1954.

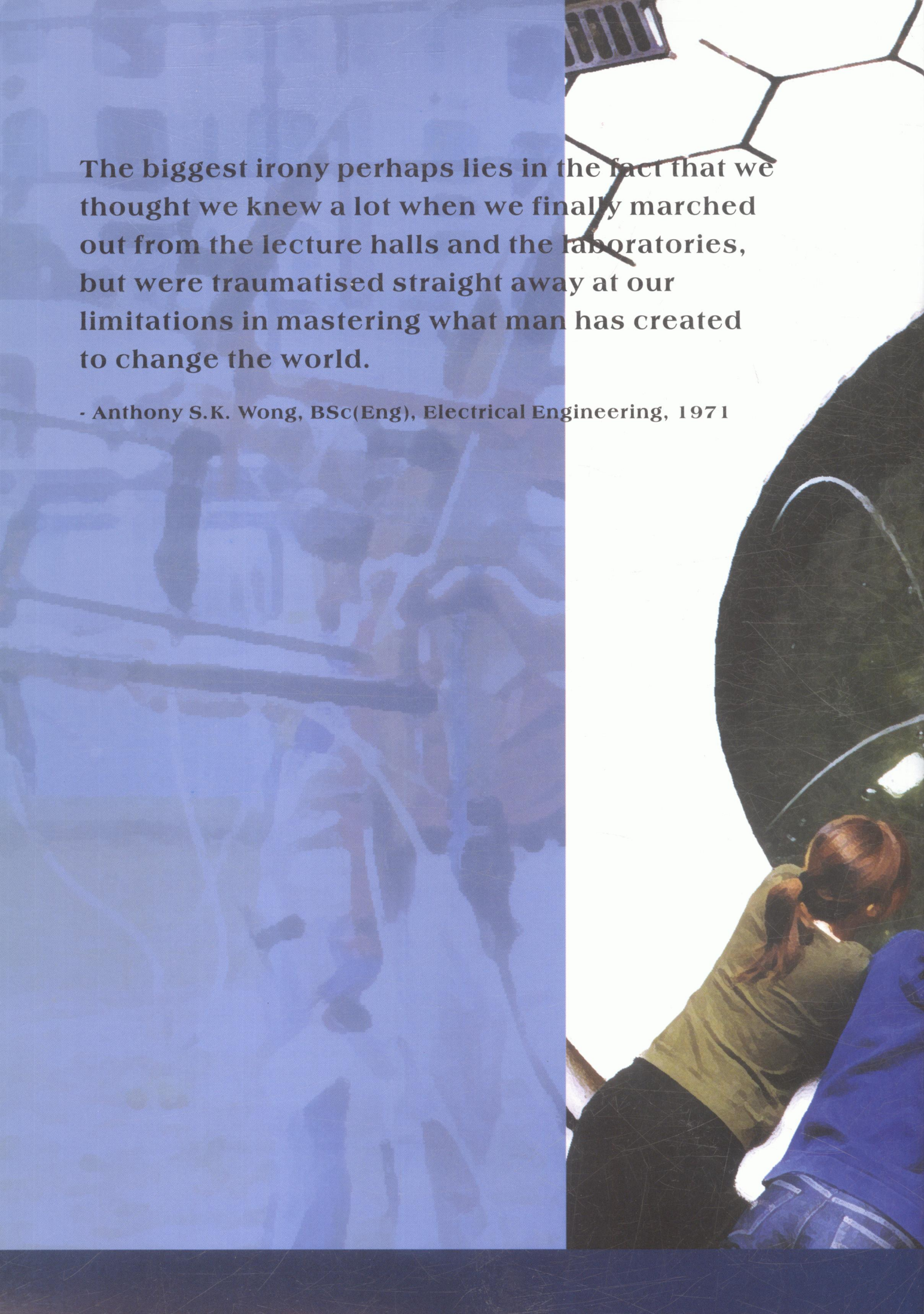
The Faculty of Engineering has evolved with time and played a pivotal role in the development of Hong Kong industry and economy. With a humble beginning in 1912 when the total floor space for laboratory and workshop consisted of a single room and an intake of 12 students, the Faculty now occupies 35,000 m^2 with student enrolment of 2,832. We are now the largest Faculty in the University in terms of student numbers, with 1,718 undergraduates, 820 taught postgraduates and 294 research postgraduates.

In the past 90 years, Hong Kong has seen some of the most momentous changes and amazing advances in science and technology. With the increasing globalisation and revolution in information technology, bio-technology and nano-technology, creativity and innovation hold the keys to human progress and the betterment of our society. As Hong Kong endeavours to transform herself into a regional hub of innovation and technology, education assumes an ever greater importance than before. We need to meet the challenges of producing the future engineers needed for the massive infra-structural developments for our Mega City, as well as to prepare our students for the global knowledge-based economy. We see it as our mission and duty not only to educate our students in the latest technology, but also to instill in them a spirit of inquiry and knowledge discovery. Equally important, we need to impart to them a sense of responsibility to society and the means to educate themselves throughout life.

In the coming years, we can look forward to an even greater presence of the Faculty in responding to the challenges, and in developing cross-department and cross-faculty initiatives that will best deploy our synergy and strengths. We can also look forward to a greater integration of research and teaching. This is the continuation of a trend that has already gained considerable momentum. For example, we have successfully mounted in the past two years a number of IT-related programmes, including the new Software Engineering, and Logistics Engineering and Supply Chain Management programmes. We have introduced a double degree programme — BEng (Software Engineering) / BBA (Information Systems) — with the Faculty of Business and Economics, and jointly offered a BSc degree in Bioinformatics with the Faculty of Medicine. In 2002, the Faculty will introduce a new BEng degree programme in Medical Engineering. At the taught postgraduate level, we pioneered in 1998 the very popular MSc in E-Commerce and Internet Computing degree which attracts some of the best students in this field. More exciting ventures with the Faculties of Medicine and Law are being developed.

To arouse interest in research and innovation among students, an Innovation and Technology Internship Scheme was launched in 2000-2001 for undergraduate students on the Dean's Honours List to work in research projects. Through this scheme, many of our bright second and third year students are offered an early opportunity to participate in Innovation and Technology Fund (ITF) or group research projects, and to experience for themselves the rigours of knowledge creation. It is only befitting of a premier university in Asia like ours to share with the next generation the vibrance of what goes on in our well-equipped laboratories, and provide intellectual stimulation through osmosis and mentorship with our dedicated engineering teachers. It is hoped that this scheme will be firmly implanted in undergraduate education in our transition to a four-year curriculum towards the end of the decade.

On the research side, we will continue to develop, in addition to the outstanding individual research, inter-disciplinary group research projects as exemplified by our Areas of Excellence in information technology, wireless communications, water environment engineering, computational mechanics and magnetic resonance imaging. We can also look forward to a greater presence in applied R&D projects, including "high tech" projects as well as integrative projects that will assist the sustainable development of Hong Kong as a Mega City in the Pearl River Delta. In 2000-2001, various groups in the Faculty are working on 15 competitively won ITF projects with a total awarded sum of $ 61.5 million. Building on this track record, we will develop further links with industry and government, to help define and solve the problems in engineering research and education. A Faculty Innovation and Technology Fund has recently been set up to provide resources for selected innovation and research projects, and to encourage colleagues to enhance their involvement in applied R&D projects.

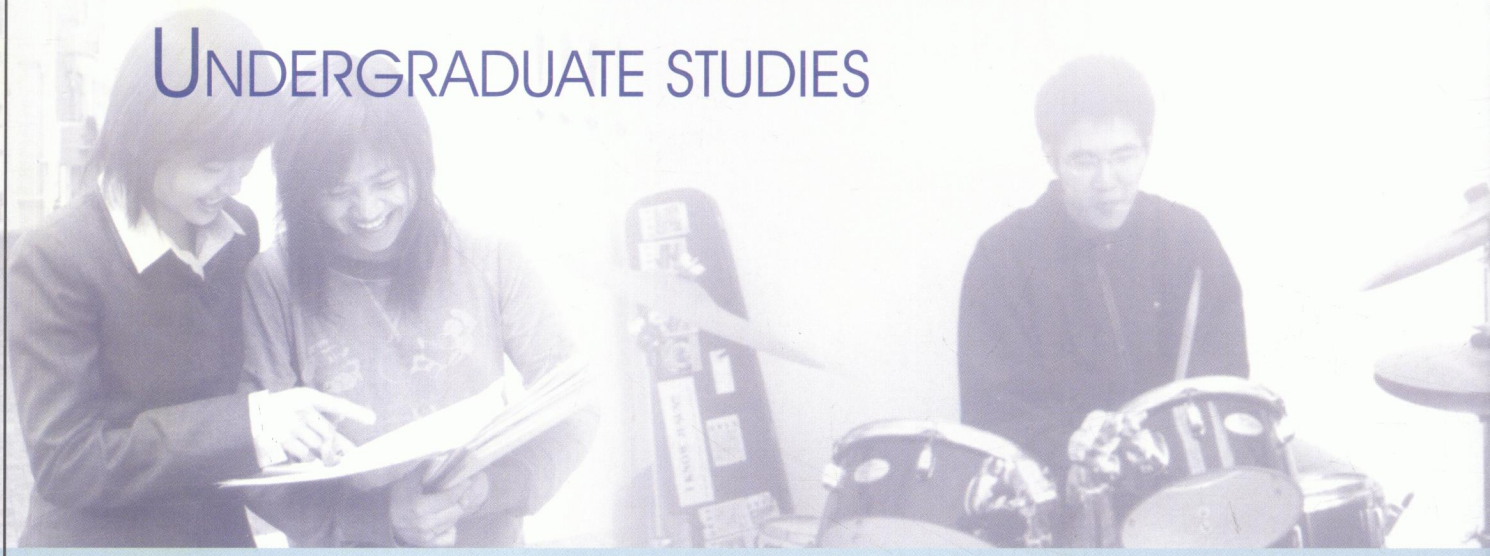


The biggest irony perhaps lies in the fact that we thought we knew a lot when we finally marched out from the lecture halls and the laboratories, but were traumatised straight away at our limitations in mastering what man has created to change the world.

- Anthony S.K. Wong, BSc(Eng), Electrical Engineering, 1971

UNDERGRADUATE STUDIES

UNDERGRADUATE STUDIES



Educational Philosophy

The Faculty provides a balanced, broad-based and well-structured three-year Honours degree curriculum in the fields of engineering, computer science and information technology. As a founding faculty of a comprehensive university, the Faculty of Engineering has long emphasised a balance among all aspects of the education we provide - technical and non-technical subjects, theoretical foundation and practical design and applications, engineering principles and skills, the education of the mind as well as the complete person.

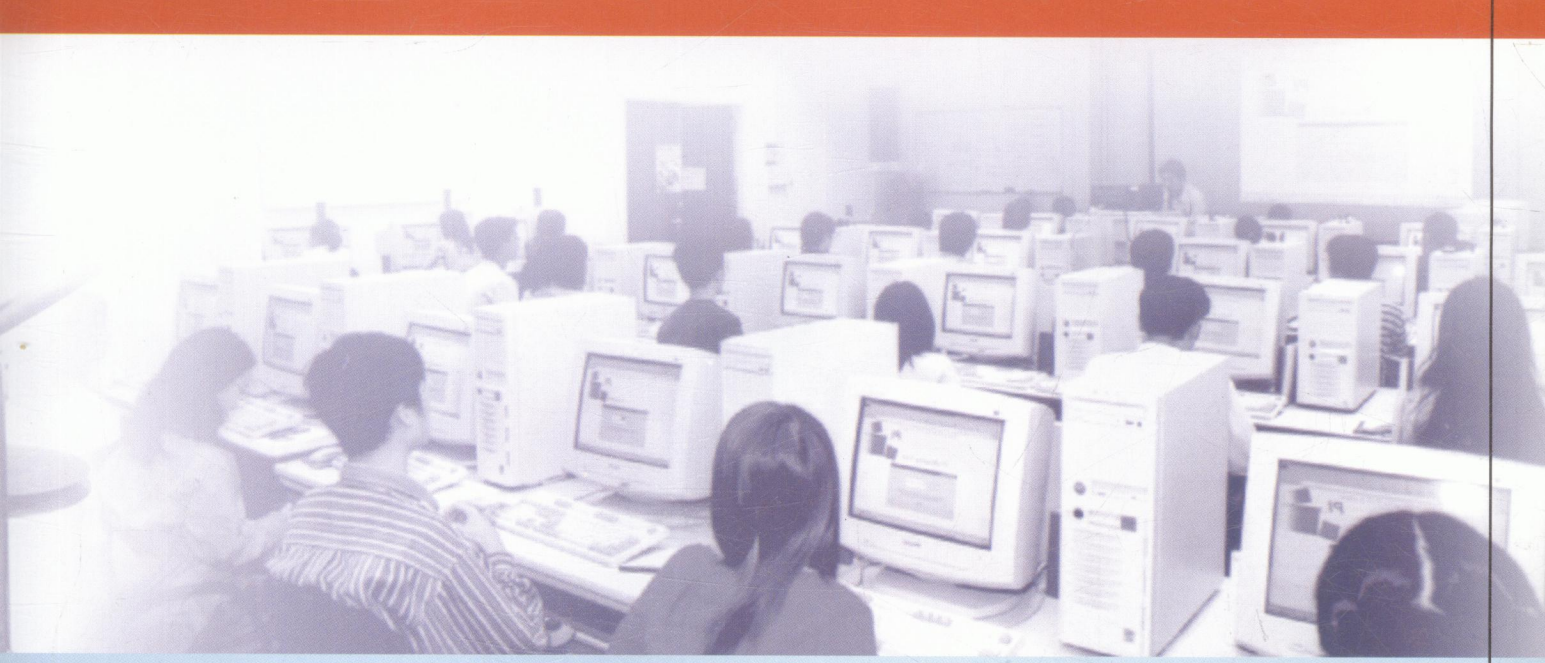
To better prepare our students to meet the challenges of the knowledge-based economy, the Faculty has devised a number of measures to enhance their competitiveness. In addition to technical subjects, all students in the Faculty are required to take courses in professional and technical communications, organisation and management, economics, and legal and contract studies. Language skill is considered a very important area of training. All students are required to take English enhancement courses and Chinese enhancement courses. They are also encouraged to participate in the English Lunch Club of the Engineering Society, organised under the auspices of the Faculty, in which teachers and alumni interact with students in English.

All students in the Faculty are required to do problem-based projects during their course of study. These projects involve design and/or experimental and analytical investigation which stimulate lateral thinking and creativity. The new Innovation and Technology Internship Scheme exposes students to interesting ongoing research projects in innovation and technology and the rigorous process of discovering and creating knowledge.

Most students are required to take 4 to 12 weeks of Engineering Workshop Training in the summer after the first year of study and to participate, for 8 to 12 weeks, in the Industrial Summer Placement Programme after the second year of study.

The new credit-based curriculum provides greater flexibility in the selection of courses and broadens the existing curriculum, without sacrificing depth and quality. Students are required to take core courses along with some depth and breadth courses to ensure a broad understanding of the discipline as an engineer or computer science and information system professional. In addition, students are required to take broadening courses outside their own disciplines.

Engineering is the only professional degree in this University that has a three-year curriculum. To meet the requirements for professional accreditation, the engineering curriculum is rigorous, compact as well as challenging.



Summary of Undergraduate Programmes

To cope with the manpower needs of the community, three new Bachelor of Engineering (BEng) programmes have been introduced in the academic year 2001-2002, namely, Building Services Engineering, Industrial Engineering and Technology Management, and Logistics Engineering and Supply Chain Management. Furthermore, the Bachelor of Science(BSc) in Bioinformatics programme has been first offered in 2001-2002 by the Faculty of Medicine in conjunction with the Department of Computer Science and Information Systems. In 2002, a new BEng in Medical Engineering programme was introduced. The Faculty also launched a four-year, double-degree programme in Information Systems and Software Engineering with the Faculty of Business and Economics in 2000-2001.

In the academic year 2002-2003, there are 15 undergraduate honours degree programmes offered by the Faculty. Those leading to the BEng degrees are as follows:	
Building Services Engineering	BSE
Civil Engineering	CivE
Civil Engineering (Environmental Engineering)	Civ-EnvE
Computer Engineering [1]	CE
Electrical Engineering	EE
Electronic and Communications Engineering	EComE
Information Engineering	InfoE
Industrial Engineering and Technology Management	IETM
Logistics Engineering and Supply Chain Management	LESCM
Mechanical Engineering	ME
Medical Engineering[2]	MedE
Software Engineering	SE
The Bachelor of Science (BSc) degree is in:	
Bioinformatics [3]	BioInf
Computer Science and Information Systems	CSIS
The Bachelor of Business Administration/Bachelor of Engineering degree is a double-degree in:	
Information Systems and Software Engineering	BBA(IS)/ BEng(SE)

1 a joint programme of the Departments of Electrical and Electronic Engineering and Computer Science and Information Systems
2 a joint programme of the Faculties of Engineering and Medicine
3 a joint programme of the Department of Computer Science and Information Systems and the Faculty of Medicine

Activities to Promote Teaching and Learning

Innovation and Technology Internship Scheme: To arouse students' interests in the many exciting research activities currently being conducted by Faculty members in different fields of engineering and computer science, the Faculty launched the Innovation and Technology Internship Scheme in January 2001. The Scheme offers students an integrated educational experience which in its totality goes much beyond earned academic credits. Selected students work with Faculty members on research projects that have an element of innovation and technology. To date, 67 students have participated and benefited from the Scheme.

Faculty Retreats: Two faculty retreats were held in 1999. The first retreat, held in January, was on "Innovation and Technology - Our Strategic Plan", in which the strengths and weaknesses of the Faculty and the University as well as the opportunities and threats were thoroughly discussed. Many valuable comments and recommendations were made at the meeting and they had been circulated to the Faculty Board and the University for information and consideration. The second retreat was held in July, where members discussed "The Boyer's Report on Reinventing Undergraduate Education". Teachers participating in the retreat brainstormed on how the Faculty could refine its undergraduate education with regard to the recommendations of the Report. The Faculty of Medicine had radically reformed its undergraduate curriculum in 1998. Professor Y.L. Lau of the Faculty of Medicine shared his

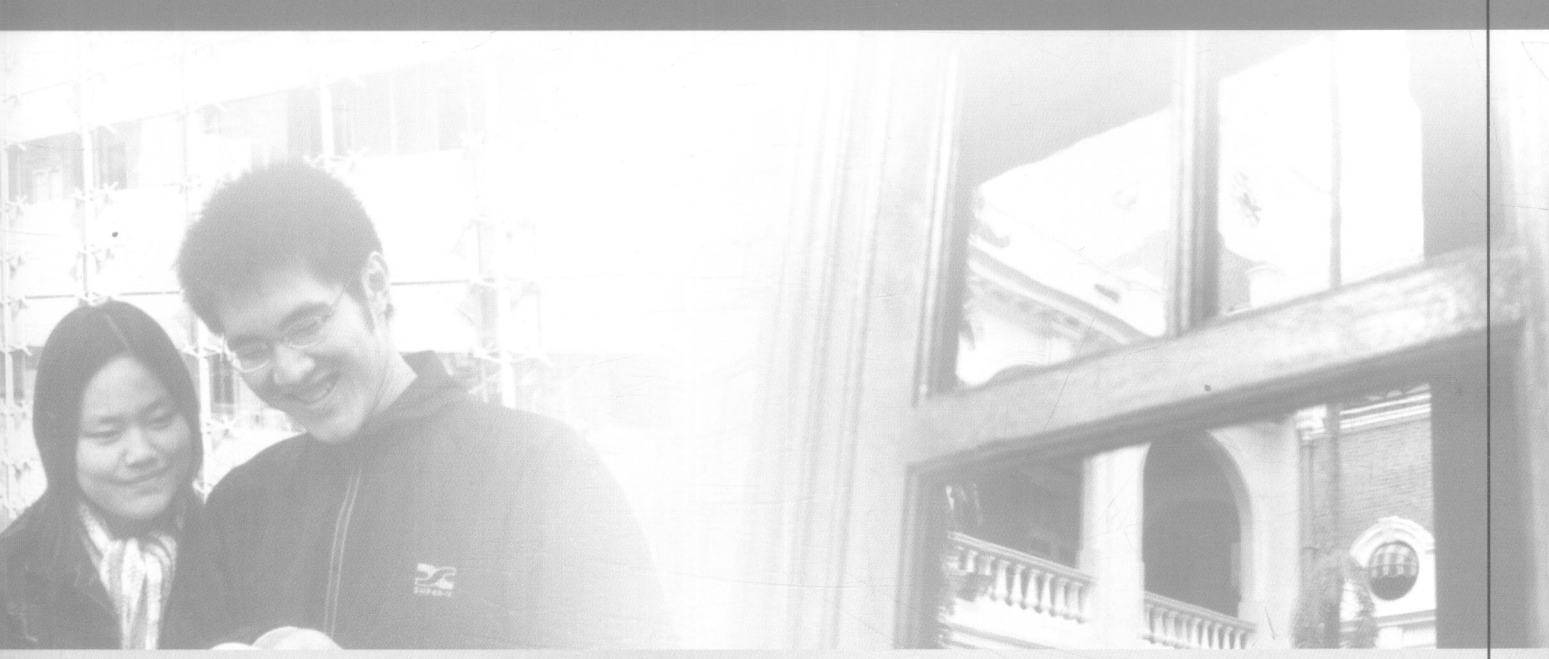
experience of the Faculty of Medicine in problem-based learning. The Faculty constantly reviews the curriculum to ensure courses are relevant and updated and teaching methods are appropriate.

Peer Tutoring Scheme: In view of the importance of a solid foundation in learning, the Peer Tutoring Scheme was introduced in the Faculty in 1999 to provide additional tutorship support to freshmen by peer-tutors. The idea of peer tutoring was first raised by Professor Eric Mazur, Professor of Applied Physics, Harvard University. The Faculty shared Professor Mazur's view that sometimes second-year students will understand the problems of the freshmen better than teachers for they have just passed similar hurdles. The objective of the Scheme is to provide additional tutorial support to freshmen and help them form study groups in order to improve their study skills and ease their transition into university life. Only second-year students who have achieved outstanding academic results and are believed to be good tutors are invited to serve as Peer Tutoring Fellows.

Graduate Mentorship Programme: The Graduate Mentorship Programme, launched in 1998, is designed to provide support and assistance to graduates one year beyond their graduation in order to help them adapt to their working environments. While formal responsibilities of teachers end upon students' graduations in most universities, a teacher's advice, mentoring and support are valuable assets to graduates even after their graduation. In addition to the mentor-mentee relationship, the University hosted get-together dinners and organised monthly half-day workshops offering advice to graduates in their work and career. The Programme ran for two years.

Enrolment

There are a total of 1,700 undergraduates in the Faculty in the academic year 2001-2002. The annual intake is about 570. The proportion of female students, presently at about 22% of undergraduate population, is steadily increasing and the Faculty of Engineering encourages application for admission from females. The Faculty attracts some of the best students in Hong Kong. Of the top 30 programmes under the Joint Universities Programmes Admission System (JUPAS) recruiting the best students (in terms of academic performance), six programmes are offered by this Faculty. Departmental undergraduate enrolment statistics and a graph on the student entrance qualification are provided under Appendix C-9, "Student Enrolment Statistics".



Resources for Teaching and Learning

The Faculty makes full use of over 120 laboratories and several hundred workstations and personal computers in teaching. In quite a number of courses, web-based multimedia teaching has been used.

In addition to more than 290 full-time, part-time, temporary and honorary academic staff members, the Faculty has technical staff, computer officers, demonstrators and teaching assistants to support the various programmes of studies. Their activities include the set-up and maintenance of laboratory and computing equipment and services, conducting and assisting academic staff members in tutorials, small group discussions, and laboratory teaching.

Accreditation

The undergraduate programmes of studies for the Bachelor of Engineering degree are accredited by various professional and academic institutions. Specific professional accreditation arrangements are as follows.

PROGRAMME	ACCREDITING BODIES
Building Services Engineering [4]	Hong Kong Institution of Engineers
Civil Engineering Civil Engineering (Environmental Engineering)	Hong Kong Institution of Engineers
Computer Engineering	Hong Kong Institution of Engineers
Electronic and Communications Engineering	Hong Kong Institution of Engineers
Electrical Engineering	Hong Kong Institution of Engineers
Industrial Management and Manufacturing Systems Engineering	Hong Kong Institution of Engineers
Industrial Engineering and Technology Management [5]	Hong Kong Institution of Engineers
Logistics Engineering and Supply Chain Management [6]	Chartered Institute of Logistics and Transport in Hong Kong
Mechanical Engineering	Hong Kong Institution of Engineers

4 for student intake in/after 2001-2002
5 for student intake in/after 2001-2002
6 for student intake in/after 2001-2002

Degree Programmes 學位課程 (2001-2002)

Faculty of Engineering 工程學院

Department of Civil Engineering 土木工程系

Bachelor of Engineering 工學學士

- Civil Engineering 土木工程
- Civil Engineering (Environmental Engineering) 土木工程（環境工程）

Master of Science in Engineering 工學碩士

- Civil Engineering# 土木工程
- Geotechnical Engineering 岩土工程

Department of Computer Science and Information Systems 計算機科學及資訊系統系

Bachelor of Science 理學士

- Computer Science and Information Systems 計算機科學及資訊系統
- Bioinformatics + 生物訊息學

Bachelor of Engineering 工學學士

- Software Engineering + 軟件工程

Bachelor of Business Administration/ Bachelor of Engineering 工商管理學學士／工學學士

- Information Systems/Software Engineering + 資訊系統／軟件工程

Master of Science 理科碩士

- Computer Science 計算機學
- Electronic Commerce and Internet Computing + 電子商貿及互聯網工程

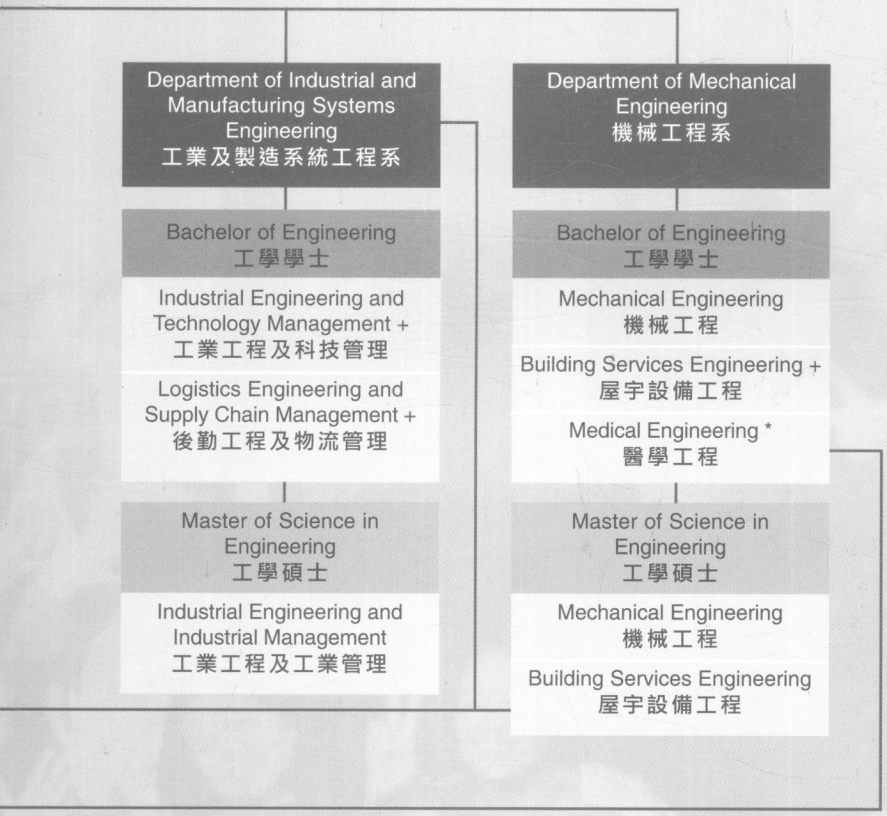
Department of Electrical and Electronic Engineering 電機電子工程系

Bachelor of Engineering 工學學士

- Information Engineering + 訊息工程
- Electronic and Communications Engineering + 電子及通訊工程
- Electrical Engineering 電機工程
- Computer Engineering 計算機工程

Master of Science in Engineering 工學碩士

- Electrical and Electronic Engineering 電機電子工程
- Communication Engineering + 通訊工程
- Computer and Information Technology + 計算機及資訊科技



Remarks: # From 2002-2003 onwards, the MSc(Eng) in Civil Engineering degree programme will be split into four programmes; they are MSc(Eng) in Environmental Engineering, MSc(Eng) in Infrastructure Project Management, MSc(Eng) in Structural Engineering and MSc(Eng) in Transportation Engineering

* launched in 2002-2003

\+ launched during 1999-2002

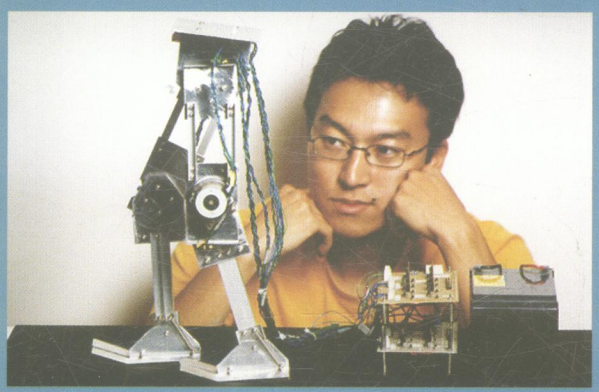
A man's reach should exceed his grasp, or what is heaven for?

- Robert Browning (1812-1889)

POSTGRADUATE STUDIES

POSTGRADUATE STUDIES

Introduction



In line with the University's mission to strive for the highest standards in teaching, research and scholarship, the Faculty has placed great emphasis on postgraduate studies and research. In addition to being an extension of the undergraduate programmes, postgraduate education also provides the avenue through which high-quality, well-trained graduates, and new research ideas and results are channeled to local and international engineering communities. The Faculty's firm commitment and dedication to high standard postgraduate and research programmes have attracted the interest of many young aspiring engineers to apply for admission to these programmes. Engineering is one of the faculties in HKU with the largest number of postgraduate students, many of whom are graduates of major overseas universities. The integrity and high quality of the programmes are maintained in all Departments, partly through the appointment of highly qualified academics from prestigious overseas universities as external examiners.

Postgraduate Enrolment

In 2001-2002, there are 1,117 students enroled in the MSc programmes, and 326 in the MPhil and PhD programmes. These students are selected after a highly competitive admission exercise. Postgraduate enrolment statistics are provided under "Student Enrolment Statistics" [Appendix C-9].

Postgraduate Programmes

The Faculty offers two categories of higher degrees: coursework degrees [MSc(Engineering), MSc(Computer Science), MSc(Electronic Commerce and Internet Computing)], and research degrees (MPhil and PhD). All MSc programmes are part-time curricula. The normal length of study for an MSc degree is two to three years. MSc programmes are offered to practising engineers or professionals in response to the needs of society. For example, the MSc in Geotechnical Engineering programme is targeted at the specific needs for advancing knowledge in this field to cope with the unique landslip problems in Hong Kong. In the Information Technology area, one prominent and very successful programme in the Faculty is the MSc in Electronic Commerce and Internet Computing. This programme was the first of its type among universities in Hong Kong when launched in September 1999; it is a fully self-funded

Support for Postgraduate Students

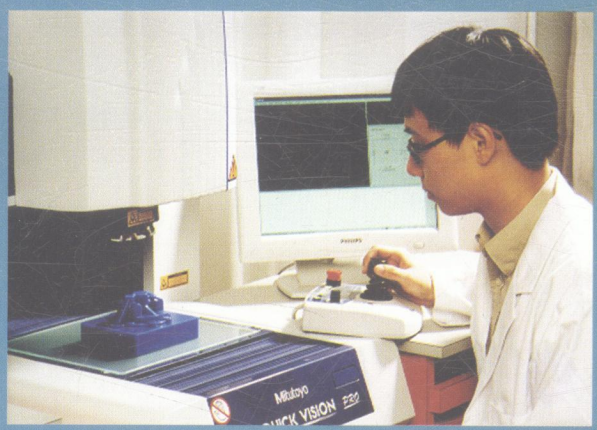
programme with over 3,162 applicants vying for its annual intake of between 120 and 150 places. Students of the programme are leaders and senior managers in the IT field with good, strong first and postgraduate degrees from the engineering and business disciplines, with quite a few of them holding MBA, and a couple of them with even doctorates. Staff on the programme is drawn from academics within the University and overseas institutions such as Carnegie Mellon, Stanford, Suffolk, Florida, as well as technologists from Hong Kong, Australian and American industries.

The period of study for MPhil is two years for full-time students and three years for part-time students. PhD candidates usually complete their studies in a period of three to four years of full-time studies and four and a half to six years of part-time studies. All MPhil and PhD candidates follow an approved course of study comprising a dissertation and compulsory coursework (with the exception of some three-year PhD candidates who may not be required to take coursework). About 40% of the research postgraduate students are from Mainland China.

The MPhil and PhD programmes are rigorous programmes of high standards. Other than the requirements stipulated by the Graduate School, all MPhil and PhD students are required to do a presentation or seminar before confirmation of candidature. All MPhil and PhD students are also required to do an oral defence after submitting their theses. A list of all thesis titles of research postgraduate candidates in 1999-2001 is in Appendix C-8.

Most research students receive financial aid in the form of postgraduate studentships, teaching assistantships, demonstratorships, or research assistantships. In addition, a number of special scholarships are available to outstanding candidates. The University sets aside funds to allow students to attend international conferences in order to present their research results and to interact with other researchers. Additional postgraduate research grants are available to supplement research activities.

On campus, the Graduate House provides extensive postgraduate accommodation and amenities.



Master of Science in Engineering (MSc(Eng))

PROGRAMME	DEGREE DESCRIPTION
Building Services Engineering	Advanced education in the field of design, management and operation of building services engineering systems.
Communication Engineering, and Computer and Information Technology	Designed for practising engineers to continuously update their technical, professional and engineering knowledge, and to keep abreast with the latest development in Communication Engineering, Computer and Information Technology.
Electrical and Electronic Engineering	Advanced education and training in theory and techniques of Electronic and Computer Engineering.
Environmental Engineering	Advanced education in the field of Water and Environmental Engineering.
Geotechnical Engineering	Designed to provide practising geotechnical engineers with advanced professional education and training.
Industrial Engineering and Industrial Management	Advanced education and training in the philosophy, methods and techniques of Industrial Engineering and Industrial Management which are appropriate to industrial and service organisations in both the private and the public sectors in Southeast Asian communities.
Infrastructure Project Management	Advanced education in the Management of Infrastructure Projects over their entire life cycle.
Mechanical Engineering	Advanced education in the field of Mechanical Engineering.
Structural Engineering	Advanced education in the field of Structural Engineering.
Transportation Engineering	Advanced education in the field of Transportation Engineering.

Master of Science in Computer Science (MSc(CompSc))

PROGRAMME	DEGREE DESCRIPTION
Computer Science	Advanced education in Computer Science, ranging from highly theoretical and computationally complex subjects to more practical and applied courses.

Master of Science in Electronic Commerce & Internet Computing (MSc(ECom&IComp))

PROGRAMME	DEGREE DESCRIPTION
Electronic Commerce and Internet Computing	Designed for business and technology managers and professionals to equip themselves with the latest knowledge and skills in the deployment of technology to expand business opportunities regionally and globally

Research Programmes (MPhil and PhD)

DEPARTMENT	RESEARCH AREAS
Civil Engineering	- Structural Engineering - Water and Environmental Engineering - Geotechnical Engineering - Construction Engineering and Management - Transportation Engineering and Planning
Computer Science and Information Systems	- Design and Analysis of Algorithms - Software Engineering - Database - Networking, Internet and Distributed Systems - Artificial Intelligence, Speech Processing and Pattern Recognition - Multimedia and Computer Music - Computer Vision and Computer Graphics - E-commerce and Information Security - Legal Aspects of Computing
Electrical and Electronic Engineering	- Automation, Control and Intelligent Transportation - Biomedical Engineering and MRI - Computer Systems, Electronic Circuits and VLSI Design - Energy Systems and Electric Vehicles - Networking and Information Engineering - Wireless Communications
Industrial and Manufacturing Systems Engineering	- Engineering Management - Ergonomics - Intelligent Automation - Logistics and Supply Chain Management - Manufacturing Systems Design - Manufacturing Technology
Mechanical Engineering	- Building Services - CAD/CAM, Engineering Design and Management - Dynamics, Control and Robotics - Energy/Environmental Engineering - Marine and Off-shore Engineering - Material Science/Technology - Mechanics of Solids and Fracture Mechanics - Thermofluid Mechanics

Each friend represents a world in us, a world possibly not born until they arrive, and it is only by this meeting that a new world is born.

- Anais Nin (1903-1977)

LINKS WITH EXTERNAL INSTITUTIONS

LINKS WITH EXTERNAL INSTITUTIONS

Department of Civil Engineering

Collaboration with Universities in China and Overseas

The Department of Civil Engineering has a long history of collaboration with overseas universities. Back in the early 1970s, we had an exchange programme with the staff of the Civil Engineering Department of the University of Nottingham. After the opening up of China towards the end of the 70s, there were frequent visits by our staff to institutions in mainland China on personal basis, which have, over the following two decades or so, evolved and expanded to visits on departmental basis. For example, in the early 80s, Professor Y.K. Cheung from our Department met with Professor Hua Luo Geng (華羅庚) from the Institute of Mathematics, Chinese Academy of Sciences and the two reached an agreement that Professor Cheung would take two of Professor Hua's former students, Professor Wu Zhi Qian (吳茲潛) and Professor Chen Ming Jin (陳明俊) of Sun Yatsen University, as co-workers in a research project funded by the Croucher Foundation of Hong Kong. Since then, there has been a stream of visitors from institutions all over China coming to work together with our staff on research projects supported by various funding bodies including the Lee Hysan Foundation, the Sino-British Fellowship, the Haking Wong Research Fund and the Research Grants Commission. Among our many mainland partners in joint projects are South China University of Technology, the Ministry of Oil and Petroleum, Tongji University, and the Institute of Mechanics.

The first major project concerned the early development of the Spline Finite Strip Method, which complemented the then well-developed Semi-analytical Finite Strip Method. The principal researchers for this project were Professor Y.K. Cheung, Professor S.C. Fan and Dr. L.G. Tham from HKU and Professor C.Q. Wu and Professor M. J. Chen from Zhongshan University. The idea of using spline function instead of the analytical functions was initiated by Professor Wu but the subsequent development and the many engineering applications were carried out by Professor Cheung, Professor Fan, Dr. Tham and Dr. W.Y. Li.

The Spline Finite Strip Method can be used conveniently for multiple span structures with various boundary conditions,

Professor Y.K. Cheung delivering his inaugural speech at the Fudan University

Professor Lu Yongxiang, the then President of the Zhejiang University and the current President of the Chinese Academy of Sciences, presenting souvenirs to Professor Y.K. Cheung

and acted upon by point loads or patch loads. It has been used extensively for the analysis of plates and shells, and for dynamic and buckling analysis of thin-walled structures.

For his pioneering work on the Finite Strip Method, which incorporated the Semi-analytical Finite Strip Method, the Finite Prism Method, the Finite Layer Method, and the Spline Finite Strip Method, Professor Y.K. Cheung was awarded a Second-Class Award of the China National Natural Science Prize in 1989.

A book entitled "Spline Finite Strip Method in Structural Analysis" co-authored by Professor C.Q. Wu, Professor Y.K. Cheung and Professor S.C. Fan was published in Chinese in 1986.

In recognition of their high academic achievements, some teachers from the Department have been granted honorary positions in universities and institutions in Mainland China. An outstanding example is Professor Y.K. Cheung, who has been given such honour by many institutions since 1980 when he became an Honorary Professor of South China University of Technology. These institutions are: Xi'an Jiaotong University (1985), Huazhong University of Science and Technology (1988), Tongji University (1992), Southwest Jiaotong University (1992), Dalian University of Technology (1993), Institute of Rock and Soil Mechanics (1993), Wuhan University of Hydraulic and Electric Engineering (1994), Institute of Geology (1995), Hohai University (1995), Nanjing University of Science and Technology (1997), Fudan University (1997), China University of Geosciences (1999), Nanjing University (1999) and Zhejiang University (2001). In addition, he was also appointed Honorary Professor of the University of Sydney (1999). Other teachers who have been recognised in similar fashion include: Professor J.H.W. Lee, who was appointed Advisory Professor of Hohai University in 1986 and Consulting Professor of Tongji University in 1997; Professor H.C. Chan, Honorary Professor of Zhengzhou University of Technology in 1991 and Visiting Professor of Hunan University in 1998; Professor H.H.P. Fang, Honorary Distinguished/Adjunct/Visiting Professor of National Taiwan University, Nanjing University, Tianjin University, Harbin Institute of Technology, China University of Geosciences (Wuhan), East China University of Science and Technology and Hunan University.


GUOJIA ZIRAN KEXUE JIANG

为表彰在自然科学研究中做出的重要贡献，特颁发此证书，以资鼓励。

证书

1989年国家自然科学奖

项目名称： 有限条法

主要研究者： 张佑启 （香港大学）

获奖等级： 二等

中华人民共和国
国家科学技术委员会主任
1990年8月11日

证书号：Z8921501

Professor Y.K. Cheung received Second-Class Award of the China National Natural Science Prize in 1989 for his contribution in natural science research

Collaboration with Zhongshan University

The Department of Civil Engineering, under the leadership of Professor Y. K. Cheung, has made numerous friendly contacts with many prestigious universities in China, and in particular has established a strong link with the Mechanics Department of Zhongshan University in Guangzhou, China. The proximity of the two cities has facilitated the frequent exchanges between members of the two departments, resulting in collaboration on several research projects in the field of structural analysis.

One of these projects is the development of the U-transformation method and its applications, which began in 1987 and is still going strong now after 15 years. The principal researchers in this project are Professor Y.K. Cheung and Professor H.C. Chan from HKU and Professor C.W. Cai, Professor J. K. Liu and Dr. Y. Li from Zhongshan University. The concept was first initiated by Professor Cai when he was doing collaborative work with the Department in the late 80s and early 90s. In 1991 he recommended one of his post-graduates, Li Ying, to join the project and also to register as a PhD candidate with HKU. Eventually Li got his degree in 1996 with his work in this project. In 1997, Professor Liu joined the research team. The collaboration has been all the time very efficient and productive.

The U-transformation Method is a novel analytical method applicable to the analysis of structures or systems with periodicity. It is the most systematic and efficient method for obtaining exact analytical solutions in explicit forms for static and dynamic analyses of structures with periodicity in one or two directions. The application of the method is then extended to the determination of mode localisation of disordered periodic structures and the convergence study of numerical analysis results by finite element and finite strip methods. Lately, breakthrough in the research work has been achieved in obtaining exact solutions for static and dynamic analyses of structures with bi-periodicity.

Two books have been written and published (World Scientific Publishing Co. Pte. Ltd.):

1. Exact Analysis of Structures with Periodicity using U-Transformation
   (by H. C. Chan, C. W. Cai and Y. K. Cheung, 1998, ISBN 981-02-3642-5)
2. Exact Analysis of Bi-Periodic Structures
   (by C. W. Cai, J. K. Liu and H. C. Chan, 2002, ISBN 981-02-4928-4)

Furthermore, this collaboration has produced results that have won international prizes, including a Third Class Award for Advancement of Science and Technology by the National Education Committee of China (1991), a First Prize by the Society of Vibration Engineering of Guangdong Province (1995) and a Second Class Natural Science Award by the Ministry of Education of China (2000). The book “Exact Analysis of Structures with Periodicity using U-Transformation” has won the First Prize for Outstanding Books (2000) by Hong Kong Zhongshan University Advanced Research Centre.

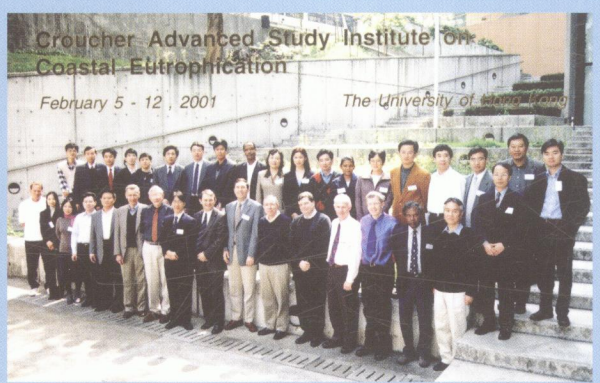
Collaboration with South China University of Technology

The Department intends to establish the "HKU-SCUT Research Centre on Urban Habitat and Infrastructure Development" with the South China University of Technology (SCUT). The main research areas of this Centre will be health monitoring of existing structures and bridges, design and construction of "green" buildings, and urban planning and construction.

Academic Exchange between HKU and China in Water Environment Engineering

Over the past two decades, the Department of Civil Engineering has participated in various academic exchanges with some key institutions in Mainland China in the area of water environment engineering. Partners include Tsinghua University, Nanjing University, Hohai University, the Institute of Water Conservancy and Hydropower Research (IWHR, Beijing), Harbin Institute of Technology, Tianjin University, East China University of Science and Technology, China University of Geosciences (Wuhan) and Tongji University. While informal exchanges in the form of lectures and discussions with colleagues from Tsinghua date back to the early 1980s, formal exchanges started in 1995 when a 5-year academic exchange agreement between the Department and Tsinghua's Hydraulic Engineering Department was signed. This was followed by several noteworthy developments. Professor Wang Guanqian, winner of many prestigious young scientist awards and now Director of the Sediment Research Laboratory of Tsinghua, first visited the Civil Engineering Department as a Croucher Visitor in 1996 on a research visit hosted by Professor J.H.W. Lee. This led to the joint organisation (TsinghuaU-PekingU-HKU) of a 3-day Young Scientist Forum in October 1997 on "Sediment, water and environment interactions", which was sponsored by the Chinese Association for Science and Technology (CAST) and held in Beijing. The prestigious "Young Scientist Forum" series was established in 1995 to provide an opportunity for accomplished, elite young scientists (limited to 30 per forum) to come together and discuss freely strategic research needs in selected areas. The seminar provided an excellent opportunity for young academics in Hong Kong to meet with the brightest young scientists and engineers in the Mainland. Subsequently, the 2nd International Symposium on Environmental Hydraulics and the 7th International Symposium on River Sedimentation were held in December 1998. This was jointly organised with Professor Wang Zhaoyin of Tsinghua and the UNESCO-supported International Research and Training Center on Erosion and Sedimentation (IRTCES) in Beijing. The Symposium was attended by over 300 delegates from 40 countries, and was addressed by Mr. Yang Zhenhuai, former Minister of Water Resources of China.

These exchanges have led to a HKU-TsinghuaU joint research project, Sediment-water-pollutant Interactions in Estuarine and Coastal Waters - with particular reference to Bohai Bay and Deep Bay, awarded in the first round of NSFC/RGC Joint Research Scheme. Led by Professor J.H.W. Lee (HKU) and Professor Wang Zhaoyin (Tsinghua), the project involves several partners from Tsinghua University, Peking University and Hong Kong Polytechnic University. The objective is to combine the expertise of the team members in hydraulic and environmental engineering to tackle the complex inter-



Participants of the Croucher Foundation Advanced Study Institute on Recent Developments in Coastal Eutrophication Research: Prediction, Decision Support Systems and Management, February 5 -12, 2001, Hong Kong

Mr. Yang Zhenhuai, former Minister of Water Resources, China delivering a Keynote Lecture at the Second International Symposium on Environmental Hydraulics and the Seventh International Symposium on River Sedementation, December 16 -18, 1998, Hong Kong

disciplinary coastal water quality problems facing China. The colleagues from Tsinghua and Peking Universities are also key collaborators in an Area of Excellence (AoE) in Water Environment Engineering which was one of the finalists shortlisted by the UGC in 2000. The last couple of years have seen more frequent exchange activities - International Symposium on Stochastic Hydraulics (Beijing, July 2000), the Croucher Advanced Study Institute on Coastal Eutrophication (Hong Kong, February 2001), the 20th Congress of the International Association for Hydraulic Research (Beijing, September 2001), an Advanced International Seminar on Education in the Water Sciences (Tsinghua, September 2001), to name just a few.

The Jockey Club Research and Information Centre for Landslip Research and Land Development - A Model for Research Collaboration between Hong Kong and China

With a generous grant from The Hong Kong Jockey Club Charities Trust, 'The Jockey Club Research and Information Centre for Landslip Prevention and Land Development' (the Centre) has been established at the Department of Civil Engineering in October 1998. As one of its missions is to promote the technology transfer between Hong Kong and Mainland China, the Centre has brought together researchers and engineers from the governments, the industry and tertiary institutions from both sides to review the latest development in various aspects of slope engineering. Based on the review results, a research strategy covering four research themes for identifying potential projects has been formulated. The themes are

(i) fundamental engineering behaviour of soils;
(ii) upgrading techniques for existing slopes;
(iii) warning system for slope instability; and
(iv) technology development.

The Centre is currently engaged in collaborative research projects with several institutes in Mainland China:

1. With the Institute of Geology and Geophysics of the Chinese Academy of Sciences, the Centre has been carrying out the analysis of saprolite microstructure and properties. The project will develop a methodology for analysis of saprolite microstructure and create a Fuzzy Logic-Artificial Neural Network System for assessment of saprolite engineering qualities.
2. With the Institute of Mountain Hazards and Environment of the Chinese Academy of Sciences, the Centre is investigating the mechanism of debris flow. The main tasks of the joint research include:
   (i) field monitoring of landslide into debris flow;
   (ii) field testing of landslide into debris flow under controlled conditions; and
   (iii) laboratory model testing of debris flow running distance. Findings from this study will be used in numerical modelling of landslide debris and quantitative risk assessment of landslides.
3. With GIS experts of the Remote Sensing and Cartography Centre of the Ministry of Construction, the Centre is developing methods for assessing the potential and extent of landslip in natural terrain.

Department of Computer Science and Information Systems

Furthermore, the Centre has adopted a number of initiatives and launched activities to promote technology transfer between Hong Kong and Mainland China. These include:

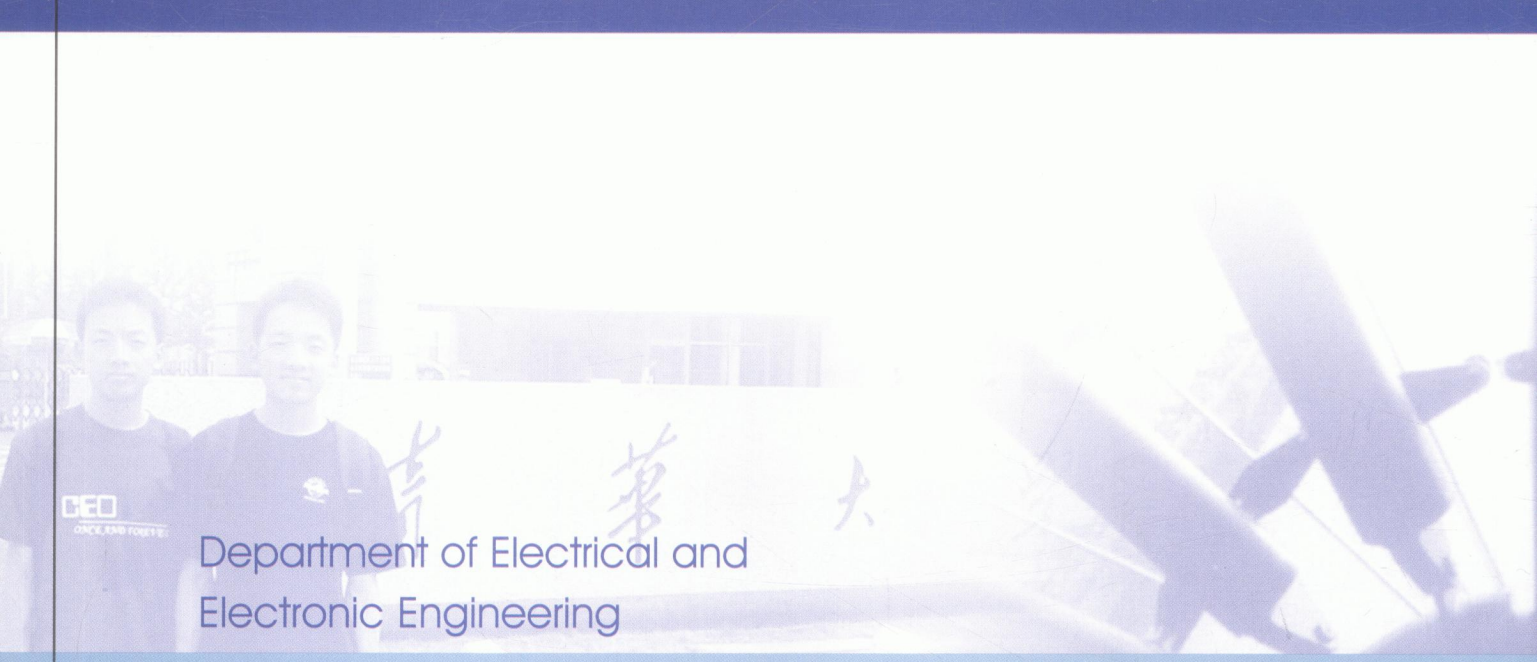
- Symposia for geotechnical practitioners and researchers to exchange experience on slope hazards and their prevention. The Symposium on Slope Hazards and their Prevention in May 2000 covered the topics on slope safety management system, the use of GIS and IT in managing slope information, mechanics of debris flow, engineering geology and triggering mechanisms of landslides, and preventive and remedial measures.
- The Hong Kong - Mainland China Geotechnical Lecture Series invited well-established Mainland researchers and engineers to deliver lectures in Hong Kong and provided an arena for exchanges of professional experience and knowledge in geotechnical engineering and geohazard prevention.
- A research assistantship programme for young researchers and engineers from Mainland China to participate in geotechnical research and projects outside Mainland China.
- A short-term training scheme for Mainland China engineering and management professionals who are currently working at The University of Hong Kong, the HKSAR Government and the industry.

Field monitoring of a Soil Nailed Loose Fill Slope at the Kadoorie Agricultural Research Centre, Yuen Long, New Territories

Collaboration with Universities and Research Institutes in China and Overseas

The Department has developed close links with universities in Mainland China and overseas and it is currently carrying out research collaboration with the College of Computer and Information Engineering, Xiamen University.

In January 2001, Dr. Q. Huo of the Department was awarded a contract research project (US$30,000) by the ATR Spoken Language Translation Research Laboratories (ATR-SLT) in Kyoto, Japan to conduct research on robust speech recognition. The objective of this project is to compare the performance of several state-of-the-art online adaptation algorithms in terms of their adaptation efficiency, memory requirement and computational complexity for speaker adaptation application. The investigation will devise ways to take advantage of the strength of individual algorithms and avoid pitfalls in them when using these algorithms to improve the robustness of speech recognition with respect to speaker variability in practice.



Department of Electrical and Electronic Engineering

Collaboration with Tsinghua University: HKU and TsinghuaU Power System Research Institute

Established in 1999, the HKU and TsinghuaU Power System Research Institute (Shenzhen PSRI) is a joint research institute under the Centre for Electrical Energy Systems, Department of Electrical and Electronic Engineering, The University of Hong Kong and the National Key Electric Power System Laboratory, Tsinghua University. Its location in Shenzhen allows the Institute to make full use of Hong Kong and Shenzhen as a window between Mainland China and the rest of the world. Combining the excellent research capability of the two universities in power systems, Shenzhen PSRI aims at promoting research and innovation, academic exchange and technology transfer in power systems. Under the leadership of two world-renowned experts, Professor F. Wu of HKU and Professor Q. Lu (Fellow of Chinese Academy of Sciences) of Tsinghua University, the Institute is now working on an array of projects, including some National Key Basic Research projects (also known as "Project 973") and studies of the Three-Gorges electricity market structure design, cross-regional power grid interconnection in China and transmission of electricity from Western to Eastern China.

Multicode Wideband CDMA with Adaptive Modulation for High Speed 3G Transmission

The Multicode Wideband CDMA project is financially supported by NTT DoCoMo, the largest wireless mobile company in Japan, and the investigators are Professor T. S. Ng and Dr. J. Wang of the Department of Electrical and Electronic Engineering, The University of Hong Kong.

The project objectives and key issues to be addressed are as follows.

Multicode Wideband CDMA has been introduced as a new transmission scheme for high speed and flexible data rate communication for third generation (3G) wireless mobile communications. The basic idea of multicode CDMA is to split the user data into a number of streams and use parallel orthogonal channel codes to modulate. In the present standards of W-CDMA 3GPP, multicode CDMA with BPSK/QPSK modulation can provide data service up to the rate of 2 Mbps. However, in the future, even higher speed data transmission with data rate as high as 10 Mbps may be required for forward link. In order to provide such high data rate service, enhanced techniques such as efficient multi-level modulation (or QAM) has to be adopted.

Engineers from Electricite de France, China Light and Power, Shenzhen Nuclear Corp., etc. visiting the Shenzhen PSRI

Opening Ceremony of the HKU-TsinghuaU Shenzhen Power System Research Institute

The introduction of multicode brings along with it several problems. One of them is self-interference (or multicode interference (MCI)) caused by non-orthogonality of different delayed versions of the intra-user signal in a multipath environment. The MCI interference may be cancelled out by use of interference cancellation.

The introduction of QAM to wideband CDMA results in performance degradation due to the requirement of larger signal to interference plus noise ratio (SIR). However, this problem can be overcome by adopting adaptive modulation. That is, when SIR is large, higher-level modulation (64QAM or 16QAM) should be used, whereas when SIR is small, simple modulation scheme (QPSK or 8PSK) can be selected.

After detailed analytical investigation of the above problems, building baseband prototypes of the multicode wideband CDMA (point-to-point transmission) with adaptive modulation and interference cancellation will be useful for further exploration of innovation.

In this project, The University of Hong Kong provides both theoretical analysis and baseband prototyping systems, while NTT DoCoMo is responsible for the design of RF parts and protocol. The two sides are working closely for the interface between baseband and RF. The theoretical results are now being used by the company.

International Collaboration on Electric Vehicles

The missions of a university in the 21st century are three-fold:
(1) Teaching - knowledge dissemination;
(2) Research - knowledge advancement; and
(3) Technology Transfer - knowledge transfer.
Universities are faced with the challenges of globalization, student centred learning and lifelong learning. For an engineering department in tertiary education, innovation along with thinking and acting globally are the keys to success.

Based on the agreement between HKU's Department of Electrical and Electronic Engineering and the Hawaii Natural Energy Institute of the University of Hawaii, the International Research Centre for Electric Vehicles was founded in 1986. The Centre also receives support from the US Department of Energy and the Electric Power Research Institute. The main objective of the Centre is to advance electric vehicle technology and promote the applications of electric vehicles. Later the agreements were extended to include other universities and industries in USA, Canada, UK, Germany, France, Italy, Poland, Mainland China, Japan, Korea, Singapore, Malaysia and Australia. Some agreements were also upgraded to the University level, namely the agreement with the Honda R&D Ltd. for the establishment of Honda Chair of Engineering in 1992, and the agreement with the Warsaw Technical University in 2002. Since 1986, the Centre has received many Visiting Professors and Visiting Research Students from member countries. The Centre has also sent colleagues and research students to those universities as part of the exchange programmes. The Centre hosted the 10th International Electric Vehicles Symposium in Hong Kong in 1990 with Professor C.C. Chan as the General Chairman. The Centre was also instrumental in founding the World Electric Vehicle Association in 1990. Professor Chan was the Co-Founder and President of the Association, and was elected as one of the three wise men in electric vehicle technology.

The major objectives of the Centre are to:

(1) develop software package for system integration and optimization of electric, hybrid and fuel cell vehicles;
(2) develop advanced electric motor drives and controllers for electric, hybrid and fuel cell vehicles;
(3) develop intelligent energy systems for electric, hybrid and fuel cell vehicles; and
(4) carry out technology transfer and provide industry service.

International collaborations carried out in the Centre have produced remarkable results mainly in the form of academic publications, intellectual proprietary and technology transfer, making it an internationally known intellectual centre of electric vehicle technology. Over 80 refereed journal papers, more than 150 conference papers, some 20 keynote speeches and 8 patents have been published. Modern Electric Vehicle Technology, a monograph by Professor C.C. Chan and Dr. K.T. Chau, was published by Oxford University Press in 2001. It was the result of the collective work of the Centre to celebrate the 90th Anniversary of the University and 10th Anniversary of the World Electric Vehicle Association.

In the field of technology transfer and industry service, Professor C.C. Chan served as Senior Consultant to Unique Mobility Inc. USA in 1989 for the development of an advanced permanent magnet motor drive for BMW-E1 electric car, which made to the list of "One Hundred Best What's New" by Popular Science Magazine, USA. He has also provided advices to large companies such as Honda R&D Ltd., Ford, and Kia Motors, and was appointed Distinguished Visiting Scientist by the Japan National Institute of Environmental Studies to collaborate with Professor H. Shimizu on the development of highly advanced electric vehicles using wheel motors. The Centre's collaboration with Amerigon Inc. USA in 1993 on the development of the U-2001 electric car has resulted in commercial production of "Reva" electric cars in India. In recognition of his contribution in electric vehicle technology, Professor C.C. Chan was elected a Fellow of the Royal Academy of Engineering, UK, and was the first Academician of the Chinese Academy of Engineering from Hong Kong (1997). Professor Chan was also selected as Asia's Best Technology Pioneer by Asiaweek in 2001.

Professor C.C. Chan has been serving as Chief Panelist of the Ministry of Science and Technology for the "863" Key National Projects in Electric Vehicles. He has also served on over 20 international committees and was recently appointed the Founding President for the preparation of the International Academy for Advanced Study in Shanghai. The Academy's mission is to promote distinguished international scholarship, to address the recent developments of science, technology and medicine that will have a major impact on the way we live. "It has been a great joy to see the fruition of international collaboration. It is that sense of *Friendship* and *Success* that will carry forever." Professor Chan said.

Professor C.C. Chan (second from right) receiving the trophy of the World Electric Vehicle Association at the 15th International Electric Vehicle Symposium at Brussels, 1998

Department of Industrial and Manufacturing Systems Engineering

Collaboration with Universities in China and Overseas

Staff members of the Department of Industrial and Manufacturing Systems Engineering have always maintained close links with their colleagues in universities in China and overseas, collaborating in research in areas such as enterprise engineering, and logistics and supply chain management. In recent years, noting the tremendous development in industrial engineering and logistics management achieved by Mainland universities, the Department has taken steps to further strengthen and formalise research collaborations with its Mainland counterparts. For example, Dr. P.L.Y. Chan is undertaking a joint research project with researchers of Lanzhou University on a shock model in reliability analysis. The results due to this research will provide significant theoretical foundations on the reliability of complex industrial systems. Also, the Department is actively contributing to curriculum developments in industrial engineering and logistics management. Professor K.L. Mak and his colleagues are now serving on the publication committee of the Industrial Engineering Department of Tsinghua University to publish a complete series of textbooks to support the industrial engineering education nationwide; and Dr. T.L. Lau has made substantial contribution to a training book entitled *Network Curriculum Development,* edited by Professor Y.H. Liu of the South China University of Technology.

Department of Mechanical Engineering

Collaboration with Universities in China

The Department of Mechanical Engineering maintains close links with many universities in Mainland China as well as overseas. Many staff members have been appointed Honorary Professors, Advisory Professors and Concurrent Professors in well-known Chinese universities. In 1994, the Department had signed the "Agreement of Cooperative Research" with the Chemical Engineering Research Centre of Tianjin University to carry out research on flow and mass transfer in distillation and absorption columns. More recently, an agreement for academic collaboration was signed between the Department and the School of Mechanical Science and Engineering, Huazhong University of Science and Technology (HUST) to carry out joint research projects, mutual visits and exchanges. One outcome of the cooperation is a tri-partite conference - International Conference on Manufacturing Automation - jointly organised by the Department, the School of Mechanical Science and Engineering at HUST and the School of Mechanical and Production Engineering at the National University of Singapore, and hosted by the Department in December 2002 in Hong Kong.

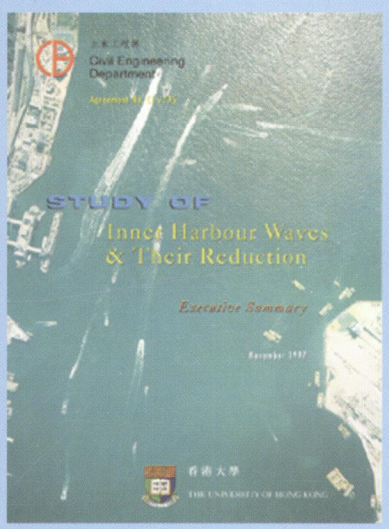
Academic Collaboration with the State Key Laboratory of Coastal and Offshore Engineering (SKLCOE), Dalian University of Technology

On behalf of the Department of Mechanical Engineering of HKU, Professor A. T. Chwang signed the Agreement for Academic Collaboration with the State Key Laboratory of Coastal and Offshore Engineering (SKLCOE), Dalian University of Technology on June 25, 1994. The two parties agreed to

(a) launch joint research activities,
(b) implement graduate student exchange programmes,
(c) carry out exchange of academic and other publications, and
(d) organise joint conferences, seminars and academic meetings.

A series of activities have followed the signing of the agreement. For example, in 1995 alone, three SKLCOE scholars visited the Department: Dr. Yongming Shen, who stayed for six months to conduct a joint research with Professor A. T. Chwang on "Refined numerical modelling of water quality in Victoria Harbour"; Professor Yu-cheng Li, who came to present a seminar entitled "Wave breaking phenomena in shallow water"; and Professor Da-hong Qiu, who is the Director of SKLCOE.

SKLCOE joined hands with the Department's hydrodynamics team in a three-year project entitled "Study of Inner Harbour Waves and Their Reduction" commissioned by the Hong Kong government. The study began in February 1996 and was composed of an extensive array of investigations including database development, field wave assessment which is supplemented by ship-wave assessment and photogrammetric/aerial-photographic survey on harbour waves, investigation of ship-generated waves, development of wave-absorbing seawall structures, and design outline of the seawall structure for engineering applications. A key result of this successful project is the 114m long prototype porous seawall - a devise to dissipate inner harbour waves - currently under construction in Victoria Harbour. During this project, Professor Yu-xiu Yu of SKLCOE visited the Department from July 1 to August 30, 1996 to present a series of lectures on wave spectrum analysis.



In preparation for the Area of Excellence proposal on Port and Harbour Studies, Professor Da-hong Qiu and Professor Yongming Shen, Vice Director of SKLCOE, were invited to visit the Department in October 1998. During their visit, further collaboration plans between the two institutions were discussed; Professor Qiu presented a seminar entitled "Brief introduction of State Key Laboratory of Coastal and Offshore Engineering", and Professor Shen presented a seminar entitled "Research programmes of pollutant transport under the action of waves and current".

Professor A.T. Chwang and Professor Da-hong Qiu successfully obtained funding from the NSFC/RGC Joint Research Scheme 1999-2000 to conduct a joint research on "Interaction between waves and the marine environment". Under this project, Professor A.T. Chwang, Dr. C.O. Ng and Dr. J.J. Shu of HKU visited SKLCOE at Dalian in July 2000. Professor Qiu, Professor Yu-cheng Li, Dr. Shao-chen Sun and Dr. Bin Teng of SKLCOE visited HKU in January 2001. The visits facilitated active discussion on the joint research and future collaboration.

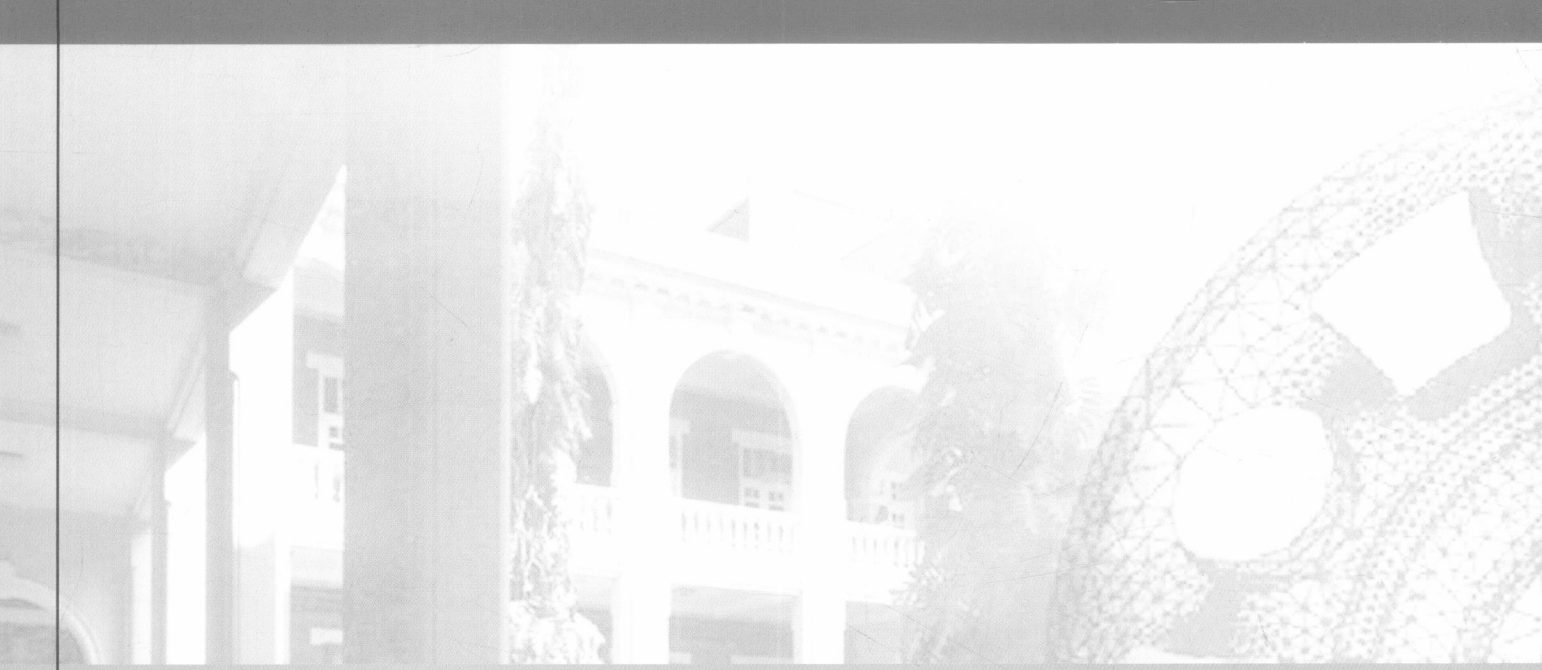
This NSFC/RGC project also necessitated a number of other visits in 2001, each lasting for about three months, by SKLCOE researchers to the Department: Professor Dapeng Sun, to conduct the joint research on nonlinear surface or internal waves with Dr. K.W. Chow; Professor Yongming Shen, to collaborate with Dr. C.O. Ng on the pollutant transport under the influence of surface waves; and Professor Bin Teng, to work closely with Professor A.T. Chwang on the development of wave absorbing seawalls and other wave reduction devices.

Since the signing of the official Agreement for Academic Collaboration in 1994, both parties have gained valuable experience on joint research. At the present time, they are exploring the possibility of conducing joint research under 863 and 973 schemes sponsored by the Ministry of Science and Technology in China.

Faculty of Engineering	
Agreement	Period
HKU-Monash University Undergraduate Exchange Programme	2000 - 2002
Global Engineering Exchange Education Program	2001 - 2003

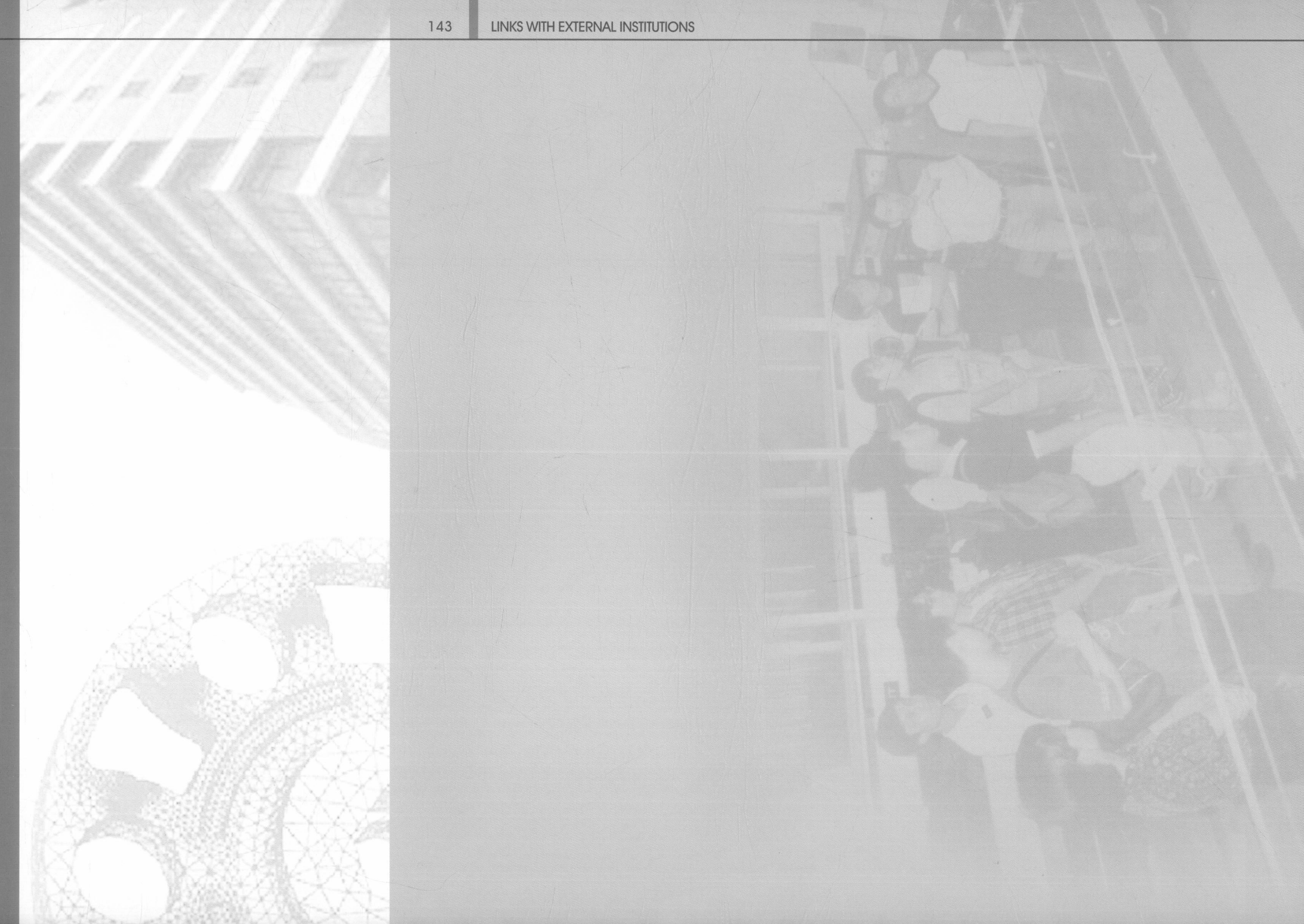
Department of Civil Engineering	
Agreement	Period
Academic Collaboration and Co-operative Research Agreement between CE and Department of Civil Engineering, Guangxi University	1996 - 1999
Agreement for Academic Collaboration between CE and College of Civil Engineering, Hohai University	1996 - 1999
Academic Collaboration and Co-operative Research Agreement between CE and Department of Civil and Architectural Engineering, Shanghai JiaoTong University	1996 - 1999
Agreement for Academic Collaboration between CE and Department of Civil Engineering, South China University of Technology	1996 - 1999
Agreement for Academic Collaboration between CE and College of Structural Engineering, Tongji University	1996 - 1999
Co-operative Research Agreement between CE and The Institute of Geology, Academia Sinica	1995 - 1997
Agreement for Academic Collaboration between CE and Department of Civil Engineering, Hunan University	1998 - 2001
Academic Collaboration and Co-operative Research Agreement between CE and Department of Hydraulic & Hydropower Engineering, Tsinghua University	1999 - 2002
Agreement for Academic Collaboration between CE and College of Water Resources and Environment, Hohai University	2000 - 2003
Consultancy Research Agreement between CE and Macao Water Supply Company Limited, Macao	2000 - 2001
Academic Collaboration and Co-operative Research Agreement between CE and Department of Civil Engineering, South China University of Technology	2000 - 2003
Academic Collaboration and Co-operative Research Agreement between CE and Department of Environmental Science and Technology, Tsinghua University	2000 - 2003
Consultancy Research Agreement between The Jockey Club Research and Information Centre for Landslip Prevention and Land Development, CE and The Institute of Geology, Academia Sinica	2001 - 2002
Academic Collaboration and Co-operative Research Agreement between CE and Clean Water Research Centre, Korea Advanced Institute of Science and Technology; Environmental Quality Research Center, Graduate Institute of Environmental Engineering, National Taiwan University; Institute of Environmental Studies and Department of Urban Engineering, University of Tokyo and ENV-NTU Environmental Engineering Research Centre, Nanyang Technological University	2001 - 2003
Co-operative Research Agreement between The Jockey Club Research and Information Centre for Landslip Prevention and Land Development, CE and Geotechnical Engineering Office, Civil Engineering Department of HKSAR Government	2001 onwards
Co-operative Research Agreement between The Jockey Club Research and Information Centre for Landslip Prevention and Land Development, CE and Institute of Mountain Hazards and Environment, Chinese Academy of Sciences	2001 - 2003

Department of Computer Science and Information Systems	
Agreement	Period
Agreement with ATR Spoken Language Translation Research Laboratories	2001 onwards



Department of Electrical and Electronic Engineering	
Agreement	Period
Agreement on Co-operation and Exchange of Education, Science and Technology with the Surgery Research Institute, the Third Military Medical University, Chongqing, China	1994-2000
Agreement with Shanghai JiaoTong University	1996-2001
Agreement with Zhejiang University	1997-1999
Agreement with School of Communications, XiDian University	1997-2000
Agreement with Department of Wireless Communications, Southeast University	1997-2000
Agreement with Department of Electronic Engineering, Tsinghua University	1997-2000
Agreement with Department of Electronic Engineering, University of Science & Technology of China	1997-2000
Agreement with Department of Wireless Communications, Peking University	1997-2000
Agreement on Co-operation and Exchange of Education, Science and Technology with Scientific Research Department, Shantou University, Guangdong, China	2000-2003
Agreement on Wideband CDMA with NTT DoCoMo, Japan	2001-2003

Department of Mechanical Engineering	
Agreement	Period
Co-operative research with State Key Laboratory of Coastal and Offshore Engineering, Dalian University of Technology on "Study of Inner Harbour Waves and Their Reduction" project of Hong Kong SAR Government	1996-1999
Co-operative Agreement with School of Mechanical Science and Engineering, Huazhong University of Science and Technology	1998 onwards



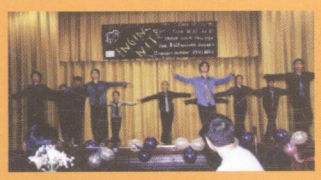
I arrived at May Hall in September of 1951, a true greenhorn, ready to be ragged by the more senior residents. A friendship developed very quickly among the victims (freshmen) and pretty soon it was work, eat and very little sleep.

- Albert I. King, BSc(Eng), Civil Engineering, 1955

STUDENT LIFE

STUDENT LIFE

The Engineering Society HKUSU



Established in 1913, the Engineering Society HKUSU is a faculty-based society with the longest history in the University. It organises extra-curricular and academic activities and welfare programmes, serves as a bridge between its members on one hand and the Faculty, the five Departments of the Faculty, practising engineers from the Alumni Association and various local engineering institutions on the other. All students in the Faculty are members of the Society. The Society is celebrating its 90th anniversary in the academic year 2002-2003.

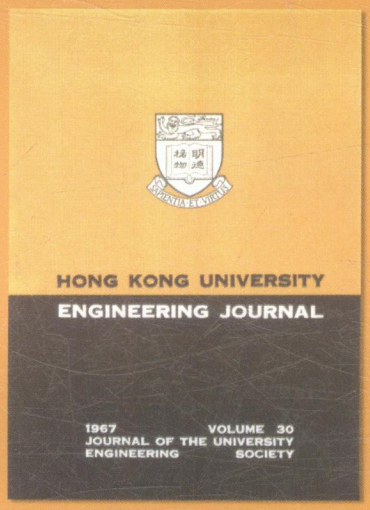
Activities regularly organised by the Society include:

- Engin' Nite, Orientation Camp, Freshmen Gathering, Engin' Super Pass Festival, Information Day
- President's Trophy, 3-on-3 Basketball Tournament
- Interflow Trip to Taiwan, Dean's Forum, Career Talk, Book Fair, Old Book Resale, Leadership Training Camp
- Publication of Rotor and CA Select

The Engineering Society won the OLMA Challenge Rose Bowls for both Overall Men's and Overall Women's Championship 2001-2002, in the Inter-Faculty Sports Competition:

- Inter-Faculty Competition (Men) 2001-2002
  OVERALL CHAMPION
  Champion: Aquatics, Athletics, Badminton, Table-tennis
  Second: Basketball
  Third: Squash, Tennis

- Inter-Faculty Competition (Women) 2001-2002
  OVERALL CHAMPION
  Champion: Athletics, Table-tennis
  Second: Aquatics, Badminton, Basketball
  Third: Tennis



Links

The Society maintains close contact with the Hong Kong Institution of Engineers - Young Members Committee, the HKU Engineering Alumni Association and the Hong Kong University Graduates Association.

Honours and Awards Won by Students

The Hong Kong Institution of Engineers (HKIE) Fugro Prize

The Peter HK Chan Award

The Hong Kong Institution of Engineers (HKIE) Scholar Award

HKIE Student Project Competition (MIE Division)

The Hong Kong Institution of Engineers (HKIE) Fugro Prize

In 2001, Carmen K.M. Kong, a Civil Engineering graduate of the year, won the HKIE Fugro Prize for best paper in geotechnical engineering from HKIE members under the age of 35. Miss Kong is now studying for her MSc degree in geotechnical engineering in the Faculty.

The Peter HK Chan Award

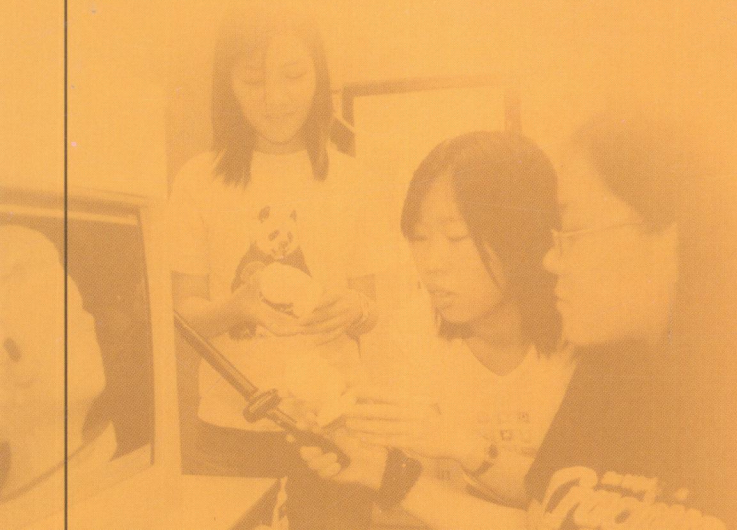
Five Civil Engineering Year II students - Tsue Siu Hang, Wong Hei Nok, Wong Hin Cheong, Wong Ka Leung and Wong Sze Man - co-authored a paper entitled “Management of Construction and Demolition Waste in Hong Kong”, which placed them the first runner-up of the Peter HK Chan Award for the Best Young Member's Environmental Paper of HKIE.

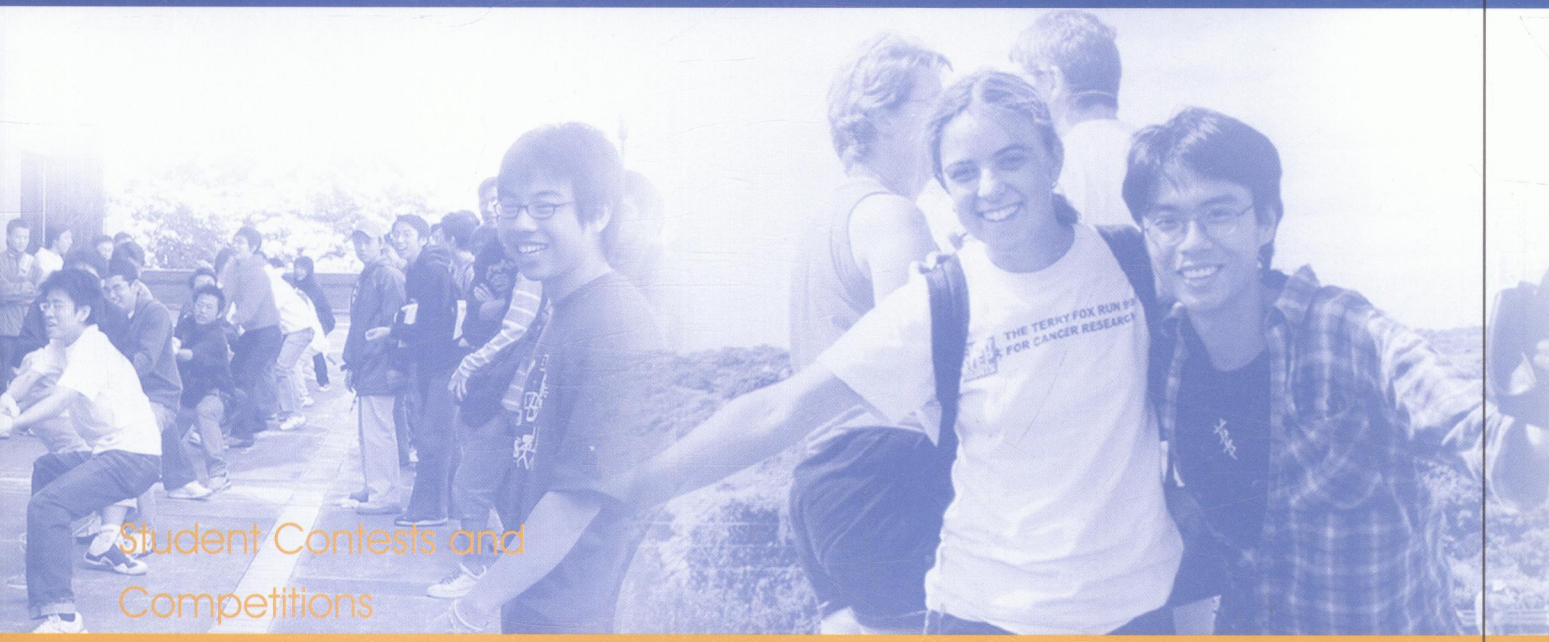
The Hong Kong Institution of Engineers (HKIE) Scholar Award

The prestigious HKIE Scholar Award programme recognises the academic achievements of outstanding full-time engineering undergraduate students. Kwok Chi Ting (Civil Engineering Year II student) and Diana C. L. Uy (Information Engineering Year II student) are two of the three HKIE scholars in 2002.

HKIE Student Project Competition (MIE Division)

A group of four Year III students from the Department of Industrial and Manufacturing Systems Engineering won the Merit Degree Level of 2000/2001 Student Project Competition organised by the Manufacturing and Industrial Engineering Division of the HKIE. The group comprises Doris H.L. Cheng, Joyce J.Y. Leung, Jason S.K. Lau and David C.W. Leung. The project entitled "i-Manufacturing Management Solution for SMEs" was a prototype system designed to meet the needs of Hong Kong's small and medium-sized enterprises.





Student Contests and Competitions

ACM International Collegiate Programming Contest

The ACM International Collegiate Programming Contest organised by ACM (the Association for Computing Machinery), which consists of regional contests held in different parts of the world, with winners proceeding to a world final, is the most prestigious of all competitions for computer science students. The HKU team was the 2nd runner-up in the regional contest of the ACM International Collegiate Programming Contest in 2000 and also in 2001. In both contests, the HKU team defeated all other teams from Hong Kong and obtained a seat in the world final in 2000, ranking 29th among 65 participating teams.

Tsinghua University Structure Design Invitational Tournament

HKU students were invited by Tsinghua University to participate in the "Tsinghua University Structure Design Invitational Tournament" held in 2000.

Thirteen teams participated in the event and were required to fabricate and load a model Millennium Bridge and prepare a hypothetical design proposal of a 1000m tall building. While the overall first and second runners-up went to two HKU teams, the overall champion went to Tsinghua University.

In 2002, the "Inter-University Invitational Civil Engineering Competition" was hosted by the Department of Civil Engineering of The University of Hong Kong. A total of 15 teams from six universities competed in the tournament. The overall championship again went to Tsinghua University.

E-Challenge 2001

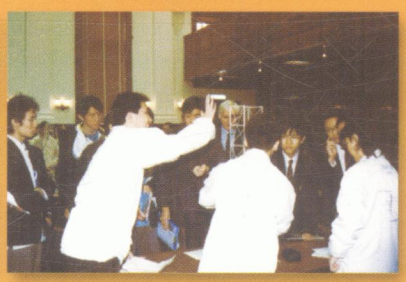
Young Entrepreneurs Development Council (YDC) E-Challenge 2001 was the second annual business plan competition organised by YDC. The HKU team won the Grand Prize of the competition in which there were over 40 entries from students in Hong Kong.

The HKU team members were David K. F. Lee, Andrew K. K. Chan, Bryan K. B. Li , Danny K. H. Kan, Ken K. C. Wong and Tony O. L. Sung.

The HKU project was also selected to represent Hong Kong at Startup@asia, a regional techno-venture business plan competition.

ACM International Collegiate Programming Contest

Tsinghua University and HKU teams with Mr. P. K.K. Lee, Head of the Department of Civil Engineering (5th from left) and Professor Yuan Si, Dean of the School of Civil Engineering, Tsinghua University (7th from left) at the "Inter-University Invitational Civil Engineering Competition"

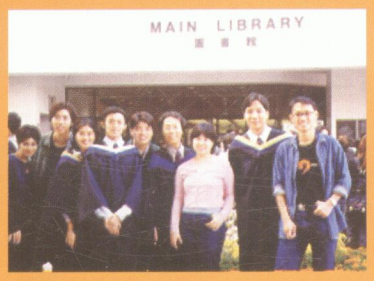


One of the HKU teams explaining to a group of high school students at the "Inter-University Invitational Civil Engineering Competition" why their tower model can sustain the loading test

Student Life

On Being President of the Students' Union

by Patrick C. S. Wong (BEng(CEEP),1998)



"Why did you take a year off from full-time study to be the Union's President?" "Is it worth it?" Questions like these were frequently thrown my way after I was elected President of HKUSU in 1997. Indeed, it was all too natural for my fellow students to ask such questions considering that apart from attending lectures, tutorials and laboratory classes, I devoted most of my time and efforts to the Union affairs during my year as HKUSU President. Perhaps influenced by the drastic changes of the political environment at the time, including the June 4 Incident and the heated political debates during the handover period, I came to believe that the community could be better if everyone could contribute and voice his/her opinions. This belief was the first and foremost reason for my decision to run for a seat in the HKUSU Executive Committee in 1997.

Being the President of the Union was really a challenge for me. Hong Kong University Students' Union is an independent student organisation that handles all financial problems, resources allocation, administration and regulations for all different clubs and societies on campus so as to facilitate the smooth running of a wide variety of student activities. The Union needs to represent students' interests and views on university affairs. As members of the community, students often voice their concerns and opinions on public affairs. One of the important tasks of the President is to attend meetings - internally with fellow student organisations or the University administration, or externally with other local and foreign students' unions. It's not exaggerating to say that hundreds of meetings were held during my term to discuss matters about the Union, the University and the society at large.

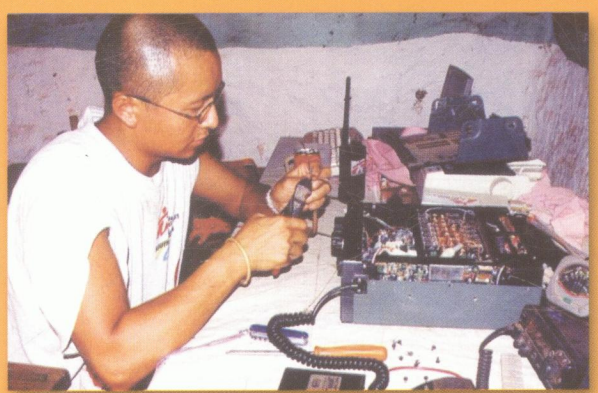
The year 1997 was critical to both Hong Kong and the University. The year for Hong Kong to be handed over to China also happened to be the one when the University started to introduce the credit-unit system. Although the actual implementation of the new curriculum turned out to be not what we had expected, I believed that we as students had expressed our concerns for the benefit of the University. It was wonderful to work with my cabinet members who shared the same goals and objectives. There were times when we got depressed, tired and nervous but these were overwhelmed by the fruits of our endeavours in organising one successful event after another. With the support from the Dean of our Faculty, Heads of Departments and my classmates, I was able to cope well with my study in the second semester of my final year soon after I had resumed full-time studies.

Last but not least, I would like to congratulate the Faculty on its 90th anniversary and hope that the Faculty will continue to play a leading role in developing engineering technology in Hong Kong.

On Serving the Medecins Sans Frontieres (Doctors Without Borders)

by Albert Ko (MPhil - IMSE)

Before becoming a full-time research student in the Industrial and Manufacturing Systems Engineering Department at HKU, I had worked in Japan, Taiwan, Mainland China and Hong Kong



Fixing the life-saving radio in our camp. Radio is the only means of communication in South Sudan, which allows us to call for drugs, food and evacuation planes at need.

for five years on mechanical design and project management in the heavy machinery industry.

As I felt that I had acquired sufficient knowledge and experience in engineering, I decided to go for a job that had earlier turned me down while I was a fresh graduate with no working experience. In April of 2000, I applied to be a volunteer engineer with Medecins Sans Frontieres (MSF), the world's largest independent humanitarian medical aid organisation that received the Nobel Peace Prize in 1999.

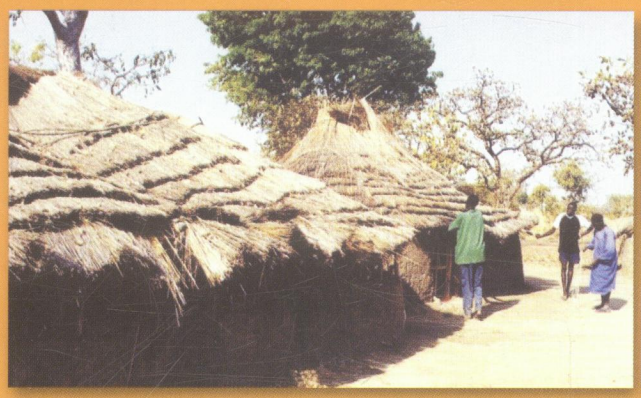
After going through a series of tests and interviews, MSF finally offered me a position as logistics administrator and sent me to Brussels, Belgium in October 2000 for a 3-week training. Until the end of the training, no one knew where we would go for our first mission.So the whole lot of us from around the world learned survival skills to adapt to different climates ranging from Siberian freezing cold to Afghanistan desert weather. We were also trained in car mechanics, radio systems, refugee camp management, finance, humanitarian law, geopolitics, logistics, water and sanitation, team development and many other things that most of us will probably never use again when we return home.

My first mission came soon after completing the training in Brussels. The destination was South Sudan, an African country that was torn apart by 18 years of civil war and is still suffering from epidemic, famine, refugees, and other war wounds. In this mission, I supervised about 160 local workers to construct hospitals, clinics, waste management facilities, airports, warehouses, water and electricity supply, latrines, mud-huts, and many more. Admittedly, the working condition was unforgiving. However, one would draw considerable gratification from actually helping doctors to save lives, and that made me understand why people volunteer to take such risk in war zones and put up with harsh living conditions serving in places far away from home, without pay.

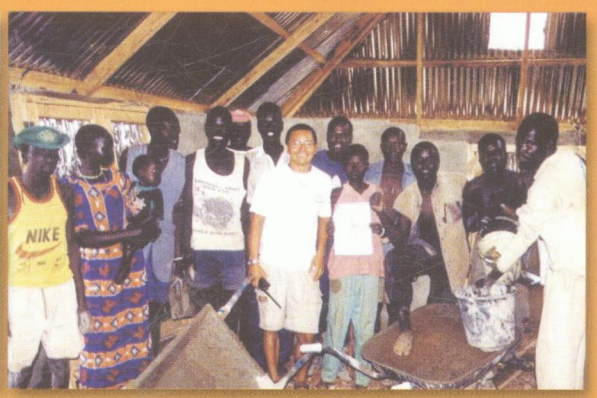
Although the Sudan mission was quite exhausting, I was eager to go on to another mission in Uzbekistan in July 2001. The mission lasted for six months so I was able to return to Hong Kong for Christmas in December 2001 and toasted the end of the designated year of volunteers.

Among the tasks I undertook as an MSF volunteer were fixing the life-saving radio in our camp and reconstructing an old hospital. Radio is the only means of communication in South Sudan, which allows us to call for drugs, food and evacuation planes at need.

South Sudan has many "Tukuls" - hospitals built of mud and hay - which accommodated a lot of unpleasant insects and will dissolve under heavy rain. We reconstructed a Tukul that had been damaged during an attack. Using galvanised plates, timber and bricks, we improved the hospital's hygiene standard as well as its structure, and we finished the job before the onslaught of the rainy season.



The old hospitals are made of mud and hay, which accommodate a lot of unpleasant insects and will dissolve under heavy rain.



Re-constructing hospitals with galvanised plates, timber and bricks to improve the hygiene standard.

On Being a Sports Scholar

by Chan Wai Kei (BEng(Civil Engineering) Year II student)

(right) Chan Wai Kei

I have been a scholarship athlete of the Hong Kong Sport Institute since 1996, and I am now one of the members of the Hong Kong windsurfing team. I have participated in many international competitions held in different countries, and have won several championships. I came 2nd in the IMCO European Youth Championships in Poland, 3rd in the ISAF World Youth Sailing Championships in South Africa, 2nd in the Hong Kong Open Windsurfing Championships, 3rd in the Mistral Asian Continental Championships and 2nd in the Asian Sailing Championships in Korea.

Sometimes it is hard to handle both sport and study at the same time. I have been really fortunate to have the great support and flexibility under the Sport Scholarship programme, which allows me to continue my sporting career while studying at the University. In sailing, I am able to build up my confidence, be independent and learn to manage time better, especially when I need to compete in overseas competition during academic terms. I will be competing in the Pre-Olympic Games and the World Championships in late 2002, warming up for the 2004 Olympic Games.

List of external prizes and awards won by students (1996-2001)

Department of Civil Engineering

1996 - 1997	
Wan Iat Meng	Fourth International Conference on Re-use of Contaminated Land and Landfills (London) : Earth Science Systems Research Award for Best Paper by a University Researcher
1999 - 2000	
Chiu Yu Cheuk	Central and Western District Translation Competition, 1st Runner-up
Li Lai Kuen	Fung Ying Sin Koon Scholarship
Hui Sun Lam	Morrison Distinction Prize
Tang Chun Ying	Odyssey of the Mind World Finals - Coach of Hong Kong Team Nehru Memorial Trust Scholarship
Lai Wing Han	Rank Xerox Scholarship by Education Scholarships Fund Committee
Hui Sun Lam	Senior Morrison Scholarship
Hui Sun Lam	Stephen Kam Chuen Cheung Memorial Scholarship 1999/2002
Wong Hei Nok	The Chinese General Chamber of Commerce Scholarship
Kam Chi Lam	The HKIE Structural Division - Best Final Year Project Award
Lam Kim Fei	Tsinghua University Structure Design Invitational Tournament, Overall 1st Runner-up
Leung Cheuk Lam	
Mok Kim Ying	
Lo Wing Keung	Tsinghua University Structure Design Invitational Tournament, Overall 2nd Runner-up
Lam Shing Fu	
Tong Suet Fun	
2000 - 2001	
Chiu Yu Cheuk	Father Carra Memorial Prize
Kwok Chun Yue	Sir Edward Youde Memorial Scholarship
Kong Ka Man	The HKIE Fugro Prize
Kwok Chi Ting	The HKIE Scholar Award
Ho Ho Man	The HKIE Structural Division - Best Final Year Project Award
Tsue Siu Hang	The Peter HK Chan Award for Best Young Member Environmental Paper by HKIE,
Wong Hei Nok	1st Runner-up
Wong Hin Cheong	
Wong Ka Leung	
Wong Sze Man	

Department of Computer Science and Information Systems

1996 - 1997	
Yeung Kwok Ho	Sir Edward Youde Memorial Scholarship
Chau Chiu Lung	Tung OOCL Scholarship
1997 - 1998	
Chan Tsz Wan, Gisa	Hongkong Bank One Year Exchange Scholarship Scheme
Tang Kam Wan	IEEE Scholarship in Computer Science
Tam Siu Shan	Reuter Foundation Scholarship
Lam Ka Yun	Tung OOCL Scholarship
1998 - 1999	
Wat Chi Mei	Hong Kong Student Services - Outstanding Service Award
Cheng Yuen Fung	Reuter Foundation Scholarship
Wong Chun Kuen	Tung OOCL Scholarship
1999 - 2000	
Wong Yuk Wah	Hongkong Bank One Year Exchange Scholarship Scheme
Lui Wing Cheung	Reuter Foundation Scholarship
Lui Wing Cheung	Simatelex Charitable Foundation Scholarship
Man Lai On	Simatelex Charitable Foundation Scholarship

List of external prizes and awards won by students (1996-2001)

2000 - 2001	
Siu Ching Pong Tam Siu Lung Wong Chun Ching	ACM Collegiate Programming Contest (IT Contest 2001) : 1st Runner-up
Chan Ho Leung Tam Kin Fai Tse Chi Yung	ACM Collegiate Programming Contest (IT Contest 2001) : 2nd Runner-up
Chan Ho Leung Koo Chiu Yuen Tam Kin Fai	ACM International Collegiate Programming Contest (Local (HK) Contest) : Champion
Chan Ho Leung Koo Chiu Yuen Tam Kin Fai	ACM International Collegiate Programming Contest (Regional Contest) : 2nd Runner-up
Group	BSPU/SCMP Web Design Competition, Champion
Wing Wai Kwong	Epson Foundation Scholarship
Group	"IT Education Awards" Programme organised by the Academic Council for IT in Education, 1st Runner-up
Chan Ai Lun, Alan Lam Tat Shing, Frankie	NetKing 2001 Internet Business Plan Competition organised by 168my.com, Champion
Wing Wai Kwong	Reuter Foundation Scholarship
Ho Chi Wong, Bernard	Shanghai Industrial Technology Innovation Scholarship
Wing Wai Kwong	Simatelex Charitable Foundation Scholarship
Chan Koon Kit, Andrew Lee Keng Fai, David Li King Bong, Bryan Kan Ka Ho, Danny	Startup@Asia Competition (Regional) : Best Presentation Award
Chan Koon Kit, Andrew Kan Ka Ho, Danny Lee Keng Fai, David Li King Bong, Bryan	Young Entrepreneurs Development Council of Hong Kong - E-Challenge 2001: Champion
Yuen Sze Ling	Young Entrepreneurs Development Council of Hong Kong - E-Challenge 2001: 1st Runner-up
2001 - 2002	
Chan Ho Leung Tam Kin Fai Tse Chi Yung	ACM International Collegiate Programming Contest (Asian Regional Contest) : 2nd Runner-up
Chung Wai Yan	IBM Gen-I Challenge 2001, Best e-business Award
Chung Wai Yan	IBM Gen-I Challenge 2001, Individual Award
Ho Chun Fai, Jeffrey Kwan Shui Ling Ng Yik Tung, Copland	"SmartApps-to-go" Competition organised by Ericsson, Smartone and Hong Kong Productivity Council, Silver Award

Department of Electrical and Electronic Engineering

1997 - 1998	
Poon Wing Chi, Irwin	9th International Olympiad in Informatics, Gold Medal
Ng Chung Pun	9th Joint College Judo Competition (Men's Open Weight) : 2nd Runner-up
Lin Kwok Fat, Simon	International Salon Competition (Color Slide Section) : Bronze Award
Sin Long Ying	The Duke of Edinburgh's Award, Bronze Medal
Ng Chung Pun	The Hong Kong Students' Judo Invitation Contest 1998 (Men's Open Weight) : 2nd Runner-up
1998 - 1999	
Sim Koon Hung, Steven	1998 IEEE Hong Kong Section Student Paper Contest (Postgraduate Contest) : Certificate of Merit
Cheung Mei Ting	1998 IEEE Hong Kong Section Student Paper Contest (Undergraduate Contest) : 2nd Place
Leung Man Yee, Mandy	1998 IEEE Hong Kong Section Student Paper Contest (Undergraduate Contest) : 2nd Place
Tung Pang Fei, Hugo	First Sun Cup Java Competition for Graduates and Postgraduates organised by Tsinghua University, China Education Network Company and Sun Microsystem, Champion
Lee Ho Fai, Vincent	Hong Kong Contract Bridge Association & HKPUB Inter-Postsecondary Competition, Student Team Champion
Man Ka Shing	Hong Kong Post-Secondary Institute of Chess / Hong Kong Post-Secondary Chinese Chess Competition 1999: Student Team 2nd Runner-up
Chan Ho Leung	Inter-school Music Festival, Champion in Chinese Orchestra
Belaramani Nalini Moti	Sir Edward Youde Memorial Scholarship

1999-2000	
Chan Ho Leung	40th International Mathematical Olympiad (Romania), Bronze Medal
Sin Long Ying	First "Iron Man of Science" Competition organised by the Faculty of Science of CUHK, Champion in 7th round
Sin Long Ying	Hong Kong Venture Scout Competition, 3rd in Hong Kong
Chu Ka Lok	Sir Edward Youde Memorial Scholarship
She Wing Han	Sir Edward Youde Memorial Scholarship
Belaramani Nalini Moti	Sir Edward Youde Memorial Scholarship
Pong Wing Tat	Stephen Kam Chuen Cheong Memorial Scholarship
2000 - 2001	
Chan Ho Leung	ACM Hong Kong Chapter Scholastic Programming Contest, Champion
Sin Long Ying	HKSAR Scout Award
Koo Chiu Yuen	Hong Kong Scholastic Programming Contest
Tam Kin Fai	Hong Kong Scholastic Programming Contest
Cheng Pak Fai, Andy	HSBC Young IT Entrepreneur Awards: Team Certificate of Excellence
Yip Wing Kai	HSBC Young IT Entrepreneur Awards: Team Certificate of Excellence
Hung Hau Ling	Java 2 Micro-Edition Design Competition, Winner
Yu Ching Han	Java 2 Micro-Edition Design Competition, Winner
Sin Long Ying	Olympic Pioneer Project, 3rd in Hong Kong
Sin Long Ying	Outstanding Scout Group Selection in New Territories, Champion
Sin Long Ying	Outstanding Scout in Tsuen Wan
Pong Wing Tat	Stephen Kam Chuen Cheong Memorial Scholarship
Uy Chi Ling, Diana	The HKIE Scholar
Sin Long Ying	The Hong Kong Award for Young People, Gold Medal

Department of Industrial and Manufacturing Systems Engineering

1996 - 1997	
Mak Wing Wo, Rigco	Institute of Industrial Engineers (HK) Scholarship
Lam Wing Yi	Institute of Industrial Engineers (HK) Scholarship
Chan Chung Fu, Leslie	Institute of Industrial Engineers (HK) Scholarship (Postgraduate)
A Group of 6 Students	Joint University Student Trade Competition, 2nd Runner-up
1997 - 1998	
Ling Kwok Tung	Institute of Industrial Engineers (HK) Scholarship
Mok Pik Yin	Institute of Industrial Engineers (HK) Scholarship
Wong Yat Sing	Institute of Industrial Engineers (HK) Scholarship (Postgraduate)
1998 - 1999	
Chu King Fung, Fox	Institute of Industrial Engineers (HK) Scholarship
Ng Yiu Ho, Edmond	Institute of Industrial Engineers (HK) Scholarship
Leung Wai Man	Institute of Industrial Engineers (HK) Scholarship (Postgraduate)
1999 - 2000	
Mok Pik Yin	Hong Kong Association of University Women Spring Chan Scholarship (Postgraduate)
Cheng Hang Lam	Institute of Industrial Engineers (HK) Scholarship
Leung Man Hin	Institute of Industrial Engineers (HK) Scholarship
2000 - 2001	
To Yuen Man, Michelle	Institution of Electrical Engineers (UK) Prize
Po Chin Fei, Kathy	Institute of Industrial Engineers (HK) Scholarship
Tai On No	Institute of Industrial Engineers (HK) Scholarship
Kwok Nga Kui, Alan	The HKIE MIE Division - Most Innovative Project Award

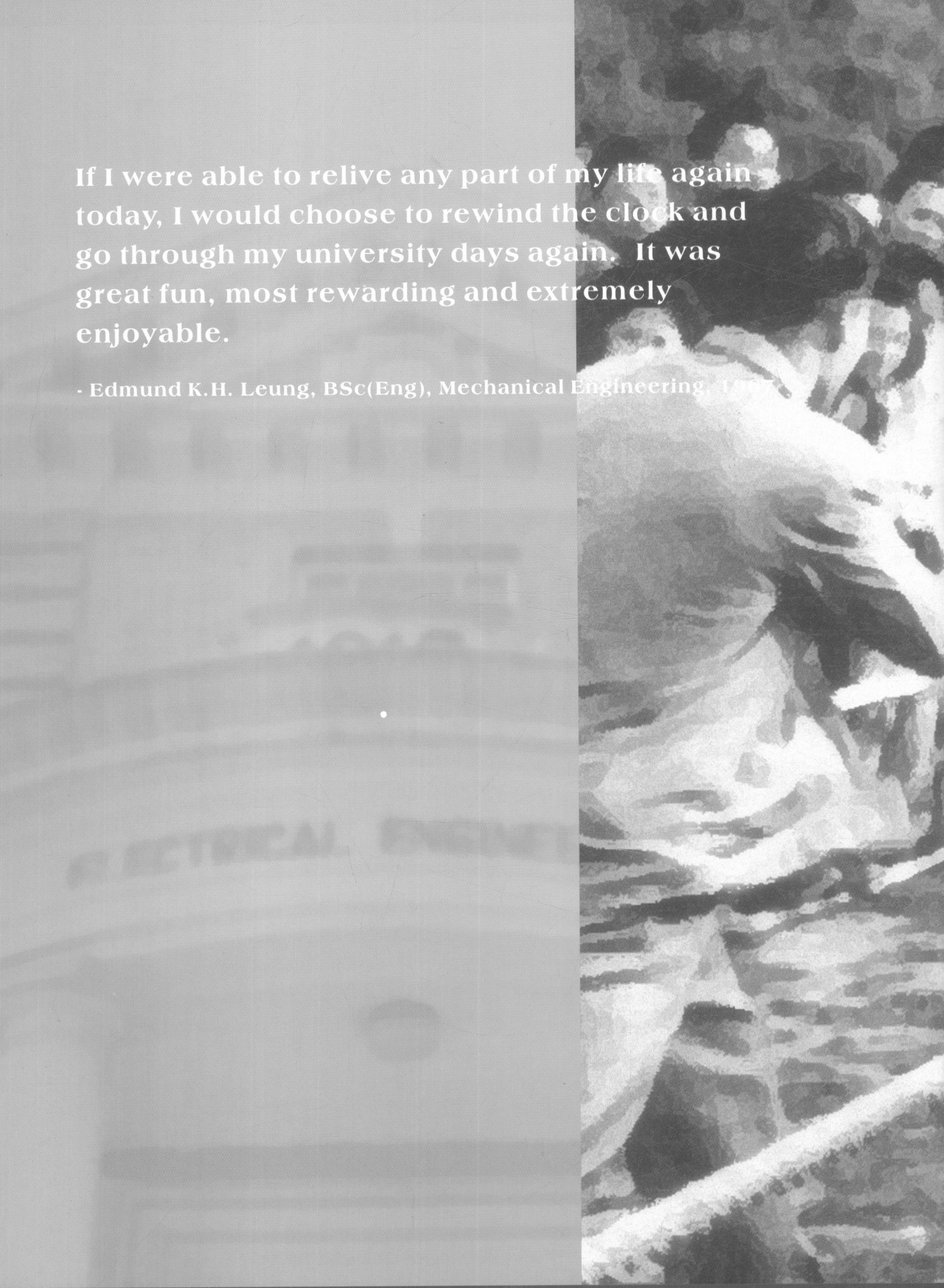
Department of Mechanical Engineering

1996 - 1997	
Wong Ho Leung	Frederic Barnes Waldron Prize
Chan Wing Fung	HKJB of RINA & I MarE Student Prize
Chan Wing Fung	I MarE Book Prize
Cheung Tung Cheung	I MechE Best Student Prize
Leung Siu Ho	I MechE Project Prize

List of external prizes and awards won by students (1996-2001)

1997 - 1998	
Tse Wing Man	Frederic Barnes Waldron Prize
Cheung Yiu Yee	HKJB of RINA & I MarE Student Prize
Cheung Yiu Yee	I MarE Book Prize
Chung Sheung Wai	I MechE Best Student Prize
Wong Chi Wai	I MechE Best Student Prize
Wong Ho Leung	I MechE Project Prize
1998 - 1999	
Wong Yat Lung, Winson	Frederic Barnes Waldron Prize
Lam Kim Ming	HKJB of RINA & IMarE Student Prize
Wong Yat Lung, Winson	I MarE Book Prize
Lau Oi Yan	I MechE Best Project Certificate
Chan Wing Kwong	I MechE Best Student Prize
Tse Wing Man	I MechE Best Student Prize
Tse Wing Man	I MechE Project Prize
1999 - 2000	
Wo Pui Ching	Frederic Barnes Waldron Prize
Cheung Cheung Tung	I MechE Best Project Certificate
Leung Chi Wah	I MechE Best Student Prize
Wong Yat Lung	I MechE Project Prize
2000 - 2001	
Chan Wing Shing	7th ASHRAE H.K. Chapter Quality Student Project Campaign, Diamond Award
Lo Cheunk Wah	7th ASHRAE H.K. Chapter Quality Student Project Campaign, Outstanding Award
Ng Hoi Pang	Croucher Foundation Fellowship
Tse Yau Yau	Croucher Foundation Fellowship
Cheung Sing Yiu	Croucher Foundation Scholarship
Cheung Sing Yiu	Frederic Barnes Waldron Prize
Pang Sin Ying	I MechE Best Student Prize
Tong Wai Lok	I MechE Best Project Certificate
Pang Sin Ying	I MechE Project Prize
Lee Man Kit	Meyer Poon Memorial Award
Tse Chun Yin	The HKIE Best Paper on Materials, First Prize


港大
SWIMMING TEAM



If I were able to relive any part of my life again today, I would choose to rewind the clock and go through my university days again. It was great fun, most rewarding and extremely enjoyable.

- Edmund K.H. Leung, BSc(Eng), Mechanical Engineering, 1987

ALUMNI ACTIVITIES

ALUMNI ACTIVITIES

"Career & Business Opportunities for HKU Engineering Graduates in China" was held at Shunde, Guangdong during February 26-27, 2002

Career Talk for civil engineering students was jointly organised by HKUEAA and Department of Civil Engineering on February 9, 2002

Hong Kong University Engineering Alumni Association

Founded in 1975, the Hong Kong University Engineering Alumni Association (HKUEAA) is the first Faculty-based alumni association of the University. It encourages networking and friendship, organises recreational, social and cultural activities, and promotes professional development among alumni and members. HKUEAA gives support to the Engineering Faculty and its students, and bridges the engineering community with alumni and friends.

Through the Engineering Faculty and the Finance and Enterprises Office, HKUEAA operates an Engineering Loan Fund for engineering students in need of financial assistance and loans to students for summer training in China. Since 1988, the annual HKUEAA Prize has been awarded each year to an Engineering undergraduate with demonstrated leadership qualities and academic performance.

HKUEAA sponsors the activities of the HKUSU Engineering Society, including the Hong Kong-Singapore Student Exchange Programme. HKUEAA is a Founding Member of the HKU Foundation for Educational Development and Research. The HKUEAA Graduate Mentor Scheme was established in 2000 to strengthen the tie between the Faculty and industry through the matching of experienced Mentor alumni with final-year undergraduates.

An Executive Committee is elected around September each year by the Council, which comprises representatives of the year's graduates of the Engineering Faculty. Activities organised in recent years have included visits to factories, mock interviews and career talks for students, leadership training camp, technical talks, discussion groups, spring dinner and numerous recreational gatherings. The Annual Ball has been held since the second year of the establishment of HKUEAA, both as a social event where alumni can enjoy with their friends and spouses, and as the major fund raising event for HKUEAA activities.

Since 1996, HKUEAA has published a biannual newsletter, distributed free of charge to its members. Latest news and information about the Association can be found on its home page at: www.hku.hk/hkueaa.

Hong Kong University Computer Science Alumni Association

The Hong Kong University Computer Science Alumni Association (HKUCSAA) was founded in 1996, 11 years after the first class of CS students graduated in 1985. All graduates of programmes solely or jointly offered by the Department of Computer Science and Information Systems are welcome to join the Association. The vision of the HKUCSAA is to assist and enable the alumni to create values by leveraging on the relationship and expertise among them. The value created will not only benefit the students and graduates, but also the IT industry and the society. It is believed that a strong alumni network is the key to the realisation and success of such vision.

More specifically, the HKUCSAA has the following missions:

- To promote good relationship and understanding amongst graduates, students, and staff members of the Department of Computer Science and Information Systems;
- To initiate and assist in the professional furtherance of members;
- To contribute to the society at large in computer science, computer engineering, and all other information technology fields;
- To promote understanding of and concern for the society of Hong Kong and world affairs.

HKUCSAA has developed steadily since it was founded. The growth of its member base has been particularly impressive in the last two years. As of June 2002, the Association has over 720 members, more than one third of all bachelor degree graduates of the Department. This rapid and substantial growth is a result of the tremendous effort of many helpers and the active participation of members, who have succeeded in achieving, among others, the following:

Creation of an Association logo in 2002. From eleven contestants' logos, the one designed by 1996 Computer Engineering graduate Mr. Hysan Liu was selected by both the judging committee and the majority of the alumni members. The logo features three circles. The lower-left green circle represents the young and growing HKU students, the upper-right red circle represents a mature, strong and powerful IT industry, while the middle one encircles the letters C and S, standing for Computer Science - the alumni body which plays a bridging and enabling role between HKU students and the IT industry.

A team-building activity of Executive Committee 2001-02

Some of the participants in the 2002 Spring Reunion Dinner

Strengthening of the alumni network. Social activities such as hiking and dinner are often the starting point for past graduates' participation in the alumni network. The AGM Dinner held in June 2001 attracted some 80 students, graduates and lecturers and offered them an evening full of joy and laughter. In the Spring Reunion Dinner in March 2002, the number of participants grew to 180.

Helping students and graduates in their intellectual and career development. The Association has invited leading practitioners in industry to speak on current topics that are of most interest to members. In May 2001, an entrepreneurship seminar was held on "how to run a sustainable IT business". In May 2002, a happy-hour talk on the topic *The Roles of Hong Kong IT Professionals under the Current Economic Integration between Hong Kong and the Mainland* was organised. Every year, with the help of HKU student organisations, computer science graduates share their job hunting and career building experiences with final-year students in career talks, and there is always job referral activities going on between graduates and in-school students.

Effective communication and valuable services for HKUCSAA members. The success of the alumni depends very much on the close communication among members through the Association's website, bulletin board, newsletters and, most importantly, the class email addresses. Each member is entitled to a free email account at the Association's own branded domain *hkucs.org*. With an annual contribution, members can host their personal websites on the Association's server and enjoy the pre-configured system software in the server.

Looking forward, HKUCSAA will continue to progress in the direction set forth in its missions. Efforts will continue to be made to leverage on the growing alumni network and to forge closer ties with other alumni bodies and industrial organisations.

To know more about HKUCSAA, please visit its website at: www.hkucs.org.

Hong Kong University Industrial Engineering Association

The Industrial Engineering Association (IEA) of The University of Hong Kong was founded in 1975, creation of a group of Industrial Engineering (IE, now called Industrial and Manufacturing Systems Engineering (IMSE)) students who saw the need to promote the IE professional image in the eyes of the general public. At the same time, IEA has been playing the vital role as a contact point for all IE (and later on IMSE) alumni. Today, IEA has over 1,800 members, including undergraduates, postgraduates, alumni and staff members of the IMSE Department. It has successfully built up and consolidated a network of IMSE graduates from different businesses and industrial sectors.

The Executive Committee of IEA consists of 13 undergraduates, led by a Chairperson who is either an alumni or an IMSE staff. Over the years, these enthusiastic students have been contributing their time, effort and imagination to make IEA prosper. They have interacted closely with alumni in the organisation of various activities to promote the fields of industrial engineering, logistics and supply chain management,

A career talk in logistic and technology management was delivered to IEA by Mr. Edmund Sung (2nd from left), an IMSE alumni and Branch Director of HK Productivity Council.

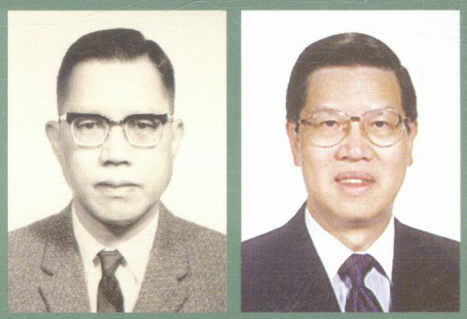
and technology management. These include seminars, forums, debates, career talks and publications of the IE Magazine. The Magazine is published twice a year and delivered to all alumni to give them the latest in industry as well as the Department. For example, the issues of ISO 9000 series and logistics were discussed in a recent edition of the Magazine.

The networking activities of IEA can be highlighted by the various reunion functions for the IMSE alumni. Such functions provide invaluable opportunities for graduates of the Department over the years to meet each other and share the stories of the good old days. The newly enhanced IEA website (www.imse.hku.hk/iea) not only provides reports on the latest activities of the Department, but also serves as a reservoir of fond memories contributed by alumni.

It Runs in the Family

It's interesting that quite a few of our alumni are descendants or siblings of alumni. The few pictured here are by no means exhaustive. They are fine examples that education at HKU permeates in their blood and has transcended to the next generation or the next of kin.

***Father** Leung Chik Luen [BSc(Eng), Electrical Engineering, 1939]; **Son** Edmund K.H. Leung [BSc(Eng), Mechanical Engineering, 1967]*

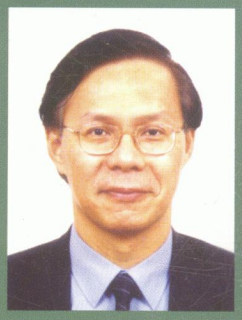
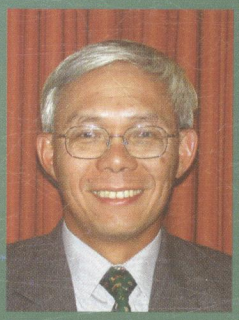


***Father** Leung Chik Luen; **Son** Edmund K.H. Leung*

*(Back row: first from left) **Elder Brother** Tsou Chen Chung, Cyril [BSc(Eng), Civil Engineering, 1959]; (Back row: first from right) **Younger Brother** Tsou Chen Hwa, Roy [BSc(Eng), Mechanical Engineering, 1962]*

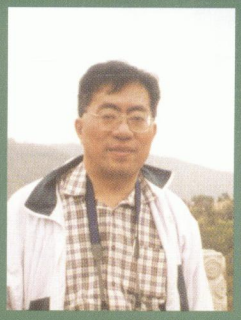
*(Centre; in red T-shirt) **Elder Brother** Kwong Hon Cheung [BSc(Eng), Civil Engineering, 1960]; **Younger Brother** Kwong Hon Sang [BSc(Eng), Civil Engineering, 1963]*

***Elder Brother** Lee Chack Fan [BSc(Eng), Civil Engineering, 1968]; **Younger Brother** Lee Yeung Fan, Dominic [BA in Geography, 1970]*

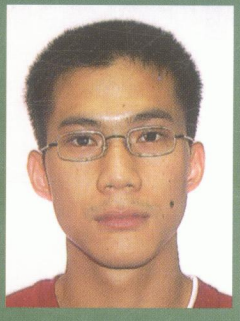
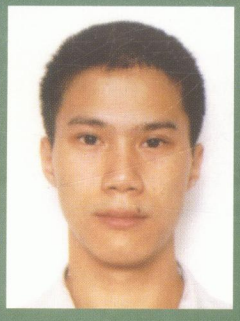
Twins *Mak Chai Kwong [BSc(Eng), Civil Engineering 1973]; Mak Chai Ming [BSc(Eng), Electrical Engineering 1973]*

Father *Tong Woon Ming [BSc(Eng), Civil Engineering, 1977];* ***Son*** *Tong Cheuk Yi [BEng (Civil Engineering) first year student, 2002]*




Elder Brother *Tsang King Man [BSc(Eng), Civil Engineering, 1977];* ***Younger Sister*** *Tsang Wai Wah, Susanna [BSc (Eng), Civil Engineering, 1982]*

Father *Wong Yiu Kam [BSc(Eng), Civil Engineering, 1977];* ***Son*** *Wong Yu Hin [BEng (Computer Engineering) first year student, 2002]*

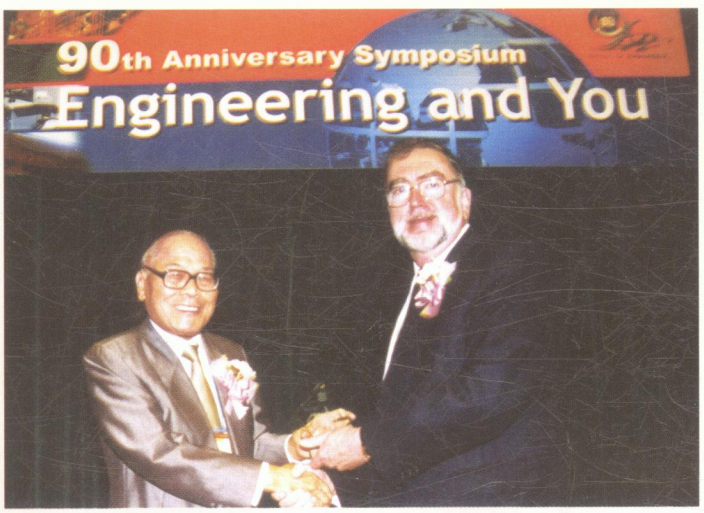



Twins *Sham Wai One [BEng (Computer Engineering) third year student, 2002]; Sham Wai Hau Two [BEng (Civil Engineering) third year student, 2002]*

Twins *Tsang Cheuk Man, Mark [BEng (Computer Engineering) third year student, 2002]; Tsang Cheuk Kan, Ken [BEng (Computer Engineering) third year student, 2002]*

APPENDICES

APPENDIX A - PROCEEDINGS OF 90TH ANNIVERSARY SYMPOSIUM



Opening Address by The Hon. Sir S.Y. Chung

Mr. Chairman, Dr. Fung, Distinguished Guests, Ladies and Gentlemen:

I am much honoured to be invited to say a few words at the Opening Ceremony of the Faculty of Engineering 90th Anniversary Symposium.

May I first congratulate the University and its Engineering Faculty on their 90th anniversary. It is 50 years older than its younger brother and 80 years older than its youngest one.

A university, like any other institution, is not static. Its organisation and operation should change with the changing environment. Over the last decade or so, Hong Kong has gone through a major paradigm shift.

Politically, Hong Kong has changed from a British Colony into a Chinese Special Administrative Region. The Colony was ruled by outsiders coming from and appointed by Britain. Now, the SAR is administered by its own people elected locally. Hong Kong and Mainland China, though operating under two systems, are integrated as one country.

Economically, Hong Kong has changed from a manufacturing-based to a service-based economy. It is no more isolated from the Mainland and the Mainland no longer keeps its doors closed to the West. The interflow of people and merchandise between the SAR and the Mainland is increasing, leading eventually to an equilibrium on both cost and standard of living.

Under these main structural changes, universities in Hong Kong now have to respond to frequent calls for change in at least five major areas.

First, it is the change from 3-year to 4-year undergraduate education. Hong Kong before the Pacific War used to adopt a 4-year bachelor programme. After the war this was changed to 3 years to follow the English system. Now, in view of the 4-year system in the Mainland and most English-speaking countries, a growing number of people hold the opinion that the universities in Hong Kong should adopt a 4-year system.

Second, it is the proportion between undergraduate and postgraduate courses. Prior to the Pacific War, The Hong Kong University only offered first-degree courses. Master and doctorate degree courses were not available until the 1950s and 60s, but enrolment was not significant until the 1990s. Even today, postgraduate students are generally less than 10 percent of the student population. With changing economic and social conditions, it is time for us to consider raising the percentage of higher degrees, at least for some institutions.

Third, it is about "town and gown" relationship. University at one time was nicknamed "ivory tower" for its isolation from the community. During the past 20 years the situation in Hong Kong has gradually changed, but we need closer ties and more co-operation between university and community, particularly in business and industry. Unfortunately there are

some uninformed people voicing objections, saying that public money should not be used to assist individual enterprise. We need to educate the general public.

Fourth, it is about type of disciplines or courses. The type of discipline offered by a university should change to meet the changing needs of the community. Not only the type but also the size of courses should be reviewed more frequently.

Last but not least, it is about university financing. Recently there are calls for the universities in Hong Kong to be privatised. That is to say, universities are to be self-financed and independent of government, as is the case with some universities in the US.

Let us assume a typical university in Hong Kong receives an annual grant of HK$2 billion from the government. It is necessary first for the government to give the university a lump sum grant to set up a foundation. Interest and investment income change from time to time, but let us assume it generates a long-term average return of 4~5% a year, then the initial lump sum grant from the Government would need to be about HK$40~50 billion. In addition, the university will further need substantial donation from the private sector for development and improvement. Hong Kong has a very low tax rate and has no world-class corporations or charitable foundations. It would be difficult for a private university to survive. Nonetheless, it is a topic worthy of more public debate.

It is hoped that the community will continue to debate these major issues. The University of Hong Kong, being the oldest of all tertiary institutions in Hong Kong, should take a leading role in the important exercise.

Before closing, Ladies and Gentlemen, may I wish the Symposium "Engineering and You" a great success. Thank you.

Opening Address by Dr. V.K.K. Fung, Council Chairman

Sir S.Y., Vice-Chancellor, Professor Lee, Ladies and Gentlemen,

First of all, my congratulations to the Faculty of Engineering on its 90th birthday. In the past 90 years, the Faculty has grown and developed with Hong Kong, and at the same time contributed significantly to the building of Hong Kong, its infrastructure, industry and economy. Many of the graduates have participated and engineered the building of Hong Kong - the airport core projects, the Tsing Ma Bridge, roads and bridges, the telecommunication network and IT infrastructure, private and public developments, buildings ... all which have made us proud of Hong Kong and being part of Hong Kong.

Higher education institution is one of the prime movers of society, educating and nurturing leaders of society. "A school is a building that has four walls and a tomorrow inside." Education values permanent contribution to the welfare of humanity. As one of the oldest tertiary institution, The University of Hong Kong will continue to play an important role in doing its share in building Hong Kong's economy in a world that is moving towards globalisation and confronted with multitude of challenges. In a knowledge-based economy, more and more emphasis is being placed on learning, teaching and research. The University is an institution with strengths in education and research. It recruits the best students by capturing no less than 46% of all students achieving grade "A"s in their A Level Examination to study in its 50 undergraduate programmes. It has groomed many good calibre graduates and has produced many distinguished and prominent leaders in the past nine decades. I have high expectation of the University, we should aim to be a world-class university and to start with, it is necessary to think globally, to measure ourselves against world-class universities, and to reflect on what strengths we should foster and promote. The Faculty of Engineering is famous internationally for research work in computational and structural mechanics, and leading-edge research is being conducted in water environment engineering, wireless communication, and difficult computational problems in biology, geometry and online scheduling. A hallmark of the research by Faculty members is the interdisciplinary network of a growing number of studies in the fields of water environment engineering, Magnetic Resonance Imaging (MRI), biomedical engineering and visualisation technology.

The University has taken many initiatives in recent years by mounting new interdisciplinary programmes of study, keeping pulse of the needs of society, developing problem-based learning and credit-based curriculum as well as increasing opportunities for student exchange. All these are encouraging developments, and I look forward to seeing many more.

"Education is not the filling of a pail, but the lighting of a fire!" The fire of curiosity, enthusiasm, humanity, wisdom that awaits to be ignited. To build a better community, we need many more good quality graduates who not only have to be trained in their discipline of professionalism, but also to be able to take up self-learning, have an inquisitive and analytical mind as well as the righteousness of being. I have faith in our younger ones who will make today's dream tomorrow's reality; and I have no doubt that this University has an important role to play in the shaping and making of our next generation.

Welcome Address by Professor J.H.W. Lee, Dean of Engineering

Sir S.Y. Chung, Dr. Fung, Vice-Chancellor, Honoured Guests, Fellow Alumni and Colleagues,

On behalf of the Faculty of Engineering, I would like to welcome you to this opening ceremony of the 90th Anniversary Symposium of the Faculty of Engineering. The Faculty of Engineering is one of the founding faculties of The University of Hong Kong. In 1912 we had 12 students with one laboratory room. In 2001, we are the largest Faculty in the University, with 126 teachers, 1,700 undergraduates, and 1,100 postgraduate students. The Faculty offers 14 undergraduate and 13 postgraduate degree programmes in the core as well as emerging academic disciplines. The teaching is supported by active research at an international level; currently colleagues in the Faculty are involved in 200 externally-funded, competitively won research projects amounting to $210 million. Just yesterday, we held our 162nd Congregation, and we witnessed the award of 43 PhDs to graduates from this Faculty.

It has been said that "Only an anniversary gives a community certainty that achievements can defy mortality." In its 90 years of history, the Faculty has made significant contributions to Hong Kong society in educating the engineers to build the industry and infrastructure of Hong Kong. Its contributions in education and research have made Hong Kong what it is today.

For the first time in 15 years now, we are celebrating our anniversary in a big way. Since May we have been orgainising a series of over 30 events and activities: distinguished lectures and seminars, speaking programme for secondary schools, and practical entrepreneurship lectures. Today is the beginning of the high point of the celebration. In the next two days, we look forward to a number of general lectures by internationally renowned speakers and distinguished alumni on a broad spectrum of topics relevant to Hong Kong - ranging from multimedia, to finite elements, to engineering education in a new global-based economy. The title of the symposium is *Engineering and You*, in that we believe what engineers do have an important impact on society. Tonight, 360 alumni and friends will gather in a happy dinner reunion at the Conrad Hotel. For the anniversary, we have also produced a Faculty video, as well as an Anniversary Volume which summarises the development of our Faculty in the past 90 years; a pre-print of the highlights has been distributed.

This Symposium has been one year in the making, and it is the dedicated efforts of the many Faculty colleagues, alumni and friends, and students who have made this a reality. I would like to thank members of the Faculty 90th Anniversary Advisory Committee and its working group, and in particular Professor H.C. Chan, Ir. Edmund Leung and Dr. A.K.H. Kwan for their hard work and unstinting support to the University and the Faculty.

An anniversary is a good time to reflect on our past, as well as to position ourselves to move forward to meet the challenges facing Hong Kong. We hope that through these activities, we can share with the community in a small way our past achievements, what we stand for, and some of our vision for the future.

I welcome you all to this 90th anniversary symposium.

Technological Innovation: The Last 100 Years and the Future

Professor Lu Yongxiang
President of the Chinese Academy of Sciences

In the course of the 20th century, the unprecedented accumulation of scientific knowledge, rapid advancement of technological innovation and productivity and uninterrupted increment of social wealth miraculously changed the world. In the meantime, the human society also went through a series of conflicts, changes and turbulences. The catastrophe of the two World Wars and incessant local wars, the disintegration of the colonial system, the rise and fall of the tides of socialism and nationalism, the globalisation of economy, the pounding of informationalisation, the aggravation of the polarisation between the North and South, and the disastrous damage to the eco-environment on which mankind relies for existence and the exhaustion of natural resources – all these are heritages of the 20th century human civilization and will bring along profound and long-lasting impact on and challenges to the development of human society in the new century.

No doubt, it is very important for us to take a close look at the historical orbit of technological innovation that spanned the last 100 years, to analyse its tremendous contribution to the development of productivity and the progress of human civilisation, and the resulting contradictions and new challenges, to fully understand and grasp the essence, distinctive features and laws of technological innovation and development, as well as the interactive relationship of technology with science and society. Such a review will aid our effort to forecast the main trend of technological development and the impact it will exert on human society in the new century that has just begun.

1. Modern technological innovation of the 20th century plays a decisive role in promoting the development of productivity and the progress of human society

During the 20th century, mankind achieved hitherto unknown success in technological innovation. High-tech innovations sprang up one after another in various fields, expediting an unprecedented growth of productivity, which radically changed the mode of production as well as our life style, influenced the organisational setup of our society, affected our ways of thinking and outlooks, and provided us with new tools, methods and means to understand and change the world. In short, technological innovation has given rise to tremendous changes and progress in human society.

1.1 Modern technological innovation liberates and extends the physical and mental power of mankind

Starting from the industrial revolution in the 17th century, machines replaced hand tools, and steam engine took the place of human, animal and hydraulic power. With the birth of electric power, huge steam engines and complex mechanisms of mechanical transmission were replaced by steam turbines, generators and motors, thereby giving rise to a new revolution in structure and power transmission of power machinery and work machine. Since the middle of the 20th century, the revolution in modern electronic technology – marked by microelectronics, semiconductors and integrated circuits – has further brought about fundamental changes in the entire structure and control part of machinery. Programme-controlled machine tools and automatic production lines were the first to appear, followed by the adoption of computer-controlled flexible automatic production lines and computer integrated manufacturing systems in the production process. The emergence of intelligent robot and intelligent machine system, integrated with mechanical and electronic components, resulted in the replacement of man by machine (computer) in operating and controlling machine. Computer entered the sphere of production management, everyday life and society, leading to the liberation and extension of man's physical and mental power.

The invention and popularisation of different kinds of electrical household appliances and the realisation of office work automation have not only freed man from strenuous manual labour, but also taken up a part of man's mental labour. It thus raised efficiency and shortened work hours to allow people more time for study, creation and rest. This recent revolution in social productivity propelled changes in man's traditional mode of production, life style and the setup of social organisation, and promoted the progress of human civilisation.

1.2 Modern technological innovation has extended the time-space of human activities

Subsequent to the development of railway transportation, the invention and large-scale production of automobiles and the appearance of expressway started a new revolution in the domain of communications and transportation towards the end of the 19th century. This not only enlarged man's scope of activity and changed the ways of production, circulation and life, but also transformed the overall pattern of urban and rural

development, gave impetus to the modernisation of manufacturing technology and management engineering, and promoted the materials and manufacturing industry, as well as sustained the prosperity of industrialised nations.

In 1903, two American brothers — Orville Wright (1871-1948) and Wilbur Wright(1867-1912) – invented the aeroplane. This invention and its ensuing development not only enabled man's dream of flight to come true, but also to a great extent surmounted the natural obstruction of high mountains and vast oceans for mankind. In 1903, the Russian scientist Konstantin Eduardovich Tsiolkovsky (1857-1935) published his equation of rocket movement; 23 years later, American engineer Robert Hutchings Goddard (1882-1945) successfully launched the world's first liquid-fuel rocket. These innovations eventually led to the birth of spacecraft. In 1957, the former Soviet Union sent to the outer space the world's first artificial earth satellite by using intercontinental ballistic missile. In 1969, the "Apollo 11" of the United States landed on the moon. In 1971, the former Soviet Union built a space station, providing for the first time a base for man's activity in outer space. In 1981, the United States was the first to launch with success the space shuttle "Columbia", and from then on man could freely go to the outer space and return. After the 1990's, man's activity to survey the depths of outer space had its start.

During the 20th century, people created instruments such as electronic microscope (1931), radio telescope (1937), space astronomical telescope, X-ray and nuclear resonance scanner, tunnel scanning microscope and atomic powered microscope, and built up super particle accelerator and collider, synchrotron radiation light source and cosmic-ray detector. At present, using large astronomical instruments like optical telescope, radio telescope and space telescope, people can observe objects approximately 10^{26} m. of cosmic space (a distance of roughly 10 billion light-years) away from earth. On the other hand, using instruments such as tunnel scanning microscope, people can observe the microcosmic sphere of nano (10^{-9} m.) dimension. For still smaller dimensions, the accelerator is applied to carry out indirect observation with precision as high as 10^{-18} m. That is to say, modern scientific instruments have enabled man's field of vision to span in dimensions of 44 numerical magnitudes, miraculously extending the power of human observation.

Pushed forward by the fast development of communications satellite, broadband network, cellular phone, supercomputer and other advanced technologies, the range and depth of the impact exerted by information technology are increasingly felt by people nowadays. The information technology made a new breakthrough in the realm of commerce, education, medical treatment and health care, and management and service. Up to May 2001, the number of network-users throughout the world exceeded 0.332 billion; in China alone, there were 26 million network-users and more than 4 million Chinese have received education from the State Satellite Television University. Long-distance education has basically enhanced the efficiency, diversity and globalisation of knowledge dissemination. In the last decade, global remote medical treatment has also begun to achieve remarkable success.

1.3 Modern technological innovation continuously raises the quality of life and level of health for mankind

During the 20th century, the innovation and development of antibiotics and immunity therapy basically freed mankind from the threat of contagious diseases. The extraction and synthesis of vitamin and amino acid raised the nutritive level of mankind. The century saw the invention and development of various kinds of medical instruments for diagnosis and treatment, which made it possible for people to obtain complete and accurate information — at overall, organic, cellular and even molecular levels and in the form of data and graphics — on the health status of, and pathologically induced structural and functional changes in, organic lives. This has greatly improved the clinical diagnosis, prevention and treatment of diseases.

In 1953, after British scientists J. D. Watson (1928—) and F. H. C. Crick (1916—) had worked out a double helix molecular model of DNA, molecular biology developed quickly. From 1973 to 1974, S. N. Cohen (1922—) and H. W. Boyer (1936—) invented the technology of DNA recombination. Based on that technology, Boyer succeeded in synthesising human growth hormone in 1976, and in the same year, the Genentech Company, allied to by Boyer, was set up, which became the world's second largest gene engineering company after Cetus Company set up in 1971. The late 1970s and early 1980s witnessed an upsurge of the industrialisation of gene engineering. Up to 1981, over 200 bioengineering companies had been set up in the United States. In 1983, products of human growth hormone entered the market. The new discipline of bioengineering, consisting of gene engineering, cell engineering, enzyme engineering and fermentation engineering, is another breakthrough in human cognitive ability. By the end of the 20th century, more than 50 countries and regions in the world already had bioengineering enterprises and today more than 160 bioengineering products have been obtained. These achievements have made a positive and far-reaching impact on man's health, quality of life, agricultural production and the processing of farm produce. The appearance of gene diagnosis, gene therapy and gene drugs will also bring glad tidings to human health.

Despite the catastrophe of the two world wars for human society in the 20th century, the average life span of man in 100 years was prolonged by more than 20 years. At the end of the 19th century, the world's average population life span was only about 40 years, and according to what is pointed out in a report made public recently by the Ministry of Commerce of the United States, the average population life span of the world in 1977 had reached 62.27 years. The average life span of Chinese people in 1949 was only 35 years, and increased to 70.8 years in 1996 (published by Chinese Population, 1999). Such significant increases in life span worldwide owe much to the rising of man's living standard and the contribution made by modern biomedical technology. It can be predicted that along with the development of science, technology and social progress, the life span of the world's population as well as the quality of life and living will be further improved.

1.4 Modern technological innovation has raised the level of man's exploitation and use of natural resources

In the 20th century, apart from man's exploitation and use of natural resources – farm produce, mineral products and fossil energy – to meet the ever-growing demand of mankind for food, clothing, housing and transportation, what merits most to be mentioned is the invention and development of polymer synthetic materials based on coal and petroleum chemical engineering. Diversified in their property, metal materials, high-grade ceramics, functional crystals, carbon materials and composite materials presented themselves one after another and became the cornerstone of modern energy, vehicles and all kinds of civil and national defense equipment. Today, we are living in a world composed of, among others, several hundred thousand different man-made structural and functional materials, and the number continues to rise at an annual rate of 5%.

In the second half of the 20th century, the exploitation and use of silicon materials and the arrival of information era marked by semiconductor, large-scale integrated circuit, computer, optical fibre and Internet fully demonstrated that new materials and their related technologies constitute one of the decisive factors for high-tech innovation and its development.

The unprecedented development of technology and production scale, however, have also pushed the world to the verge of natural resource exhaustion and caused serious deterioration of the eco-system and environment. Starting from the 1960s, people began to realise that it is only by taking the road of coordinated development with nature that the development of human society can be sustained. People started to develop renewable energy technology, renewable materials technology, environmentally friendly technology and naturally degradable materials, and the technology of eco-environment protection and control. All these technologies were later to be referred to as "green technology".

2. Exploration into certain aspects of technological innovation in the 20th century

Technological innovation in the last century and its tremendous effect in promoting human society were by no means easy to be foreseen one hundred years ago. This is due not only to the incessant changes in technology itself, but also because of the mutual promotion between science and technology and between social need and the development of technology, as well as the increasingly socialised system for innovation constructed to speed up the innovation process. Inquiry into the laws of technological innovation and development in the past one hundred years has great significance both for our understanding of technological progress during that period and for our choice of strategy for technological innovation in the future. In the present globalisation of economy, technological innovation should focus on global competitive superiority and the benefit to mankind.

2.1 The nature and characteristics of technology

Technology is in nature not a derivative or an appendage of science, but "refers to all means and methods used by human beings to develop their muscle, sense and intelligence in the interaction of man and nature – and also plays a major role in the creation of cultural value" (The Multicultural Planet – the report of a UNESCO International Experts Group, Chinese Version, Social Sciences and Literature Press, 2001, p.216). And technological innovation means the improvement and innovation of methods, instruments and systems made by people for practical purposes. The innovation of technology has a very clear aim and is of actual value.

The development of technology is characterised by innovativeness, continuity, diversity and selectivity. Blazing new trails is the soul of technological advancement, and if everything is done by imitation, it will be impossible for technology to get developed. Diversity refers to variety of technological formation in a given time and space, which is the outcome of diversified selection and innovation. Continuity refers to the invention of any new technology as based on existing accumulation of knowledge. Owing to the disequilibrium between people's innovative ability and development of need, the surplus part of innovation is bound to lead to selection. Therefore, technological development has the feature of selectivity and the selectivity is diversified, involving economic, military, social and cultural factors.

The development of technology in the 20th century reflected the trend of comprehensive and integrated development. After the 1960s, the idea of sustainable development and the progress of high technology brought a new challenge to traditional ethics and moral concepts. The aim of technological development is not just to transform and utilise nature. It is to bring sustainable benefit to mankind and protect nature.

In the 20th century, technology had become the main impetus for the growth of economy, and market and demand had become the conditions and the main traction for the innovation and progress of technology. Science and technology had become the decisive factors for determining overall national strength, whereas the state and enterprises had become the chief planner and main body of technological innovation for the development of science and technology.

2.2 The motive force for the development of technology

The motive force for the development of modern technology in the 20th century came from the progress of science, man's creative desire and curiosity geared to application and opening up of the future, as well as from the diversified society and market and their interaction. For example, among the major technological inventions of the 20th century, the motive force

for the invention of the prototype of aeroplane and automobile came at first from people's creative desire and curiosity, not directly from the actual need of society, but in this connection the social demand then and later did provide opportunities and great motive force for the technological development, especially large-scale industrialisation.

The birth of the world's first electronic computer mainly resulted from the U.S. Navy's need to calculate the trajectory of artillery shell and the creative desire of a number of outstanding scientists during the Second World War.

Laser technology is a typical case of science promoting technological development. That it can be applied on such an extensive scale is the outcome of the interaction between technology and social demand. The laser was developed through synthesising the stimulated radiation put forward by Albert Einstein in 1916 and the concept of particle number contra-rotation evolved in the 1940s together with the oscillation technology in radio-electronics. The process of this synthesis was to a great extent propelled by microwave spectroscopy initiated before and after the end of the Second World War. The successful development of the first microwave amplification by stimulated emission of radiation (maser) in 1954 prepared the theoretical ground for laser along with the technology and personnel. After the birth of the first ruby laser in 1960 and later the helium-neon laser, people envisaged the various prospects of laser application in the light of its remarkable high monochromaticity, directivity, coherence and brightness, and proceeded with all kinds of application experiments. Success in the experimentation stimulated widespread social demand and attracted investment from government and enterprises. Large numbers of research and development persons shifted into this field. Hence, the progress of research on the theory, devices and technology of laser was accelerated, quickly turning laser into a technology of great vitality. It can be noted that the laser technology, which was originated from microwave spectroscopy, has been producing a tremendous effect on the processing of materials, medical treatment, communication, weaponry, holography, isotope separation, nuclear fusion and mete-wand and becomes a crucial technology of support for the Information era.

Reviewing the milestones of 20th century technological development, one would not fail to notice that no matter what the circumstances were, many patent-owners were application-oriented, filled with creative desire and passion and had courage in their unremitting practice.

Because the process of technological innovation has the feature of selectivity, while social selections are usually not all guided by the advancement of technology, on many occasions, economy, applicability and market competitiveness are often taken as the main basis of selection. In addition, we also should not overlook some other factors, which, under certain historical, political and cultural backgrounds, bring about different social selections for the development of technology and lead to different outcomes. Technological development in the 20th century was very much affected by political factors, such as the consequences of technological development caused by armament race during the Second World War and the later "cold war" period.

Similarly, in view of the continuity feature of technological development, social and environmental conditions for the development of science and technology are an important factor as well. The invention of semiconductor triode was beyond doubt built on the basis of electronics and solid-state physics, but if the need for easier and more convenient, more reliable and cheaper amplifiers had not been stimulated by radar and radio set, which had already been invented and in extensive use then in Europe and the United States, it would be quite hard to imagine Bell Telephone Company would take up research on solid-state amplifier. Furthermore, technological development is inescapably under economic restraint, and the overall level of the development of economy and technology too would produce a great impact on the social selection of technology.

2.3 Motive force mechanism and innovation system for promoting technological development

In the development of technology, motive force is needed, but more important are a system and mechanism of innovation to guarantee that technological development will be promoted. In China's present situation, more attention should be paid to the following aspects:

(1) A macro-environment for a sound and open, legalised, equitable and orderly market economy and a mechanism for rational and orderly competition need to be constructed or improved so that enterprises will conscientiously become the main body of technological innovation.

(2) The government should appropriately exercise its function and play its role in encouraging and promoting the advancement of technology. That is to formulate and constantly improve relevant statutes and policies for encouraging technological innovation and industralisation, and set up an effective system for protecting intellectual property rights. There should be sufficient amount of input for basic and applied basic research, as well as for the research and development of strategic, forward-looking, basic technology and those with a bearing on social welfare (such as agriculture, health care, environment, security, technology standards and monitoring). The mechanism for rational competition has to be introduced to propel the exchange and cooperation among countries and enterprises and between enterprises and universities/research institutions. An effective system should be set up to support the technological innovation of small and medium-sized enterprises to help build up a national innovation system.

(3) Great attention is needed for the development of education, and upgrading the cultural and educational standards, the vocational and technical level and the degree of popularisation of knowledge of science and technology for the Chinese people. More efforts shoud be made to foster a large number of highly qualified professionals for

technological innovation and management and to build up a network to promote international exchange of education, technology and public understanding of science. A fine cultural atmosphere and proper social values need to be cultivated to respect knowledge and talents, as well as to encourage technological innovation and pioneering work.

(4) Also needed are sound and effective systems for legislative, judicial, consulting and intermediary service, and for risk investment and financial services that benefit technological innovation, exchange, industrialisation and marketification. Technology, professionals and capital markets should be developed, and great importance ought to be attached to high-tech parks, professional associations, high-tech industry associations, and the role of media and networks in technological innovation.

In addition to being affected by insufficient input, slow development in education and science & technology, and the lack of an innovation culture, the chief reason for China's shortage of original innovation and patented major inventions lies with the fact that at present China has not yet established a complete system nor an effective motive force mechanism favourable to the promotion of technological innovation and development. For instance, the system to protect intellectual property rights is still far from being perfect, and it is not rare that the rights and interests of technological innovators are infringed upon. The function of the government in technological development is more often than not mixed up with that of the market. A good environment inducing open, legalised, equal and orderly market competition is not yet in place, whereas the distribution of resources beneficial to technological innovation and industrialisation is still not quite systematic or effective. Within this environment of unequal competition, therefore, it is totally unrealistic to expect enterprises to conscientiously make themselves the main body of research and development and really base their development on S&T innovation, system innovation and management innovation. It is also unlikely that enterprises could be eager to set up effective, rational division of function to facilitate cooperation and complementation among themselves and between enterprises and universities/research institutions.

Lagging behind the fast development of high technology and its industry in today's world is China's present patent system ridden by all sorts of inadaptability and faced with numerous new challenges. What is not to be denied is that patent systems have played a very important role in the process of industrialisation in most developed Western countries. The Chinese system for protecting intellectual property rights should be further examined and improved so that it can become an important legal means to protect and encourage knowledge and technology innovation.

Technology cannot extend into industry on its own accord, but its development is very much decided by industrialization. The development of industry is often buttressed more by an effective system for innovation than by technology itself. As for the innovation system for promoting the development of technology, we might as well draw on the experience of India's development of software industry.

2.4 Types and characteristics of technological innovation.

Technological innovation may be roughly divided into two types: original innovation and integrated innovation. The former, which is often likely to create and open up new demands and markets, requires a rational structure of competent personnel, a support for applied basic research and a relaxed environment to encourage innovation; and the latter, while needing the innovative consciousness and the motion of engineers and inventors, is mainly born of social and market demand.

Original technological innovation refers to the invention and application of basic or crucial technological invention. Breakthroughs in basic research often serve as the foundation and basis of knowledge for original innovation while the prospect of wide application produces tremendous motion. A case in point is the invention of transistor. At that time, basic theories such as quantum mechanics theory, energy band theory and metal-semiconductor contact rectification theory were established one after another, and because the vacuum tube is bulky, short-lived, costly and unreliable, people looked forward to its being replaced by a better device. The unique conditions of the Bell Laboratory — rational structure of competent personnel, prominence given to applied basic research and easy environment for supporting and encouraging major original technology innovation— enabled the invention of the triode, an original technological innovation that ushered in the Electronic Era.

The successful invention of aeroplane by the Wright brothers lies in the fact that, unlike their competitors, they did not go into design activities blind-folded. They had a clear knowledge of some basic principles before they started the actual design. They carried out their applied basic research in a rather systematic manner — constructing a small wind-tunnel, revising the then widely accepted lift coefficients, inventing of a set of measuring balances to gauge lift, resistance, propeller thrust, and so on. These activities really seemed to be out of the common run in the process of technological innovation a hundred years ago. Some scholars have pointed out that the Wright brothers were not just inventors, they were technological scientists, for in order to design a flying vehicle, they proceeded to study the laws and principles on which it was based.

Integrated innovations are omnipresent in our life today, from modern carrier rockets and Boeing plane series to electrical home appliances, from container technology system to the Internet. It can be seen that innovation in science is determined by first discoveries in the world, whereas innovation in technology embodies not only original inventions but also integrated innovations of great application value.

2.5 Evaluating standards and the main body of the technology evaluation

The standards for evaluating technology should be in accord with the goal and motive force of the innovation and technological development. Hence the promotion of technological innovation and development cannot simply rely on government awards.

The difficulty with technology evaluation chiefly lies on the diversity of influencing factors and the difficulty of predicting market and social selection, including:

(1) The difference between the advanced nature of technology and market selection. The latter is often restricted by the level of economic and technological development and influenced by marketing strategy.

(2) The vast difference between the prototype of new invention and the batch products which have been repeatedly developed as the invention is turned into final industrial products for the market.

Hence, the often risky business of selecting new technique, new technology and new product is much influenced by the ability to correctly judge the market and predict the trend of economic and technological development.

New technology should be evaluated not just by technical experts and not within the confines of the research and development frameworks for the respective technologies. Market and social systems play a vital role in the evaluation process, especially when it comes to the appraisal of the side effects of technology.

Technology evaluation must satisfy the requirements in three aspects:

(1) Objectivity and comprehensiveness. Evaluation must be done on the positive and negative long-term effects of modern technology and major engineering projects.

(2) Use of comprehensive and all-rounded methods and means. Evaluation must not be confined to mere measurement of separate features and economic characters of an advanced technology or a project.

(3) Compulsory evaluation. Technology evaluation should become the prerequisite and basis of scientific decision for future development.

2.6 The relationship between technology and science

Both science and technology are involved in the process of innovation and cognition. Science provides potential possibility and theoretical basis for the development of technology, whose limit is determined by scientific principles and laws.

Before the 19th century, science and technology developed quite independently of each other. After the Electrical Revolution, especially in the 20th century, technological innovation and development began to rely more on science as the basis, but technical invention still had its distinctive orbit. In certain domains where the scientific basis was relatively weak, it was technological breakthroughs that preceded and initiated theories. For instance, G. Marconi was the first to merge radio into the long-range signal transmission system, and his success with wireless telegramme came only after countless failures. This shows that people do not wait for the emergence of theories to guide their practical experiments, and that scientific theories may occasionally fall behind the practice of technological innovation and development.

Innovation and development of technology in the 20th century also provided new means for scientific research activities and expanded new domains. For example, without ultra-low temperature technology, the emergence of superconducting physics would be impossible. Had there not been the high-energy accelerator, there would not have been the rapid development of particle physics as we have seen. In the absence of the X-ray diffractometer or the nuclear magnetic resonator, the development of molecular biology would be quite unimaginable. Devoid of radio astronomical telescope technology, to explore the depth of cosmos would just be unthinkable.

2.7 The relationship of technology with ethics

Alongside the ever-growing impact of scientific and technological activities on man's social life, the research on scientific and technological ethical problems is also given increasing importance. In the activities of modern technological innovation, the relationship between technology and social ethics mainly involves principles dealing with social effect and economic returns. The rapid development of technology puts forward new and challenging moral problems. Particularly in biological technologies, issues such as "test-tube baby", "test on animal and the human body", "clone technology", "organ transplantation" and "euthanasia" are all faced with a multitude of problems. Modern technology renders weapons increasingly powerful in inflicting casualties, while the appearance of mass casualty-inflicting weapons like nuclear and biological weapons has turned the understanding and control of such weapons into an international ethical and legal topic. The emergence of Internet brings along with it network ethical problems correlated with network efficiency, sharing of resources and network security, information security and even the protection of family and personal privacy.

Another category of technological and ethical problems have still greater impact. These are problems concerning our environment and ecology, as well as sustainable development and rational sharing of natural resources and intellectual resources. Such problems have always existed, but became particularly serious in the second half of the 20th century. The ever-aggravating acid rain, noise, greenhouse gas, global warming, particulates in the air, air and water pollution, sharp decline in forest area, extinction of species, soil erosion, inundation, aridity and desertification, and urban garbage – all these have forced people to take a hard look at the practice of seeking maximum profit at the cost of the eco-environment and to set about re-establishing new technological ethics for maintaining the eco-environment and sustainable development of human society. With the rise of high-tech industry and knowledge-based economy, represented by information and biological technologies, technological and economic ethical problems of global concern have risen: How can natural

resources and intellectual resources be rationally shared between the developing world and the developed world, and between the poor and the rich? How to reduce, instead of widening, the "North-South difference", the "East-West difference" and the gap between the poor and the rich?

3. The development trend of 21st century technological innovation

During the 19th and 20th centuries, the stress of technology and industrial civilisation was on the ability of mankind to conquer nature, on the market competitive power, economic benefit and destructive and casualty-inflicting power of weaponry that might be realised by technological innovation, and on the large-scale benefit of engineering and technology. Struck by the near exhaustion of natural resources and the deterioration of eco-environment caused by highly developed productivity, and in view of the unprecedented catastrophe resulting from mass casualty-inflicting weapons during the two World Wars, people have, since the 1960s, come to be aware of the negative impact technology could bring to civilisation and progress as well as to man's eco-environment. Such awareness gradually gave rise to the concept of sustainable development. While people continue to focus on technology's market competitive power and economic benefit, they are at the same time paying great attention to the influences of human activities on the eco-environment and looking into sustainable utilisation, protection and development of limited natural resources and unlimited intellectual resources. In weaponry, still greater importance is attached to air, naval and information dominance while prominence is given to information superiority and superiority in quick reaction and accurate attack. While the large-scale benefit of engineering and technology continues to be expanded, more attention is now given to the diversity, openness and developability of technology. In stressing technology as a decisive factor of productivity, people attach tremendous importance to the provision of means for new scientific exploration, eco-environmental protection, and medical treatment and health care. Alongside the increasingly close relationship of science and technology, the need to integrate technology with humane studies and arts has been repeatedly stressed. And research on technological ethics and the legality, management and supervision of the social effect of technology are receiving growing attention around the globe.

In the 21st century, high technology will continue to advance by leaps and bounds and will develop in harmony with human society. Technological innovation, which opens up new prospects for man's civilisation and progress, will provide strong support to China's effort to attain its "third-stage development strategy". Economic and technological globalisation and competition poses another challenge. Serious analysis and skillful handling of S&T development in the new century and a faster pace in the construction of a state innovation system have great significance for promoting sustainable development in China.

It may be predicted that activities of technological innovation in several key aspects as detailed below will produce a profound impact on the civilisation of human society in the 21st century and lead us closer to the ultimate goal of bringing genuine happiness to mankind.

3.1 Information technology will ceaselessly make significant progress on the basis of cross-link and mergence of disciplines

With the computer and broadband communication network technology at its core, information technology will keep on making new progress in capacity, bandwidth, speed and the intelligence of informationalisation. Molecular physics, condensed-state physics, nano-technology and biological technology will provide information technology with new materials and equipment of storage, transmission, processing and display. People will ultimately break through the language and information barriers between man and man and between man and machine to realise direct interaction with computer/network that transcends different languages, as well as the direct information interaction between man and machine and between machine and organism. Advances in mathematics as well as in brain research and cognitive science are likely to bring about a new revolution in the structure of computer, mode of network communication and form of information expression and processing. For mathematics, material science, life science and biotechnology, astronomy and geo-science, clean, safe and renewable energy technologies, and eco-environmental science, information technology will provide new mode of research, work platform, data bank and numerical pattern construction and processing method, and will derive new cross-linked science and technological frontiers. Based on information technology, the advancement of GIS, remote sensing and GPS will be developed into the digital earth system, thus providing a reliable technical platform for research of global cycle of nutrient elements, global resources and eco-environment, global natural disasters, global economy and communications & transportation as well as security of national defense. With its never-ending development and unprecedented power of impact and penetration, information technology will continue to change the patterns and forms of human economic activities, life style, social structure, learning and cognition, government administration and business management, and cultural dissemination and exchange.

3.2 Life science and biotechnology are brewing new breakthroughs and going to usher in a brand new century

New breakthroughs are being brewed by the development of life science and biotechnology. It might be estimated that in the next two to three decades, mankind will make significant progress in understanding his own origin and evolution, as well as his brain and neural-structure, functional development, cognition and transmission, and how information is processed and stored. The advancement of genomics, proteinomics, bio-informatics, molecular neuro-developmental biology and

molecular ecology will enable man to understand, on a molecular level, heredity, development and ageing, metabolism and immunity, ecology and system evolution, and the evolutionary law of bio-diversity, thereby linking up and integrating macrobiology with molecular biology.

The accomplishment of the whole genomic map sequencing of human and other model organisms has paved the way for post-genomic studies, and the information of the functional genes in these genomic maps will be fully interpreted. In pace with the research development on the structural and functional genomics and proteinomics, the progress of gene, cell and tissue engineering and stem cell technology will exert hitherto unknown impact on agricultural breeding, gene therapy, organ regeneration and transplantation, reproductive regression and control, drug development, and the protection and control of eco-environment, so that agriculture, medical and health care development will enter an entirely new era.

DNA chip, bio-computer, biomass energy, biological and bionic materials will become the focus of future technological innovation and new industries.

3.3 Materials science will transcend the limits of biotic and abiotic matters and give birth to new frontiers for high technology

In the 21st century, materials science is likely to transcend the limits of biotic and abiotic matters. Consequently, advances in physical biology, chemical biology and informatic biology will push the quantum theory development into a new stage. Investigation on the property of matters and their interaction under extreme conditions will further reveal the motion, structure and law of their interaction under physical conditions of nano-space dimensional degree and femto-second time scale, thereby possibly producing a revolutionary influence on materials, energy and information technology. The new development of nano-materials, nano-devices and nano-scale monitoring technology, as well as technology of micro-mechanical and electrical system will usher in an era of molecular and atomic adjustment and control, molecular and atomic assembly and self-assembly. Mankind will keep on creating and preparing ultrapure, ultrastrong, intelligent, self-adapting, self-compensating and self-assembling materials, as well as a diversity of renewable and naturally degradable structural and functional materials. Eco-environmentally friendly "green technology" will be developed in addition to renewable energy and clean, highly efficient and safe nuclear reactors. Together with a new generation of vehicles, fusion energy will also be exploited and commercialised. Clean, highly efficient, economical hydrogen energy will be developed and put to use.

3.4 Multidisciplinary technological innovation will usher in an advanced manufacturing era

Progress in materials, technology, computer and broad-band network as well as the development of economic globalisation will enable the manufacturing industry to take further steps in the use of virtual design and global parallel design, computer-integrated manufacturing and global virtual manufacturing systems will be formed. The manufacturing industry will then not only turn out integrated mechanical and electronic production equipment and work machines, but also equipment for experimentation under extreme conditions, work machines, micro-mechanical and electrical equipment for medical diagnosis and treatment, and instruments and installations for biochemical and biological engineering.

Nano-technology will bring about a new change in materials and micro-processing technology while manufacturing technology will expand from under the roofs of conventional factories and workshops to virtual factories. Characterised by computer-integrated information, technology and management and combining the essential factors of social production with marketing and service, such virtual factories will become a complement to global manufacturing system. With total automation of manufacturing, industry will be replaced by the man-machine integrated intelligent systems with man at the core and computer as a medium. Manufacturing industry will transform itself into one that is at once flexible, intelligent, nimble, ever-improving, green, artistic, globalised and humanised.

3.5 To lay a foundation for achieving the grand goal of benefiting mankind by technology and realising sustainable development

Technology will ultimately serve to bring prosperity and sustainable development to human society. In the 21st century, people will be more concerned about their health, housing, natural eco-environment, and relevant technologies will develop greatly in the future.

Represented by information, biology and nano-technology, 21st century technological development will give rise to a series of new problems concerning information security, biological and eco-environmental security, security of life and health, economic security and security in national defence, in addition to new challenges of technological ethics. Besides, it may also lead to widening gaps between the North and the South and between the poor and the rich, and will probably become a tool for power and international crimes. Hence, 21st century technological development requires extensive international cooperation and the sharing of technological achievements in order to establish and continuously improve upon a common set of moral codes and legal concepts. Only so may the feared unprecedented negative effects of technological development be averted and the widening digital and knowledge divide be diminished, making it possible for technological innovation to promote sustainable development and prosperity for mankind.

In this connection, may I call upon my fellow Chinese scientists and relevant organisations to work hard and cooperate closely with their counterparts around the world, and make their due contribution.

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The Future of Multimedia in the Internet

Professor Benjamin W. Wah
Department of Electrical and Computer Engineering
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Abstract

The Internet has revolutionised the way people communicate with one another around the world, and many have proposed to use it for real-time video conferencing and multimedia communications. Is the Internet ready for prime time, just like what telephones did one hundred and twenty-five years ago? In this talk, we examine some factors that limit the effectiveness of the current Internet for real-time multimedia. The Internet will need to increase its bandwidth by many orders-of-magnitude in order to support everybody's needs. Changes will need to be made to existing communication protocols, perhaps coupled with a charging mechanism for various qualities of service. Coding algorithms will need to be redesigned to cope with data lost in transmissions. Special-purpose, high-speed signal processors will need to be used to process image and audio data on the fly. All these point to new architectures of the Internet that will lead to continued research for many years to come.

The Engineering Profession – An Innovative Force For Progress

Ir. Dr. the Honourable Raymond Ho Chung-tai, MBE, JP
Legislative Councilor (Engineering Functional Constituency)

Professor Lee, Alumni from around the world who are here to celebrate the 90th anniversary of The University of Hong Kong and its founding Faculty of Engineering, Distinguished Guests, Fellow Engineering Students, Ladies and Gentlemen,

I appreciate very much the honour that Professor Lee has bestowed upon me in asking me to address you today. Being an HKU engineering graduate, I take great pleasure to join you in celebrating the 90th anniversary of the Faculty of Engineering, of which I am an alumnus. If good education is a ticket for a better future, the Faculty of Engineering has certainly provided me one. In fact, it has given me more than that. Like many alumni of the Faculty, I have many happy remembrances of my student days at the University.

However, my past is not today's subject. As you are aware, the theme of this Symposium is about engineering. But I am not going to bore you with technical stuff as some of you may not be in this profession. Then what exactly is engineering? I have to admit that it is a tough question as engineering spans over many different disciplines.

Just take Hong Kong as an example. There are altogether 16 disciplines in the Hong Kong Institution of Engineers – the body responsible for qualifying engineers in Hong Kong. These are building, building services, chemical, civil, control, automation and instrumentation, electrical, electronics, environmental, gas, geotechnical, information, manufacturing and industrial, marine and naval architecture, materials, mechanical and structural disciplines.

For an easy understanding of the work of engineers, I found a one-line definition from the Britannica Online. "Engineering is the application of science to the optimum conversion of the resources of nature to the uses of humankind". Also, engineering has been defined by the Engineers Council for Professional Development, in the United States, as the creative application of "scientific principles to design or develop structures, machines, apparatus, or manufacturing processes, or works utilising them singly or in combination; or to construct or operate the same with full cognisance of their design; or to forecast their behavior under specific operating conditions; all as respects an intended function, economics of operation and safety to life and property."

In Hong Kong, engineering has come into the picture of the local development from its very early stage. Engineering helped turn Hong Kong from a small fishing village into a busy entrepot with all essential infrastructure facilities. When manufacturing took off in Hong Kong shortly after the Second World War, engineering again played an important role. To date, engineering has been an important driving force for progress in the knowledge-based economy.

Influenced by traditional perception, many members of the public have a tendency to associate engineering with the more fundamental fields of engineering, such as civil, electrical and mechanical engineering. I do not blame them for that. The engineering profession has been contributing significantly to large-scale infrastructure projects, from public housing to airport development.

The imprint of the profession is evident in Hong Kong. Innovations in engineering have allowed both horizontal and vertically spatial expansion. In Hong Kong, we are too familiar with the process of reclamation that has been going on for a century. Many areas along our harbour front and our coastline were reclaimed from the sea. In order to optimise land use for our development, Hong Kong has also taken the vertical spatial development options. The past two decades have witnessed an increasing number of tall buildings completed in Hong Kong.

The need to house a fast-growing population in Hong Kong always turns to the engineering profession for solutions. On average, 1 million people are added to the local population every 10 years. However, the local population increased by 1 million over the past 7 years. Different generations of new towns in Hong Kong form part of the solutions, Including early developments like Tsuen Wan, Shatin and Tuen Mun as well as more recent ones like Tseung Kwan O, Tin Sui Wai and Tung Chung. Such developments have benefited from different engineering approaches and applications, be it reclamation methods or building techniques. It is worth noting that utility facilities including electricity and gas transmission networks are also indispensable for their development. Again, engineers have contributed their efforts there.

Transportation is essential to the development of new towns too. The Kowloon-Canton Railway and the Mass Transit Railway System have become our major transportation network which is still expanding. Six new railway projects are under construction now. One is the 30.5-kilometre West Rail. The other projects are: the 12.5-kilomentre Tseung Kwan O Extension of the MTR, the 11.4-kilomentre Ma On Shan to Tai Wai rail link, the 1-kilometre Hung Hom to Tsim Sha Tsui Extension of the KCR, the 7.4-kilometre Sheung Shui to Lok Ma Chau spur line and the 3.6-kilometre Penny's Bay rail link

connecting Yam O to the area where the Hong Kong Disneyland is to be built.

Besides the railway projects, there are also major road projects under way, including two large-span bridges: the Stonecutters Bridge and the Tsing Lung Bridge. The Stonecutters Bridge, with a main span of more than 1,000 metres, will be one of the world's longest cable-stayed bridges. Tsing Lung Bridge connecting Tsing Lung Tau and North Lantau will have a span of 1,418 metres. Upon its completion targeted in 2007, the Tsing Lung Bridge will be the third longest suspension bridge in the world and definitely another major landmark in Hong Kong.

All these new projects require the latest engineering technology and expertise. Our past records show that we have no difficulty in taking up challenges. As we know, Hong Kong has been able to overcome some of the toughest technical difficulties in building up its main infrastructure. In less than a decade, we have completed the 10-project Airport Core Programme (ACP), one of the world's largest infrastructure programmes. Apart from the airport island itself, there were two major land reclamations in West Kowloon and Central. And the new town at Tung Chung on North Lantau was also built largely on reclaimed land.

The other ACP projects include the Airport Railway, five road projects, including tunnels and bridges – running under the harbour from Central District, across the western shore of the Kowloon peninsula, across the islands of Tsing Yi and Ma Wan, and along the North Lantau coast to Chek Lap Kok. Among them, the award-winning Tsing Ma Bridge, a suspension bridge carrying both road and rail traffic with a main span of 1,377 metres, is now one of the major landmarks in Hong Kong.

Initially with the help of foreign expertise and know-how, local engineers have been gaining much experience in developing large infrastructure projects in the last three decades. While it is very important for us to continue to assimilate the latest engineering technology, the practice of over-dependency on overseas engineering personnel should be avoided. Local engineers in Hong Kong should be given the chance to develop their own expertise in designing and constructing large infrastructure projects, such as railways and airport. A pool of capable and experienced local engineering personnel will be essential for Hong Kong and will make our development less susceptible to the availability of foreign engineering professionals. Emphasis must be given to technological transfer and more use of the expertise and facilities of our tertiary institutions.

As a matter of fact, there are many engineers of high calibre in Hong Kong who are as competitive as their overseas counterparts. Our engineers have already been exporting their services to other areas in the region, particularly to Mainland China. Take the construction industry as an example. Major types of professional engineering services such as project management, building services work and engineering consulting, are currently being exported.

While involvement of the fundamental engineering fields in infrastructure projects and the construction industry is highly palpable, contributions of the engineering profession in other fields may not be so obvious. And I want to talk about them.

First, many engineers are working quietly and diligently in research and development in advanced learning institutions including this Faculty. Their efforts are essential for the technological advancement and the development of the profession. I would like to take this opportunity to pay tribute to this highly respected group including all the academic staff of this Faculty who have been working behind the scene for the progress of our society.

Second, there is a strong contingent of engineers within our 180,000 civil servants. About 40% of the members of the Hong Kong Institution of Engineers (HKIE) are working in various bureaux and departments of the HKSAR government. Their technological knowledge and professionalism have built Hong Kong into a vibrant city.

Third, many engineers, though not working in the government, also play an active role in public services through their participation in public bodies and various advisory committees appointed by the government. From time to time, there are engineers who serve in the Executive Council, Legislative Council and District Councils.

Fourth, a large number of engineers are working as managers, directors and CEOs in every sector of our economy, from manufacturing to services, from telecommunications to transportation and from banking to town planning. Membership of the Election Committee mirrors the diversity. Forty-seven HKIE members were elected to the Election Committee last year although the number of seats allocated to the Engineering Subsector, like other subsectors, is 20. Why is there a discrepancy? It is simply because these 27 engineers represent other Election Committee sub-sectors, namely Commercial, Employers Federation of Hong Kong, Industrial, Real Estate and Construction, Transport, Information Technology, Higher Education, the Chinese People's Political Consultative Conference, Hong Kong and Kowloon District Councils, the National People's Congress and the Legislative Council.

Indeed, footprints of engineers are found everywhere in Hong Kong. In the new millennium, the engineering profession is playing a particularly strong role in the following aspects.

Engineers in information discipline form an important driving force in information and communications technology – the backbone of our future development. With the advancement in information technology and telecommunications infrastructure, we have developed new ways of communications and adopted new ways of doing business. They are determinants in future economic development.

Also, engineers become part of the equation for solving environmental problems. The rapid industrialisation of the Pearl River Delta Region and the pressure of local population in Hong Kong have aggravated the local environmental problems in all fronts – air, noise and water pollution as well as overcrowding

living environment. Facing these challenges, engineers in different disciplines are working very hard to prevent new and solve old environmental problems, adopting more environmentally friendly modes of transportation, developing renewable sources of energy, applying new engineering techniques in construction to minimise damage to our environment, and so on.

Nowadays, sustainability is highly valued in any form of solution. Simply speaking, the concept provides a framework of economic growth and development with minimum negative impact on resources, which allows our society to continue functioning into the indefinite future. In other words, the concept focuses growth that maximises long-term rather than short-term benefits and gains. To make sustainable development a reality, engineering once again provides us enlightenment.

Besides solving problems, engineers and engineering have a key role to play in increasing the competitiveness of Hong Kong as a whole. Engineers develop new technology, production processes and products. Engineers are always ready to meet new challenges and make the best of every opportunity. The closer relationship between Hong Kong and the Mainland since the reunification offers new opportunities for local engineers.

Despite the slowdown in economies of other Asian countries after the Asian Financial Crisis, China still maintains a robust economic growth. Its development will further accelerate with its "Go West" programme.

In May this year, I participated in a high-powered Hong Kong delegation to China's western regions. I observed that the western regions have abundant natural resources and enormous potential for development. However, essential infrastructure facilities are lacking. As these facilities are crucial for the development of these inland areas, both central and provincial governments are giving high priorities to their development. I believe that Hong Kong engineers have much to offer in the imminent infrastructure and industrial developments in the western regions.

Meanwhile, the impending accession of China to the World Trade Organisation and the hosting of 2008 Olympics in Beijing will definitely generate strong demand for engineering services. As Hong Kong enjoys many advantages including geographical proximity, language and knowledge of doing business with the Mainland, our engineers definitely have a competitive edge over their competitors from overseas in accessing the Mainland markets.

It is clear that engineers and engineering have a key role to play in the development of Hong Kong. It is also expected that there will be more involvement of Hong Kong engineers in the development of Mainland China. For that, our engineers must always remain competitive and innovative.

In the fast-changing world today, it is essential for our engineers to upgrade their knowledge and keep abreast of developments in their respective fields. Meanwhile, we must ensure that we have a steady supply of young engineers with the right professional skills. In this regard, the Faculty of Engineering of this University will continue to play an important role, as it has been doing for the past 90 years.

Thank you very much.

Luncheon Address

Ir. LEE Shing-see, JP
Secretary for Works

Professor Lee, Distinguished Guests, Ladies and Gentlemen,

It gives me great pleasure to address you all at this memorable moment.

I am very impressed by the development of the Faculty of Engineering, which is one of the two faculties when The University of Hong Kong started off in 1911. During these 90 years, the number of engineering graduates has multiplied from 12 to some 900. In 2000, the University conferred degrees in 26 programmes of study in a broad spectrum of core as well as emerging engineering disciplines. The exponential growth is not only a testimony of academic pursuits, but also a response to the need of the community.

Today, I would like to speak on a topic the result of which is very much dependent on our engineers, that is, The Prospect of our Construction Industry. I shall focus on two markets and two reviews.

Local Market

Construction industry relates to many facets of human life. It is also a main pillar of our economy, contributing to about 5 to 6% of our GDP. The Government has always accorded priority in infrastructure development aiming at improving our living environment and quality of life.

In October, the Chief Executive delivered his Policy Address underlining the importance of infrastructure. Despite the prospect of a huge budget deficit this financial year, the SAR Government will continue with its huge investment on infrastructure.

The Chief Executive mapped out a mega investment plan which consisted of $400 billion investment in the Government's own capital works programme and $200 billion investment in railways. This is almost four times of the Airport Core Programme which was about $150 billion. The investment will substantially enhance our infrastructure, meeting community needs and supporting the forthcoming economic restructuring. The new projects will provide business opportunities for local companies and create new jobs for people in Hong Kong, relieving their hardship at this particular time.

The capital works programme consists of about 1,600 projects. Major projects include Route 10 from North Lantau to Tuen Mun, Route 9 from Shatin to Tsing Yi, the Shenzhen Western Corridor, South East Kowloon Development and the remaining Central and Wanchai Reclamation. Altogether, $400 billion will be invested on the programme within a time frame of about nine years.

Besides public works, the Government will heavily invest on railways. Railways are environmentally friendly and efficient mass carriers. Locating future strategic developments along rail alignments will reduce reliance on road-based transport, enhance the efficiency of the rail network, and ensure affordable fare levels. The total investment of new railways is around $200 billion, about half of which would be used to build six committed railway projects including the West Rail, the Tseung Kwan O Extension, the Ma On Shan Line, the KCR Extension to Tsim Sha Tsui, the Penny's Bay Rail Link and the Sheung Shui to Lok Ma Chau Spur Line. The other half will be invested on six new projects to be completed in the coming 15 years – the Sha Tin to Central Link, the Island Line Extensions, the Kowloon Southern Link, the Regional Express Line, the Port Rail Line and the Northern Link.

All these infrastructure projects will enhance the living standard of Hong Kong people. They will also create job opportunities in the short term to help those who may be suffering from unemployment now. To give you some indication, among the $400 billion committed investment in the capital works programme, about $90 billion, consisting of 170 projects, has been newly added this year. These include the Final Phase of the School Improvement programme at $8 billion, 64 new leisure and cultural projects at $9 billion and the Shenzhen Western Corridor at $2.8 billion, which will create about 15,000 job opportunities. In addition, the Government has decided that to further increase the creation of new employment, the works departments will expand their minor works programmes substantially, generating another 5,000 jobs. Therefore, a total of 20,000 jobs will be created. They are all new jobs arising from new initiatives and are extra over those projects committed in the past.

Mainland Market

Apart from the local market, we should not underestimate the potential of the Mainland Market. China's recent accession to the World Trade Organization will usher in a new era in the development of the global trade. The integration of China into the international economic system offers many new

opportunities for both China and the rest of the world. Hong Kong enjoys an excellent competitive edge in many areas. We are well-placed to play a vital role in the growing Mainland market. The opening up of the key services sector in the Mainland will unleash a whole range of opportunities for professionals from Hong Kong as well as overseas.

In particular, certain restrictions and barriers hindering Hong Kong contractors' participation in PRC projects will be phased out in stages. For example, joint ventures with majority foreign ownership will be allowed upon accession. Wholly foreign-owned enterprises will be permitted within three years for undertaking foreign-funded projects as well as certain Chinese invested projects. The challenge now is for professionals of Hong Kong to move ahead of the times to capture the Mainland markets.

Government also stands ready to provide facilitation as far as possible. Over the years, the Works Bureau has organised a number of conferences and mission visits to various key Chinese cities, promoting our professional services in the Mainland. More recently, we have been negotiating with our Mainland counterparts on the co-operative agreement on the exchange of business information. All these measures are taken to help the business exporting our construction services to the Mainland.

PWP Procedural Review

Back in Hong Kong, there have been calls recently from the engineering and related circles to streamline our public works procedures. Over the past two to three years, we have heard many criticisms about the lengthy pre-construction procedure for public works projects which easily runs up to six years or even more before construction can be started. Causes for such long processes include time-consuming environmental impact assessments, rounds of public consultation and debates, lengthy gazetting process, resolution of public objections and complicated land resumption process.

A few months ago, the Works Bureau working in consultation with other policy bureaux have come up with a much shortened procedure. This was done by either fast-tracking individual tasks or taking parallel actions. For example, we have already revised our procedures in the past two months to allow projects to be tendered before funding is approved. We have also consulted the Advisory Council on the Environment and obtained its support to our proposal of gazetting non-environmentally sensitive projects under our ordinances in parallel with the EIA process. This alone will bring forward the gazetting and approval of projects by as much as nine months. We are now simplifying requirements on preliminary project feasibility study. Under the new requirements, a study could be completed in about four months instead of twelve. The administrative procedure of land resumption will also be simplified to shorten the time for land resumption and clearance. With all these measures, we reckon that in the future a medium-size project can start construction in less than four years instead of six years.

We will continue to look for improvement measures. Another area that we are now looking at is the statutory procedures. We all know that it could take many months to get a project through all the legal procedures. We are reviewing these legal requirements and will consider whether any of the laws could be improved to make the overall process shorter and more efficient. With much shortened procedures, many of our public works projects can come on stream earlier, and we will have the capability to undertake more projects.

Industry Review

To handle the voluminous projects in the pipeline, we may need to rethink the whole methodology of the current industry practices.

Early this year, the Construction Industry Review Committee (CIRC), under the chairmanship of the Honourable Henry Tang, completed the review and submitted a report to the Chief Executive. In its report entitled "Construct for Excellence", the CIRC recommended a package of 109 improvement measures aiming to substantially lift the quality and cost-effectiveness of the construction industry. Emphasis is placed on a major cultural change in order to achieve an integrated construction industry that is capable of continuous improvement towards excellence in a market-driven environment.

The Works Bureau has in June this year formulated a strategy in taking forward the CIRC recommendations, and is currently making steady progress.

Responsibilities for policy issues and regulatory requirements affecting the construction industry are dispersed among several bureaux and departments. With the support of the CIRC and the construction industry, the Works Bureau has been assigned to assume a lead role within the Government to foster better co-ordination on construction-related matters and to maintain an overview of all issues concerning the industry. The Works Bureaux will be regularly monitoring the progress of implementing the CIRC recommendations, and will conduct a full review of the overall progress in three years' time.

The CIRC has identified the need to establish a statutory industry co-ordinating body as a key building block for the future success of the construction industry. It has recommended that the industry co-ordinating body should have a permanent secretariat and be funded by the industry through construction levies.

Pending establishment of the statutory body, which will involve legislation and substantial input from the industry, the Government set up the Provisional Construction Industry Co-ordination Board in September 2001. The experience gained by this provisional board will facilitate the efficient and effective development of framework and legislation for early formation of the statutory body. The provisional body serves as the main channel for the Government to seek the industry's feedback on strategic matters impacting on local construction, and will become the focal point for implementation of improvement measures requiring co-ordinated input from the industry.

Ladies and gentlemen, the SAR Government is fully committed to the infrastructural development in Hong Kong to improve the living environment, to spur the economy and to create job opportunities. With Mainland's accession to WTO, there will be plenty more opportunities for Hong Kong. I am therefore very confident that despite the difficult times that we are going through at the moment, our construction industry will continue to prosper.

In closing, I wish to commend all staff, professors and graduates of the Faculty of Engineering. I also pay tribute to our predecessors. Without your dedicated support, Hong Kong would not have become an international city. I hope the Faculty can build on its solid foundations and, together with the community, press onward with new strengths.

Thank you.

Nanostructures, Petabytes - Data Storage

Professor Teck-Seng Low
Chairman of the Advisory Board
Data Storage Institute, Singapore

Abstract

Computing is pervasive today. Technology drives on relentlessly, providing us with the opportunity to be "connected" and always "on". A key enabler of such a "connected-and-on" environment is data storage. A wide spectrum of storage solutions is available today. Personal computers are supplied with at least 20 gigabytes of hard disk storage; and a device the size of a credit card is capable of storing over a gigabyte of data. This represents a giant leap from the days of the IBM RAMAC, when a kilobyte of storage will take up the space of a room. The data storage industry today integrates a vast repertoire of leading-edge science and technologies, making it possible to store gigabytes of data in a disk 2.5 centimeter in diameter and to create storage area networks that can handle petabytes of information.

Currently, magnetic storage, the cornerstone of rotating data storage solutions, is augmented by optical and magnetic-optical storage systems. Novel systems continue to be explored with the application of MEMs and nanotechnologies. These innovative techniques include probe storage, ETOMs and different schemes for holographic storage. Some more exciting developments are in non-silicon solid-state storage solutions such as MRAMS, CRAMS and the use of pattern media and aspects of nanomagnetics.

This lecture describes recent developments in science and technologies for data storage, with particular emphasis on rotating magnetic memories and nanomagnetic structures for spin-electronics and solid-state magnetic storage. The lecture will also discuss the integration of storage systems to provide network storage facilities, from giga to petabytes for home, enterprise and scientific applications.

Air-Conditioning in the 21st Century: Impact on Human Productivity, Health and Comfort

Professor P. Ole Fanger
Director, International Centre for Indoor Environment and Energy
Technical University of Denmark

Abstract

Air-conditioning has had a substantial impact on human life and economy in many parts of the world. It is therefore not surprising that air-conditioning has been proclaimed as one of the most important technical inventions of the 20th century. Without air-conditioning, human activity in moderate climates would be slowed down during warm summers. This is even more evident in tropical regions with a warm climate all year round. The strong economic growth in South-East Asia for example, which has changed developing regions into developed industrialised cities over past decades, would have been unthinkable without air-conditioning. However, air-conditioning elicits mixed responses from people around the world. Field studies reveal that a substantial number of people, living and working in a considerable number of buildings, suffer from the so-called Sick Building Syndrome (SBS), even though existing standards and guidelines for the use of air-conditioning are met. A paradigm shift in research is apparent today from the construction of mediocre indoor environments to that of excellent indoor environments. Elements of such a paradigm shift towards excellence are suggested. New research data document the positive impact of an excellent indoor environment on human productivity, health and comfort. By appropriate engineering, the principles of excellence can be provided with moderate energy consumption.

Interaction of Art and Engineering! Then What?!

Professor Norman W.M. Ko
Honorary Professor
The University of Hong Kong

I am honoured to be invited to give a talk on this important 90th Anniversary Symposium of the Faculty of Engineering, The University of Hong Kong. It is, indeed, a great pleasure for me to share my experience with such a special audience on a topic so close to me.

To an individual, 90 years is really a long time. To Hong Kong, 90 years also constitute a large proportion of her time. However, to the time of about forty thousand years of the civilisation of man, since the Palaeolithic or Old Stone Age, it is indeed short. To the time span of the universe, it is definitely infinitesimal. Nevertheless, this short and long life span of the Faculty does indicate its existence and the dedicated path it follows.

I am not trying not to acknowledge the great effort and achievement of the Faculty. Nor am I not acknowledging the past and present effort of the staff, the graduates and the students of the Faculty. In fact, the rapid and great achievement of Hong Kong over the past thirty to forty years, which is a wonder of the world, has been closely associated with the hard work of the graduates of the Faculty. The past and present transformation of Hong Kong was and is also due greatly to the continuous contribution of its graduates. The graduates were and still are, without any reservation, the corner stones of this city of success and miracles.

As a graduate of this Faculty and an engineer by training, I was overwhelmed by the invitation to speak on the topic of interaction of art and engineering. It would give me much comfort, if I only have to speak solely on the engineering aspect. It would give me much pleasure, if I only have to speak on my engineering research in the last thirty years. But I was invited to amalgamate the art and engineering.

Such an invitation did give me an uneasy time, interspersed with occasional nightmares, as art is a subject I was not professionally trained in.

Selfishly, my appreciation of art is for my own enjoyment. My wife and I built up a collection of artworks, which is also merely for our own pleasure. Thus, practising art is really for my own happiness.

Even before I became an artist, I did underwater photography for my own satisfaction, enjoying the beauty and wonders of underwater life. With my engineering experience, I designed and built underwater cameras and equipment. I have three inventions and patents on underwater camera in the United States and the United Kingdom.

In addition, I enjoy the wonders of the world. I also enjoy the creations of man. It was and is my wish to record all these wonders, for my own purpose and hopefully, for our future generation.

By chance, I started doing sculpture twenty years ago, at the age of forty-one, due partly to my admiration and love of the sculpture of the Ancient World, of the Renaissance and of the Modern. It was also because sculptures, which my wife and I tried to collect, were getting too expensive. It is definitely cheaper to do it myself.

Much later, I started doing paintings, at the age of forty-nine, because I was and still am awed by the magnificent large cave paintings of the Cro-Magnon people of the Old Stone Age in France and Spain. I am overwhelmed by the paintings of the Renaissance and of those of the last century. I have to admit that the paintings, which we tried to add to our collection, were so expensive, far beyond our limited means. Again, it is definitely much cheaper to do it myself.

To all of us, the definition of engineering is obvious. I am arbitrarily using the following definition:

ENGINEERING:
The application of science for the control and use of power, especially by the use of machines; the technology, work or profession of an engineer.

> *[Oxford Advanced Learner's Dictionary of Current English with Chinese Translation, New Edition, 1985]*

The definition of art, however, is more confusing. They can be

ART:
The creation or expression of what is beautiful, especially in visual form; fine skill or aptitude in such expression.

FINE ART:
Drawing, painting, sculpture, architecture, music, ballet.

> *[Oxford Advanced Learner's Dictionary of Current English with Chinese Translation, New Edition, 1985]*

ART:
The use of the imagination to make things of aesthetic significance.

[Longmans English Larousse, 1968]

As you can see, the above definitions of art are not really applicable to the modern art world, as some of the artworks are neither aesthetic, nor finely skilled. This is particularly true in the second half of the last century, when the movements and directions of art were so diversified and numerous.

Personally, I like the following definition:

ART:
... something upon which a man has worked.
The fine arts are basically not created for any purpose; they justify themselves, although this does not exclude the possibility that the works may be put to some use.

[Pears Cyclopaedia, Sixty-eight Edition, 1959-60]

As an engineer, I like this simple but all-inclusive definition of art. It really includes the activities of engineering, though the definition of the latter is more specific.

As an artist, according to this definition, I am producing things, which are useless!

In the following parts of the talk, I shall not elaborate further the differences and similarity of the definitions of art and engineering. Nor shall I adhere rigorously to the above definitions, as the definition of art changes with time and environment.

Rather, I shall pay more attention on the interaction of art and engineering. As there are so many examples of the interaction through the ages, I arbitrarily choose the following examples. The few examples I am going to cite are the ones in which my limited knowledge lies and I am personally involved. I am not trying not to acknowledge those of other civilisation and in other parts of the world. The other interactions, I am sure, did and do contribute to the development of man.

Further, I shall not present my engineering researches, even though they involved interaction of fluid structures, of fluid dynamics and acoustics and of noise and man, and some of my results did contain a certain amount of artistic elements.

Our primitive ancestors in the Stone Age, about 30,000-5,000 years ago, produced pottery objects for daily use. Without the benefit of writing, they mastered the skill of pottery.

Our ancestors, even in extremely hostile environment, in which survival was a premium, were not satisfied in merely producing these objects. Artistic patterns were added. These patterns are not significantly different from some of the patterns of the modern pottery.

In addition, for whatever purpose, they produced objects not for daily use. These objects are so artistic that the abstract style is not significantly different from some of the works of modern artists, nearly 10,000 years later.

In the Neolithic or New Stone Age, our ancestors in China, about 7,000 years ago started using pottery wheel in the "mass or batch" production of pottery.

Although it was basically man-powered, it was one of the earliest interactions between art and engineering. It thus seems that this production technique had been used, even before the dawn of civilisation.

Knowingly or unknowingly, these "primitive" man amalgamated the skill of using heat, of using clay, of using different substances with different chemical compositions, of using mechanical means, of using production technique and of using the experience acquired, in producing pottery objects of daily use and of specific purposes.

Although copper was the first metal discovered by the Chaldeans, as early as 4500 B.C., it is too soft for practical use. Nevertheless, some copper sculptures were found in the ancient Egypt and in the Middle East. The addition of tin into copper ushered in the Bronze Age. It was not only used for tools, weapons and utensils, but also fairly extensively used for sculptural purpose.

Our Chinese ancestors in the Shang and Zhou dynasties, as early as 4,000 years ago, excelled in the making of bronze ritual vessels and containers for kings and nobles. They are of abstract form and of very intricate design. Some of these vessels are of big size, as high as one metre. The Shang bronze was the most highly developed in the ancient world. The lost wax method, perfected at that time, in casting the bronze objects is still an important and commonly used technique of our modern time. In some respect, the casting technique of the modern time has not really surpassed that of the ancient time.

In the 1960s, with the building of the Aswan Dam, Egypt, the flooding water threatened this 3,000-year-old temple, which had been carved out of limestone rock face. It was through the supreme effort of the engineers and others that the temple was salvaged. The whole temple was cut into pieces and was relocated on top of an artificial hill, above the water of the Dam. This very fine example of the interaction of art and engineering, once in the ancient time and once in the modern time, illustrates the importance of the interaction not only in the creation and but also in the preservation of human artistic heritage.

The ancient Egyptians, since the Neolithic Age, by sheer labour and primitive tools, achieved in bestowing on us their gigantic temples, pyramids and obelisk. Now looking at the life expectancy of buildings in Hong Kong, which is around forty years, without any trace of ruins, we can't help thinking that those much, much older Egyptian buildings, though in ruins, seem to have really surpassed ours.

Personally, I have the fullest admiration of these ancient people. Without the basic understanding, nor the benefit, of demarcation into art, metallurgy, thermodynamics, fluid mechanics, mechanics, structure, geology, soil mechanics, tooling and technique, they produced such masterpieces, which have not really been surpassed, even thousands of years later. To them, demarcation and classification were not the issue. Interaction, not only of art and engineering, but also of every possible aspect, was important and necessary for such supreme achievement in such harsh environment and primitive society, which enhanced the development of our civilisation.

In modern world, there definitely are examples of interaction of art and engineering. One can well imagine that without the artistic touch to the engineering products, such as motor vehicles, furniture, electrical and electronic goods, and many others, their success would be in serious doubt.

Motorcar is the supreme outcome of the accumulated efforts of artist and designer, of mechanical engineer, of electrical and electronic engineer, of computer engineer, of environmental engineer, of industrial engineer and chemical engineer, mentioning only a few. Without the contribution of the artist and designer, its fate is sealed.

Although engineering is the art of consideration and compromise of different factors, somehow, we do not include this artistic aspect into our basic training. This lack of wider vision result in some of the "ugly" things that we produce. In those situation, we might only satisfy the basic need of engineering, without due consideration of the interaction with art.

Occasionally, our engineering products, such as aircraft and suspension bridge, are aesthetically appealing. The inherent shape of the suspension bridge with its suspension cables is not dissimilar to geometric sculpture. For aircraft, the basic requirement of aerodynamics dictates its streamline shape. Nevertheless, additional artistic touch is still preferable.

Personally, the interaction of art and engineering enabled me in completing the 19-metre high monumental sculpture, *Sky is the Limit*, in the Hong Kong Stadium. It consisted of 5 elements, varying from 6 to 19 metres high. With my engineering knowledge, I dared to design each element resting only on a footing of 400x500 mm, but still withstanding the high wind load of Hong Kong.

Interaction occurs in both directions. Engineering does give inspiration to artists, who use the engineering concept and idea for their artistic works. The sculptors of these sculptures also used the technique and materials, which are so familiar to engineers. Some sculptors used the scrapped components of engineering products as the medium of their artwork, rebelling against the wastage and materialism of the modern society.

Regrettably, as I am a practising engineer and a sculptor, I do not really want to know when the demarcation and the very fine classification of different areas or topics started. It did shock me that, occasionally, I had to choose a topic out of the classification of hundreds of subjects and sub-subjects of the American Physical Society. The demarcation of the modern man, in every aspect, is indeed great and thorough, though excessive. I am sure, in the dawn of civilisation, our ancestors in such primitive society did not require and would not have dreamt of such a classification and demarcation. I might try to understand the rationale and necessity for such fine demarcation.

In the present world, we are constantly under the pressure and urge to excel in our work, to rise to the top in our field, to climb to the peak of our power and to grasp the most of the wealth. It is, indeed, ironical that when we are in our childhood, we open ourselves to the world. With age, although we gain what we want to gain, our path is basically narrow. The tunnel vision may shut us up from art and from the rest of this very interesting world.

I do fully realise that, fortunately and unfortunately, we are in a world of explosion of knowledge. It will require great effort in maintaining oneself in this unforgiving tide. The time, the energy, the dedication and even self-sacrifice required in excelling oneself, is, indeed, great. In this environment, interaction with one's own family may already be in difficulty. Interaction with other human beings and other aspects of life may be problematical. Thus, interaction with art would definitely not be of the highest priority. The cost in excelling oneself may, eventually, be high and the effect may be, unexpectedly, long.

Probably, for most of our students, the Faculty is the last place for them to be educated. Because of the "narrow" approach of the secondary school education in Hong Kong, one would feel the urge to widen their horizon.

Although the Faculty has started to move in that direction, further serious thought may still be desirable.

On this important occasion of the 90th anniversary of the Faculty, let us ponder the impact of our engineering profession, and assess the effect of interaction – whatever it is – on the life of the individual, of the family, of the society, of the country and of the world. As the impact of our ancient ancestors is still with us today, we, the engineers, should not be solely responsible for our materialistic well being. Let us engage in deep thought that with, for example, interaction of art and engineering, we will go beyond what is required of us. With wider scope and vision, I am confident that we, the engineers, can create a better and more interesting world. I do sincerely hope that the impact of our new approach and renewed effort will last far beyond our present time.

Personally, I always like the prologue of his treatise, *On Painting*, in which Leonbattista Alberti wrote, in 1435:

Our fame ought to be much greater, then, if we discover unheard-of and never-before-seen arts and science without teachers or without any model whatever.

Nearly six centuries later, I have the uneasy feeling that, except a limited few, we still have not achieved it.

Discovery needs not necessarily depend on knowledge. It can be on oneself.

Finite Elements and Engineers – A Historical Perspective

Professor O. C. Zienkiewicz and Professor D. R. J. Owen
Department of Civil Engineering, University of Wales Swansea

Abstract

The finite element method is today probably the most powerful numerical tool used by engineers and scientists in solving problems governed by differential equations, whether they are those of structural engineering, geomechanics, fluid mechanics or other origins. Most of its success is owed to the work of engineers who, following the lead given by the applied scientists of the 19th century, have established its present form. This paper reviews the way in which the method developed to its present day status and evaluates the prospects for future developments.

The difference between the engineer and scientist was most aptly summarised by Von Karmann in the 1930s in the statement that "the scientist studies what is, the engineer creates what never has been". To solve problems of engineering it is therefore necessary not only to understand the underlying physics but be able to obtain quantitative solutions for systems not previously encountered. In the 19th century most of the differential equations governing various physical areas were already established, but only some trivial solutions could be obtained by conventional mathematics. However engineers soon simplified the complex systems by describing them as assemblies of simple elements and configurations. These discrete systems resulted in a large number of simultaneous equations whose solution was the most complex part of the analysis and here the work of Sir Richard Southwell, in which he presented the so-called "method of systematic relaxation of constraints", was crucial.

This methodology and the physical interpretation of the differential equations were echoed by the work of Hrenikoff and McHenry in 1943, who developed the so-called "bar-truss analogy" to represent an elastic continuum. The introduction of a more arbitrary and direct subdivision of a continuum into physical elements was presented in the classical paper of Turner, Clough, Martin and Topp in 1956 and this process was for the first time termed the "finite element method" by Ray Clough in 1960.

In the early 1960s it became apparent that a very general approach to the methodology could be obtained by using virtual work equations to establish the so-called nodal forces and a link immediately appeared between the work approaches and the direct approach known as the Galerkin method of approximation. In 1915 Galerkin considered the approximate solution of beams and plates through the concept of a residual which could be weighted by its own approximating function and then equated to zero to provide the basic discretised form.

It was immediately realised that under certain circumstances the direct formulation by energy or Galerkin methods permitted the use of elements with discontinuous fields along the edges. Despite such violation, satisfactory results were obtained and the importance of passing the patch test to determine the admissibility of such elements was established in the late 1960s.

With the method being accepted as a mature and universal engineering design tool in the 1970s and 80s, issues arose regarding its safe use by the profession. The subject of error estimation and the subsequent development of adaptive mesh refinement procedures in the 1990s have enabled the user to automatically control the accuracy of solution.

The enormous, and unprecedented, growth in computing power has resulted in the solution of ever larger problems and recently a problem with over a billion variables has been solved. As well as introducing challenges in data handling and visualisation of results, the availability of almost unlimited computing power will undoubtedly influence future approaches to finite element research. For example, a more fundamental description of material behaviour will be made possible by the introduction of multi-scale effects and the study of more complex physical phenomena will be facilitated through multi-physics modelling.

Engineering Education in the New Millennium

Professor Jin Wu
Distinguished Professor of Engineering
National Cheng Kung University

It is indeed a great pleasure for me to participate in this celebration of the 90th anniversary of the Faculty of Engineering. I have been here before, visiting this great institution. Yet, this is my first visit back since I returned to Taiwan about seven years ago. I would first like to extend to you the best wishes and warmest congratulations from friends in Taiwan. Dean Lee, Joseph, is an old friend and a former colleague of mine, and I am very happy to see him doing so well.

Engineering is a profession with great pride and much challenge. We engineers indeed have made critical contributions in improving the quality of life for the human society. In fact, much of it has been accomplished during the past century. Earlier last year, the National Academy of Engineering of the United States selected, from 100 nominations submitted by 27 professional engineering societies, the Greatest Engineering Achievements of the 20th Century. They include: Electrification, Automobile, Airplane, Water supply and distribution, Electronics, Radio and television, Agriculture mechanisation, Computers, Telephone, Air conditioning and refrigeration, Highways, Spacecraft, Internet, Imaging, Household appliances, Health technologies, Petroleum and petrochemical technologies, Laser and fiber optics, Nuclear technologies, and High performance materials. Indeed, the entire engineering community ought to be congratulated for all these inventions of human civilisation. I am confident we will not disappoint the society as we continue to build this Earth into an even better home for all.

Our task will not be easy as the world around us has changed at an ever-increasing pace. Such a rapid pace had been recognised even before September 11th of 2001, before the terrorist attack. At that time, we appeared to be quite concentrated, and on course, to build the Earth Village. I am an ocean engineer and physical oceanographer. As earth scientists, we were among the first to promote the concept of protecting the environments and preserving the clean atmosphere and clean ocean for the Earth Village. "Please do not contaminate our home, the earth; we have nowhere else to move to," so we pleaded, long before most others have begun to give any attention. Subsequently, those in the politics have adopted this very concept of building a better home for all under the name of Human Rights. Now, we are in the midst of building an economical Earth Village, with the code name of WTO (World Trade Organization). It is certain that no country can live alone within its own borders or territories any longer. As President Lu has pointed out, time and space of human activities have gone through recent revolutionary changes. We all have to think and place ourselves in very different spatial and temporal frames. Then came September 11th, chaos and disorder of gigantic proportions took place. It has further complicated our life, and even more so for the engineering profession. We need not only to extend and widen our frames of thinking, we also have to be prepared for unprecedented events. And we have a great task in front of us: Preparing our students to take up Challenges of Tomorrow.

In this regard, I would like to share with you some of my thoughts. I realise, of course, Hong Kong has been a dynamic place, and has always led the tide of changes. For example, this occasion has gathered experts in Engineering Education, and a faculty body who has done so well in shaping Hong Kong, the crown jewel, into what it is today. Nonetheless, Joseph asked me to be brave enough to offer a few things for our discussion to follow, especially regarding my experience in Taiwan over the past few years.

First of all, in my view, this generation of engineering students must not be confined within just their own technical domains. They need to have a greater concern for the economy, society, and environment. Obviously, economy is very much in everyone's mind these days. From our daily life at one end of the spectrum and the global politics at the other, the economy has played a dominant role. To the word "economy", today we often add the word "market", making it "market economy." We have talked about and advanced the "market economy" so much, especially during the past decade. Yet, let us look back and ask: Have we neglected some of our responsibilities with the society and our living environment? As far as the society is concerned, should we ask whether the level of disparity between the rich and the poor has been greater than before? This may be one of the deep-rooted problems associated with the disaster of September 11th. Let me talk about other concerns we also need to address. About a year ago, John Chambers of Cisco came to Taiwan to promote e-commerce. I had an opportunity to chat with him at a public forum. I asked him the following. "John, you suggest that much of the shopping in the future will be done at home, where we can also select any movies to watch. I guess the shopping mall will be left mostly for restaurants, as we still have to go there to eat. The competition among those restaurants would probably attract us to not only dine out more often, but may even increase the chance of dining separately for family members. Have you, as the e-commerce leader, studied its social impact?" Don't forget, I said at the very beginning that the mission of engineers is to improve the quality of life for the human society. Isn't family the founding block of our society? Have we protected it well?

Let me tell you another story. Last year, I spent some time in the Bay Area around San Francisco, California. There, I heard, local residents were no longer eating fish over one foot, 30 centimeters, long. You know why? The Silicon Valley is nearby. I think we perhaps agree, regarding regulations and practices on the environmental protection, United States may have done better than any other countries, at least within its territory. Even so, residues of heavy metals still exist in streams there, and are consumed first by little fishes and deposited inside their bodies. The law of nature is that the bigger fish takes up the smaller fish. So the entrapped heavy metals get accumulated inside the bigger fish. These are serious problems, and of course hard to deal with. Engineers may not be able to solve them all. But our students must be aware of them and develop a real concern for the society and environment as we declare a mission in sustainable development.

The second point I wish to address is the "problem-solving ability and the general education". Over the past few decades, those of us in higher education around the globe could rarely avoid a universal criticism from the outside community. That is, what we teach in colleges and universities may not be immediately applicable to the jobs our students find upon graduation. As we look further, we find that the problem is not only with the curriculum, but also the way our students are taught. We also identify that our students may do well with their home work at school, but they could be quite incompetent in solving real problems at the work place. In other words, the outside community expects college graduates to do more, to assume more responsibilities, and to take more initiatives in problem solving. Many universities, especially well-established institutions in the United States, have responded. They have declared they wish to provide the country not just professionals, but also leaders. They have also realised that college and university curriculum is filled too much, and in some cases exclusively, with technical courses, at the expense of thought-provoking general courses. Courses in General Education have, therefore, been developed at many of the top universities in the West. These courses are designed to widen the scope of learning, to be helpful to our students in constructing not only microscopic but also macroscopic views of a phenomenon. Concurrent with taking courses of their specialties, students are encouraged to think deeper about and to develop a fuller appreciation and a better understanding of problems at hand, so as to carry out their work more successfully after they leave schools.

Actually, as far as the courses are concerned, what many college graduates in the United States, after they have left school, remember most are those courses of General Education. Each university has made a great effort in developing the unique and diverse contents of those courses, which are very different from many technical courses generally taught with common textbooks across universities. In our region, Hong Kong, Taiwan and Mainland China, we still need to do more, far much more, in developing and promoting courses of General Education. In Taiwan, I have organised lecture series to promote the General Education on the network. We need, with such efforts, to have onboard not only students but also many of our professors. Recently, whenever I talk about the general education, I like to cite a conversation between Zhang Zi Yi (章子怡) and her master in the Oscar-winning movie *Hidden Dragon and Crouching Tiger*. She said to her master: "I know that my swordsmanship is superior to yours because you have practised only swordsmanship, but I have practised it along with chirography." How wonderfully it has explained the importance of General Education. Professor Ko has just spoken the highlight of General Education. I think Professor Ko really has pointed out how to combine what is beautiful with what is useful. After all, along the primary function of competition, racing cars can also be nicely designed to "lure" us into buying it.

Let me now begin to talk with you on the subject of life-long learning, which has been promoted in the East as well as in the West. It used to be on the luxury side with courses in arts, music and literature; they have been designed mainly for our enjoyment. But it has taken a different tone lately, especially in the engineering field, to re-train the working force and make it more competitive.

The technology has advanced at such a rapid pace. What we teach at school now is likely to be out-of-date when our students start to work. Our students therefore must establish the proper attitude on life-long learning to advance with new knowledge. We, the faculty, need not to be discouraged by our continuing responsibilities to provide our students with the most up-to-date knowledge. On the contrary, we should be quite excited about the rapid advancement. A year or so ago, I invited Morris Chang (張忠謀), Chairman of the Board and Chief Executive Officer of Taiwan Semiconductor Manufacturing Company (TSMC) to come to our university. He was greeted with a room of standing audience, mostly our professors and students. At the beginning of his speech, he said, clearly and directly: "What you taught in the Department of Electrical Engineering was not very useful at TSMC." It was such a "blow" to me as the host. As I escorted him to the door, I said, "Morris, if what you do at TSMC has all been taught at our universities, can your company still make a profit?" In any event, to meet this challenge from industries, we need to prepare our students well with fundamental knowledge, and to strengthen their ability to grasp and digest new ideas. We, all together, should equip our students with the basic understanding of fundamental principles, and with the capability of adopting and creating new ideas.

I now come to my third topic: "Creativity and Team Work." Compared with students in Western countries, our students in the East appear to be most deficient in these two areas. These are not only the weakest areas of our education system, but also causing major setbacks to our children and youth during the most important stage of their growth. My understanding is that the most critical stage of intellectual and spiritual development of our children and youth is during the Junior High School days, between the ages of 12 and 15. When I served at the Ministry of Education in Taiwan and took up the Education Reform, this was the foremost reason that had driven me working day and night and traveling throughout the island to promote the Reform. I sensed then the tremendous urgency in saving and serving our children. In fact, the darkest period of the education system in Taiwan is right at the junior high, during which we drill our children the hardest for the entrance examination.

Obviously, the recent trend of fast globalisation makes competitiveness stand out. The impact of the World Trade Organization is really here. Products of a small local firm will be pushed aside by those of global industries. Fierce competition among global industries will propel companies into producing the newest products at the lowest cost and distributing them in the fastest ways to consumers. Along this path, you must first use all your ingenuity to create products. We are pushed to proceed quickly due to competition; we are also forced to work with others in a team effort because of the complexity of today's products. Here, although I am talking about products, please do remember that service is also as a product. In any events, creativity and teamwork are coupled requirements for the success of our students in the new century.

Having said that, let us go back to take a look at our education system in Taiwan. As I just mentioned, I believe the same system is shared by Hong Kong, Mainland China, Japan, Korea and Singapore after I have had talks with most of their Ministers of Education. Schooling to our students appears to be always in the preparation of the next entrance examination. Furthermore, for the sake of the so-called fairness, we have always designated the scope of materials to be tested in advance. Our students then are drilled within this very confined sphere of knowledge. Their eagerness to learn new knowledge diminishes, while endless repetitive drills severely suppress the development of creative and analytical abilities. Yes, let me repeat, all of these actually occur at a very stage of life, during which those abilities should be harvested. When I was young, we attempted to memorise a few facts from the textbooks. Today, as pointed out by Professor Low, we have the entire library at our fingertips; also, as pointed out by Professor Wah, we can have live pictures from overseas in two seconds. We need, obviously, to train our students how to select and digest the massive data, and to become the master of data.

Let me share with you another story. When I was at Taiwan's Ministry of Education, Professor Chuck Levin of Stanford University came to see me. He said, "I have now established over 1,000 junior high schools in the United States, emphasising the teaching of analytical ability. When you come to the States, just call me. I'll show you one nearby." He then added: "During the process of establishing those schools, I have often been questioned whether this was the best thing to do. They cited that children in Asia have been taught in a manner exactly you attempted to avoid. But those large and small dragons in the East are doing well and exporting so much to the United States. They asked whether I was sure this could really help children in the United State." Professor Levin is at the Business School of Stanford. He and his colleagues then conducted a study of our region, including Hong Kong, Taiwan, Singapore, Korea and Japan. The study was completed before the Asia economic crisis. They concluded that the economic gain in our region was due largely to the fact that education was quite popular, people worked hard, and investments were plenty. Yet, they said, the region might have problem climbing up to the next level. How alarming the message was!

Let me talk about another aspect. In order to drive our students to move along this grinding process of preparing for the next entrance examination, teachers often compare student A with student B to stimulate them. This is the worst way for children to grow up together, and the worst way to cultivate the team spirit. We all know the very familiar Chinese proverb on the consequence when you compare one person to the other. 人比人，氣死人. (You compare, you despair.) For sure, this is not the environment in which we like our children to be.

You may say by the time all those children in our region come to us at the university, they really have missed the golden period for creativity and team spirit to be developed. In certain way, you can say they have been damaged. We are then taking up the role of repairmen.

In summary, let me highlight the followings:
Engineers have served well in the past to improve significantly the quality of life for the human society. We, of course, will carry the torch forward into the 21st century with many new challenges. The training of our students needs to be accordingly re-directed.

Advances of technology have made our life more convenient, but much more complex as well. Engineering students must be trained to have a greater concern for the economy and society, as well as, very importantly, for the environment.

Today's education reform, emphasising problem-solving ability, promotes the general education. With the evolution of knowledge at an ever-increasing pace, engineering students not only need to be equipped with keen skills to grasp new ideas, but also need to be prepared for life-long learning.

Engineering projects today often find themselves in keen competition with one another across the globe. For their competitiveness, we need to further foster students' creativity; for their scope, we need to develop students' ability to perform well in teamwork.

So far I have concentrated on the education of engineering students. Although this is what Dean Lee asked me to address, I still wish to touch upon the function of Engineering Faculty in this new era, especially for our region. We all perhaps agree that a university has three main functions: teaching, research, and service. It is quite obvious in Taiwan that our universities have done well in teaching, but may need improvements in the other two categories. I think such an observation is also quite true here in Hong Kong as well as in Mainland China. The so-called economic miracle in Taiwan has started from and is deep-rooted in factories. University's function was mainly to provide industries with graduates. In the process, exports of our industrial products have boomed. But our universities have not provided the much-needed leadership in the building of our society on the humanistic and cultural side. Our engineering colleges have not led the way in the upgrading of industries. No wonder then that the whole machine in Taiwan appears now to run out of steam. Yes, we need to do something about it. The university in Taiwan, as well as in other parts of our region, must shoulder the responsibility to do some 'catch-up' in the re-building of our society.

This group, the Engineering Faculty in the leading University in Hong Kong, ought to be first congratulated for accomplishing the mission of the current stage. But there is no looking back. The torch has already been handed to us by the factory; you may need to carry out more active basic research for long-range development as well as applied research to team up industries. In any event, in the era of so-called knowledge-based economy, the engineering faculty, not the factory, must lead the way for regional development. The engineering faculty in our region is really facing the challenges of not only to continue to do well in fostering a new breed of students, but also to step in in pushing industries to the leading edge. It is exciting. Good luck to your endeavor and to all Engineering educators in our region.

Luncheon Address

Ir. Edmund K.H. Leung
Chairman, Hyder Consulting Limited

Good afternoon, Ladies and Gentlemen,
Please permit me to disturb your lunch for a moment.

The other day I bumped into one of our Professors, and while talking about life, he remarked: "Perhaps I am **TOO** HONEST". Not going to be outwitted, I responded by saying: "Perhaps I am HONEST **TOO**!".

So why do I waste this precious time of yours to tell you this small anecdote?

To me, there are at least three reasons:

- My speeches are boring, and this is Saturday lunchtime. I am trying to attract the attention of my audience.
- Professor Vincent Leung, who has never stopped teaching me since the 1960s, advised me that any speech worth listening to must have a sprinkling of jokes. I always listen to him.

Last but not least, as an engineer I believe we must be HONEST with ourselves, and messages we deliver must be both CONCISE and PRECISE.

But surely you important people today did not come here to listen to my anecdotes. I was invited here to give my views on engineering education.

Now you will wonder if I am qualified to speak on this subject. Definitely not! But being a practising engineer for my whole career (almost but not quite, for some 35 years), covering utilities, manufacturing and construction sectors, and until recently, actively involved in academic accreditation, perhaps my biased view could have a small place in this prestigious gathering.

And before I start on the serious bit, let me pose a question.

Does our University educate engineers or managers, technologists or leaders?

I guess the answer is obvious. We would like this prestigious University to educate students to be future managers and leaders, as otherwise students can always choose the other universities.

So, what tells a leader from the rest of the crowd?

This is slightly more difficult to define.

Let us examine a typical curriculum. It consists of a significant part of technical subjects, a certain proportion of mathematics, and a little bit of project work.

What does it provide?

An excellent background for a good technologist, but as to leadership and managerial expertise, I am afraid very little in the form of emphasis. We became managers by training at work, and once in a while, a leader emerges.

Is this really what we wanted, and can we do better?

I would suggest that we certainly can.

If I were to start my university education today again, I would like to concentrate on at least three areas:

- Technical subjects and mathematics
- Social and economic studies
- Language and communication skills

I would have thought that achieving technical competence would normally not be a problem in a leading university like ours. If I have any concerns, they are about the other subjects, which I call "soft issues".

If we believe that an engineer's duty is to harness the forces of nature and convert them to serve the progress of mankind, we'd better know what drives the progress of mankind, and this you cannot learn from technical books.

If we believe that an engineer is one who could do, for a dollar, what anybody could do for ten, then we'd better learn economics.

If we engineers are honest with ourselves, we should own up whether we really understand what the community needs and wants. As an example, we should not focus on our abilities to design a concrete structure with the smallest number of the thinnest members to save weight. Let us pause and consider: May be our client, who, for the sake of argument, intends to build a soccer pitch and not a warehouse, and therefore needs only a flat piece of land with good drainage, rather than a structure. So we could be wasting our effort, even with the state-of-the-art structural design.

This brings me to focus my idea of soft issues on university education related to language and communication. How do we come to know what mankind wants, and closer to home, do we know what our clients, who pay us, want?

Listening is important, and watching body language without needing to hear the words is even more important. I could carry on talking on a subject I personally find interesting, but if you as an audience fall asleep in front of me, or getting up to stretch yourselves, then I am already too slow to pick up the cue. I should have concluded my speech far earlier when I started to lose eye contact with you. Preferably, these things we should learn in university, not after we have made mistakes in society.

In this context, I like to share some personal observations with you.

I find that students who have spent time overseas, be it UK, USA, Canada or Australia, tend to display much better and clearer body language than stodgy local graduates like me. Somehow, Westerners learn their body language early in life. They are also much more confident and you will find them normally better in making speeches and presentation.

Students who get the opportunity to be placed overseas are able to learn it from them, subconsciously or otherwise. I am pleased to learn that our University promotes a student exchange scheme which enables some students to do this.

But we live in a real world. To make these theories work, not only do we have to focus on the action and commit to them, we need other stakeholders to come along with us.

I therefore plead to all of you to consider, and if you think fit, make these changes:

- To the university faculty: A more innovative approach to the curriculum
- To the accreditation bodies: A more flexible approach to the course contents, and instead of focusing on the process, let us focus on the results.
- To the students: Apart from studying to pass the examinations, please focus to become a leader rather than a technologist.

I know it is easy to be idealistic; to implement it effectively takes a lot more effort and commitment.

I hope to leave these views as food for thought for those of you who are interested in engineering education, and I thank you for letting me preach my thoughts to you in the last 20 minutes.

Ladies and Gentlemen:

Please continue to enjoy the lunch and the afternoon part of the seminar.

Creativity in Engineering and a Possible Approach to Teach It

Professor Ronald M. C. So
Head
Department of Mechanical Engineering
The Hong Kong Polytechnic University

Abstract

The Hong Kong economy is changing quickly from industrial-based to knowledge-based. Coming along with this change is the requirement for a new breed of engineers and managers that are creative in their approach to deal with technical challenges and are knowledgeable about technological advances and their impact on human and societal developments. As far back as the mid-1980s, Western countries, in particular the U.S., already started to prepare students for the onset of the knowledge-based economy. Their approach is to revise traditional curricula, to develop new ones that are more broad-based, and to encourage creativity and innovation in the solution of problems that are most likely to be open-ended. This talk makes an effort to explain what creativity is and the important role it plays in the development of technology. An example in human flight is used to illustrate the importance of creativity in scientific and technological developments. The engineering curriculum in Hong Kong is quite traditional and fails to provide our students the opportunity to acquire a broad-based education and develop an innovative approach to solve problems. A possible way to change this is to revise our present engineering curriculum. How this can be accomplished is discussed. The proposed new curriculum puts emphasis on the teaching of "why" rather than "how" and on general education rather than specialisation. It is hoped that through this emphasis, our students will be better prepared for the new era of knowledge-based economy.

Forty Years of Engineering Experience and Beyond

Ir. H.S. Kwong
Former Secretary of Works

The 90th anniversary of the Engineering Faculty is a milestone achievement that gives all of us a chance to reflect on the advancements in engineering that have taken place in Hong Kong.

From a personal perspective, I am fortunate to have been involved in the steady growth of Hong Kong's engineering capabilities for around forty years. Starting with my time as an undergraduate in the Engineering Faculty and continuing to the present day, it has been immensely satisfying to have experienced first-hand the considerable achievements of Hong Kong's engineering fraternity. As an alumnus, I am proud to say that these achievements have involved tremendous contributions from our Faculty and our fellow graduates of The University of Hong Kong. It would not be inappropriate to say that the Engineering Faculty has had a major hand in creating the modern, sophisticated metropolis in which we now live.

In keeping with the reflective mood that anniversaries often bring, I'd like to share with you some of my own engineering experiences as, perhaps, a sample history of the kind of work that many of us have been involved in over the years.

Alumni of my generation will still remember that in the early 60's, the number of engineering graduates each year was very limited and hardly compares with the present day, especially considering that there were no other universities producing engineering graduates. However, the job opportunities were also very restricted. Looking back, Professor Mackay was much more commercially minded than most of us. He always tried to persuade us not to join the civil service, saying that once you joined government, you could more or less forecast what you would do in your career and what kind of projects you would be involved in. There might have been an element of truth in his words, but what he could not foresee back then was the colossal amount of public works that followed. I never regret joining the civil service although at the time, there was little choice. In those years, there were not too many private firms which could give proper training, whereas government training for graduates was well provided. Even now, this is still a decisive factor for many young engineers.

My first year was spent with the now defunct Development Division, which was one of the big money spenders at that time. Most people are familiar with Hong Kong's proficiency at reclaiming land from the sea, but few will recall that in the early days a lot of development land was formed by cutting into the hill sides and by filling up valleys. All these land formation works not only produced sufficient space to meet the demand of the rapidly growing population, they also generated considerable revenues. This enabled the government to proceed with initial infrastructure programmes, whilst at the same time laying down the foundation for later industrial development, for example at Kwun Tong.

Many people know that our new town programme began in the 1970's. For me, though, the idea was mooted long before that. One of my first jobs was to prepare an estimate for developing Shatin. Typically of those days, I had no guidance and little indication of what the future Shatin would be. Consequently, I worked more or less straight from a blank sheet of paper. Whilst, on the face of it, this may seem to be a fairly easy task, the difficulty lay in the fact that there was no other experience from which to borrow. At that time, the concept of building a satellite town was something entirely new, so my colleagues and I had to rely solely on our common sense and our training. I cannot recollect what sort of figure that I eventually came up with, but certainly it was nowhere near the amount of money that has been spent so far on Shatin, which now has a population of over 600,000 people.

My next post was with the then Highways (NT) Division, and my main assignment was the Lion Rock Tunnel Road project. The estimated project cost was about HK$6 million, the largest contract that the Highways Office had ever had up to that time. Nonetheless, even converting into money of today, this amount is quite minimal compared with our current standards. What is important to note, however, is that it was the first major highway leading to the New Territories. This, together with the Lion Rock Tunnel, was the first step in opening up the New Territories. Lion Rock Tunnel was also the first vehicle tunnel ever built in Hong Kong. Interestingly, though, its primary function was not initially planned around traffic demand. We needed the tunnel to accommodate the two water mains conveying fresh water from Shenzhen. Nobody at the time could foresee the need for a major traffic corridor, although very soon we had to plan for duplicating the two-lane tunnel, a classic example of our city's economic growth outpacing even the most forward thinking of our planners.

One of the areas in which pioneering work was done in the 1960s and earlier in Hong Kong was in traffic engineering. Except for in the US and perhaps Germany, traffic engineering was at that time very much a science in its infancy. Taking the

UK for example, their motorway network was only just taking shape, and traffic engineering was not accepted by the Institution of Civil Engineers as a specialist field. Again, there was little guidance and reference available. The most valuable reference in our office at the time was a book called *Road Layout in Rural Areas* published by the Ministry of Transport in the UK, costing a princely 12s6p. As an indication of the fledging state of our traffic engineering capabilities, the first linked traffic signal system for Nathan Road involving twenty-two junctions was considered a specialist job which required advice from overseas. However, the government did have a very good foresight of allocating sufficient resources to tackle our transportation problems. Hong Kong was the first Asian city to introduce area traffic control systems, which now cover hundreds of road junctions. We were also the first city to implement the bus priority lane, nowadays a common and readily accepted feature of our roads. Few people will remember that when the idea was first introduced to the mid-levels area, it was such a controversial issue that during the first two days alone of the consultation period, we received almost four hundred complaints. We had the "Long-Term Road Study" published in the early 70's, which provided the basis of formulating most of the existing highway network in the territory. Therefore, in respect of the traffic engineering field, we were working way ahead of other countries in the region. Most people can appreciate the work involved in the physical completion of our major construction projects but probably far fewer realise the amount of efforts put in by our traffic engineers and transportation planners to keep the city moving. Despite the fact that we have an extremely high traffic density by world standards and our population has grown by millions in the past thirty years, I believe our traffic conditions are still one of the best among the world's major cities.

Hong Kong is a small city, only about 1,100 square kilometres and about 60% of it is hilly land. In order to make way for the implementation of infrastructure projects and housing, many man-made slopes were formed. As such, we have been dealing with slope problems since the beginning of Hong Kong's development. I can still remember that when I was in charge of Kowloon Highways, a single heavy rainstorm often caused more than eighty landslips in Kowloon. During all these years we have moved forward in leaps and bounds in respect of slope protection and maintenance. Our work is fully recognised and respected by other countries and many have asked for our advice. I believe that we have a very strong force of geotechnical engineers and in many aspects our experience is unique. Furthermore, due to our topographic conditions, we have also accumulated a lot of experience in dealing with unusual ground conditions and underground water problems. After all, there are not too many cities with forty-storey buildings erected on slopes. This is surely a piece of engineering science that we can develop further to our benefit and advantage. For this reason and with the generosity of the Hong Kong Jockey Club, we have established the Research and Information Centre for Landslip and Land Development under the Civil Engineering Department of this University. This Centre deserves the active support of all our alumni, as I firmly believe that, one day, it will become a very important part of the University.

The major projects of the Airport Core Project Programme, which bring me more or less up to date with my work within the government, have most definitely been in the lime light of the Public Works Programme in recent years. It is true that projects like the Tsing Ma bridge and the Airport itself have been acclaimed as world-class achievements, but what is more important is the overall coherent effort put in by the whole construction industry to enable the completion of the programme on time and within budget. I believe that we have all gained a lot from this programme, both in terms of the confidence of handling mega projects and the tremendous management skills that have been accumulated. These skills can be applied to our current and future projects. The Ting Kau Bridge is perhaps the first example of this application process, where the Highways Department staff played a major role in implementing the scheme, based on experience acquired from the Kap Shui Mun Project.

Another item I wish to mention is related to tall buildings. There may be other factors contributing to our resorting to vertical spatial development, but the key reason is the lack of sufficient space. Forty years ago, buildings more than ten storeys high were something unheard of, now buildings of thirty storeys or more are commonplace. Throughout all these years, Hong Kong has gained a huge amount of experience in the design and construction of tall buildings. Apart from the foundation and structural design, there are many other aspects where our experience may be useful, for example, typhoon effects, impact on transportation and air circulation, fire fighting and so on. I also know that our building services works are rated first class and our more recent environmental designs for buildings are well appreciated by others. I am sure that given proper support, Hong Kong can develop into a major centre for tall building expertise.

Looking ahead, we are all aware that we still have a very large railway development programme. We are also going to build more bridges of world-class stature. There will be a lot of development work near the border. Because of the ever-growing population, we still need to build more housing and all its associated infrasturcture. If we can sustain such a huge construction programme for the next ten to fifteen years, it will be great. However, no matter how hard we try, Hong Kong is still a small place. Now is the time that we have to plan for new opportunities so that we may continue to practise our profession. Many senior government officials, including the Chief Executive Mr. Tung Chee Hwa, have recently suggested that we should extend our professional services into the Mainland. I agree that this is something we must do sooner or later, and present economic situation may well prompt us to make it sooner.

To this end, I believe that our academics have done their homework and established good relationships and contacts with their counter parts in the Mainland. Hong Kong's Government's Works Bureau, over the past few years, has had frequent contact through different channels with the relevant Ministries of the Central Government in order to inculcate and promote better working relationships and understanding of our different systems. The Hong Kong Institution of Engineers is having dialogues with the Mainland

authorities to discuss the possibility of mutual recognition. All these efforts will help one way or another to enable us to participate in the Mainland market, where our future job opportunities lie.

I have, above, briefly run through some of the projects in Hong Kong with which I have been fortunate to have had some measure of personal involvement in the past forty years. In fact, though, I have really been attempting to highlight through my own experience some aspects of our professional expertise in general, which I believe can form the basis of expanding our engineering services beyond Hong Kong. In particular our strengths in the following areas should give us great opportunity to make this happen.

Geotechnical Engineering I consider that our overall experience will be useful in helping develop the great west of China. Many cities in the northwest and southwest will have problems similar to those we faced forty years ago. Recent major landslip incidents in Sichuan province have caused grave concern. The Mainland authorities have indicated their intention of seeking cooperation with Hong Kong on these issues. I am at the moment intending, through our Research and Information Centre for Landslip and Land Development, to organise activities so as to promote the application of our expertise in the Mainland.

Transport Engineering I have always believed that this is one of the strongest areas where we can provide services outside Hong Kong. This is not because technically or scientifically there is no other authority equally capable, but mainly because our habit, social life, culture, land usage, population density, and so on are more comparable and suitable for application to Asian cities. Almost every sizeable city in the Mainland has transportation problems of one sort or another, either in respect of vehicle or people movements, or public transport. Furthermore, the amount of professional personnel in the Mainland to handle these problems is limited. On top of this, with expanding trade, logistic issues, the movement of people and goods, will become a further strain on the Mainland's infrastructure, which will also demand transportation expertise. I firmly believe that this is a relatively untouched field in the Mainland and provides a golden opportunity for our transportation engineers to take a lead in the market. Unfortunately, even in Hong Kong not too many people have taken note of this. I sincerely hope that we can do more, within universities as well, to promote this, and I hope that one day we can establish Hong Kong as the Asian centre for transportation expertise.

Building Works I have mentioned tall buildings as one of our areas of strength. I maintain my view that Hong Kong should be able to become a centre for tall building studies. Together with our experience on building services work and environmental design, we can develop the necessary expertise to provide services to the fast expanding Mainland cities.

Construction Management The Airport core Projects have provided a tremendous amount of experience for the local industry in how to manage mega projects. What is also important is that Hong Kong has always worked on an international basis. With China gaining accession to the World Trade Organization, I believe Hong Kong engineers can help our Mainland counterparts to reach the international platform more smoothly. This is indeed a new opportunity for us, as we have both ample international experience and familiarity with the Mainland's infrastructure problems.

The development of Hong Kong over the past forty years or so has produced a large pool of high quality professionals and technical expertise, but our future hinges more on the Mainland market. It is my hope that the kind of success that the Faculty has had in providing capable engineers for Hong Kong's development over the past forty years can be extended over the next forty years to provide Hong Kong engineers for the development of Mainland China.

Complexity and Commonality of Fracture Behaviours of Engineering Materials

Professor Yiu-Wing Mai
Chair Professor in Materials Engineering
City University of Hong Kong

Abstract

This speaker's research interests in fracture mechanics and advanced materials were nurtured some 30 years ago as a PhD student at The University of Hong Kong by a great mind, the late Professor Charles Gurney *OBE*, and they were further molded and shaped at Imperial College by another distinguished researcher, Professor Gordon Williams FRS, FREng. He has also had the good fortune of working with the resourceful Professors Tony Atkins and Brian Cotterell, and the innovative thinker, Dr Brian Lawn. This lecture is based on his past research experiences with these ingenious scientists and engineers, at different times over many years, on a range of materials.

The reliability and integrity of engineering structures, whatever their scales, depend very much on a complete basic understanding of the performance characteristics, especially fracture and strength properties, of the materials from which these structures are made. For a wide range of engineering materials from ceramics, concretes, timbers, polymers and their blends, to fibre composites of various forms, their failure behaviours are complex and often chaotic. However, there are common features that exist in all these materials. For example, micro cracking, crack-deflection and crack bridging, to name but a few, that would provide the micro failure mechanisms of cracks. Analytical and numerical models can be formulated and developed to describe these events and to aid in the microstructural design of newer and improved materials. An analogy of how high-strength, high-toughness fibre composites can be made by mimicking both natural and biological materials is presented. Examples are given for tailored composites with better fracture control, higher toughness and superior fatigue resistance for tailored applications.

From a Grain of Sand to the Service of Man: An Engineer's Journey

Professor E.S. Yang
Chair Professor of Microelectronics Engineering
The University of Hong Kong

Abstract

In the past 50 years, a technology revolution has transformed the world – in the office, at home and on the beach – and the metamorphosis is most significant in the engineering profession. While engineers used to work near the engine, they are now in banks, governments, schools, hospitals, and movie studios among other places. The changes come because of the pervasive and ubiquitous presence of the computer and telecommunication networks built on the semiconductor technology. The first part of this lecture will trace both my personal experience and view on the sideline of the dynamic and exciting technology theatre in the Eastern Corridor of the U.S.A., where most of the microelectronics research was performed. The second part will focus on work done in Hong Kong with emphasis on applications of microelectronics, especially in Magnetic Resonance Imaging (MRI). Current status and future trends of these two diverse fields will be discussed.

Closing Speech

Professor W.I.R. Davies
Vice-Chancellor

Good afternoon, Ladies and Gentlemen,

The Symposium is a very fitting way of celebrating the birthday of the Faculty of Engineering, I think you have done this very appropriately. You have obviously brought together the people that are close to you; you have brought together old friends and colleagues. I think, listening to you all last night, you have had the chance to reminisce and you have filled in some of the gaps in terms of your personal knowledge of each other; and of course in this Symposium, you have also had a chance to have an overview of engineering disciplines and you have had a chance to gaze a little into the future.

But all good things have come to an end. I wish to thank very much the distinguished guests from overseas who have added kudos to the Symposium. I'd like to thank members of the Faculty of Engineering – the academic and the support staff – for all their hard work, and to congratulate the Faculty on this truly memorable celebration which fits as well into the University's 90th birthday. I thank you for the contributions the Faculty has made in the past and I am certain will continue to make in the future.

Thank you ladies and gentlemen.

APPENDIX B
- SPEECHES AT REUNION DINNER (NOVEMBER 30,2001)

Welcome Address

Professor J.H.W. Lee
Dean of Engineering

Ir Dr. Cheng, Vice-Chancellor, Honoured Guests, Fellow Alumni, Ladies and Gentlemen,

A very warm welcome to you all to the Reunion Dinner of the Faculty of Engineering's 90th birthday. A 90th anniversary is indeed a time for celebration and get-together and I am extremely happy to see so many of you here and also at this morning's Symposium. Engineers do not throw parties too often. The last time the Faculty had a party of this nature was 15 years ago, when we celebrated our 75th anniversary. Since May this year, we have been organising a number of activities: distinguished lectures and seminars, speaking programme for secondary schools, and technical entrepreneurship series. This morning we saw a two-day symposium on *Engineering and You* off to a good start; tomorrow we will continue to have exciting lectures as well as a discussion forum on engineering education.

For tonight we have specially produced an anniversary booklet; this is a pre-print of a fuller volume which will be sent to you after the symposium. The booklet hopefully brings forth fond memories; it also captures in a quiet way what the Faculty stands for, some highlights of our past achievements in education and research, and our developments over the past nine decades. Anniversary is a time for reflection, and on reflection I am pleased and proud with the achievements the Faculty has made in the past nine decades. The quotation we selected for the Anniversary Volumes is : "Only a University gives a community certainty that achievements can defy mortality." Indeed, we have made significant contributions to our society, its industry, infrastructure and economy, and have served our community well.

In this booklet no doubt you will recognise many of the images familiar to you in your younger days: the Northcote Science Building, the Peel Laboratory, and the much narrower Pokfulam Road. I, for one, still recognise my office on the ground floor of the Duncan Sloss Building when I joined the University as a young lecturer 21 years ago. Those were good times; when the entire society was so upbeat, the new towns were being realised one after another, when Hong Kong still had a manufacturing industry base, and we were all so proud of Hong Kong. For the academics as well as students, those were also the days when we had much more time for reading and scholarly pursuits, and much less administration and other duties. Tonight lets drink and talk about the old times.

Alumni may find in the volume many interesting (illuminating/ amusing) facts about the history and developments of the Faculty, its transformation, its growth in student numbers, its

research activities. The Faculty started with a single teacher, Professor Middleton Smith, who at some point of his career almost regretted having taken up the appointment at the University. In the old days, research MSc. or PhD students did not have to pay composition fee, all they paid was laboratory fee of $400. Also of interest is that there has been no less than 13 HKIE Presidents who are alumni or teachers of this Faculty since 1958.

You may notice from the Anniversary Volume and the theme of our Symposium *Engineering and You* that work of this Faculty is intimately related to our daily life. It is intertwined with almost every facet of our life. Our recent research activities in this volume are specifically divided into groups relating to water, health, environment, land, IT and e-commerce, and telecommunication and electronics, to reflect how much engineering is part of us.

The Faculty has many notable research areas that are internationally recognised. The work of our structural engineers in computational mechanics, particularly in finite element and finite strip method, have enjoyed an excellent reputation. Our work on electrical cars has gained prominent visibility internationally; Professor C.C. Chan has been selected as one of the seven best tech-pioneers in Asia by Asia Week recently. The election of Professor Y.K. Cheung and Professor Y.C. Cheng to the Chinese Academy of Sciences in 1999, and Professor C.C. Chan to the Chinese Academy of Engineering in 1998 attest to their outstanding achievements. Members of the Faculty have also won the much coveted Telford Premium from the UK Institution of Civil Engineering four times (Professor Peter Lumb, Dr. Robert Lam, Dr. Louis Lam, Professor Y.K. Cheung, Dr. Albert Kwan); this is probably a record for any Asian engineering faculty. The Faculty has one AoE in Information Technology with other institutions and two shortlisted AoEs in Water Environment Engineering and in Wireless Communication. Colleagues in this Faculty also conduct a growing number of interdisciplinary research projects with the Faculty of Science, Medicine, Architecture, and Social Sciences - in MRI, bio-corrosion, algal blooms and red tides, visualisation technology, bioinformatics, and medical engineering, to name but a few.

The Faculty of Engineering, like the University, thrives on three interlocking essential elements - staff, students, and alumni. We value immensely the partnership with alumni in fostering the work of the Faculty and in enhancing engineering developments in Hong Kong. There are numerous opportunities for partnership, in the form of applied R&D, teaching company, industrial associate and offer of advice by alumni to the work of the Faculty in our advisory committees and in the shaping of the education required for students. The Faculty and Hong Kong society will benefit from this synergy of brain, resources, idea and networking of our alumni and its alma mater.

Today we seem to have a confidence crisis. Our top government officials have been talking about a knowledge-based society in recent months. But I would suggest to you that this Faculty has always produced high calibre students and graduates with knowledge and innate creativity and energy. Increasingly, as our engineers demand more sophisticated solutions to complex engineering problems facing Hong Kong and the region, as our engineers look for partnerships and business opportunites in Mainland China, I suggest that the local university-alumni-student partnership is even more important. This partnership is important for us to consolidate and take full advantage of the local technological base. And in developing basic research, in mounting inter-disciplinary applied research efforts, we believe HKU still can play an important role in the region. It is my belief, that only by building up an advanced local engineering expertise, will we be able to join in effective partnership with our colleagues in Mainland China. We welcome opportunities to collaborate with the industry and government in applied R&D and in fact this has been a growing trend. We have 15 ongoing ITF projects in diverse areas ranging from power electronics, cryptography, advanced product design, visualisation technology and fabric fault detection. The Faculty has the capability in terms of human resources, the equipment, the technology, a firm sense of commitment, and more importantly the good will to foster more collaboration at all levels. We have already seen such collaboration in the transport studies conducted by the Department of Civil Engineering in conjunction with the Transport and Highways Departments, the project to solve the urgent flooding problem in Mongkok by the Civil Engineering team and the work of the hydro-dynamics team in Mechanical Engineering on the mitigation of waves generated by the navigational traffic in Victoria Harbour.

Finally I would like to thank our sponsors for their generous support for our anniversary activities. My special thanks go to the 90th Anniversary Advisory Committee and its Working Group on Publication, Working Groups on Anniversary Activities and Fund Raising for their good work on organising 33 activities in the anniversary year, and in particular Ir. Edmund Leung, Professor H.C. Chan and Dr. Albert Kwan. My deepest thanks to all our alumni, colleagues and students for their hard work and dedication throughout the years; without them the Faculty would not have been what it is today.

Thank you.

Welcome Address

Professor W.I.R. Davies
Vice-Chancellor

Mr. Dean, Distinguished Guests, Alumni, Ladies and Gentlemen,

Reunions are all about talking to friends and colleagues, and catching up on old times, so I promise I will not keep you very long. The Dean of the Engineering Faculty said that I should speak for no more than 3 minutes so I will proceed as quickly as I can.

I am really here to say "happy birthday" to the Faculty of Engineering of The University of Hong Kong. Yesterday, I had the honour of addressing the Congregation of The University of Hong Kong when we awarded all our doctoral, master and bachelor degrees, and the message that I tried to give to our graduates in the class of the year 2001 was that the alumni of this University is a jewel in the crown of The University of Hong Kong. I have never ceased to be amazed at the contributions they have made and the dedication that they have to Hong Kong society. They have shown true leadership in the community. This is certainly true of the Faculty of Engineering as your Dean was saying at the opening of your Symposium today - you have truly shaped Hong Kong. You shape our homes, you shape our workplaces and you shape the means by which we travel between the two of them. You give us the energy which provides the power in the workplace and the home, and supports the means of transport. You ensure we are able to exchange information effectively and efficiently. You are the ones who help us with our environmental improvement and you are helping Hong Kong to work to that long-term goal of sustainable development.

If I may, Mr. Dean, share with all your guests tonight a correspondence that crossed my desk just a couple of weeks ago which was between a historian in the Faculty of Arts of The University of Hong Kong and your Dean. It said, "Mr. Dean, you cannot claim to be 90 this year because your Faculty was only founded in the year 1912", and it was this very learned letter which said, "...it (the University) had its foundation stone laid in 1910 and it had its formal ordinance in 1911 but the first faculty boards of the Faculty of Medicine and the Faculty of Engineering occurred in 1912." When I read that, I thought this was a classic example of the difference between the minds of historians who have to look at details and the minds of engineers who try always to see the big picture.

Whatever happened 90 years ago, there is no doubt whatsoever that the Faculty of Engineering is one of the two founding faculties of The University of Hong Kong. It has pioneered so much for the profession. The University is enormously grateful for all its contributions and I have no doubt it will continue to pioneer so many things into the twenty-first century. So happy birthday to your Faculty, Mr. Dean.

Those Were the Days

Professor Vincent W.S. Leung, J.P., Emeritus Professor

Ladies and Gentlemen,

I know you are by now fed up with listening to speeches and you all think that my speech is one speech too many this evening. Actually I fully agree with you. I would very much like to go back to my seat and continue to drink my coffee. Unfortunately our Dean, Professor Joseph Lee, would not allow me to do so. He insists that I have to sing for my supper. I am afraid you have to bear with me for a few more minutes.

Once upon a time, there was a barren rock on the southern coast of China. The barren rock was called Hong Kong. Ninety years ago, a university was founded on the western side of this barren rock, and it was named after the barren rock, namely The University of Hong Kong. We are gathered here tonight to celebrate the 90th birthday of the University's engineering faculty which was born at the same time as the University. As this is an after-dinner speech, I know you will expect me to tell you a couple of jokes. Well, I am sorry you are going to be disappointed. You see, our Dean has asked me to say a few words to you on the history of the Faculty in my capacity as the oldest former faculty member who is still alive and around. As history is no laughing matter, I am not supposed to tell any jokes tonight. So what I am going to say will be the truth, the whole truth and nothing but the truth.

As a matter of fact my life in the Faculty began in 1960 and it lasted for over 33 years. I shall now tell you the story of the first half of my life in the Faculty, i.e. from the early 1960's to the late 1970's. When I first became a faculty member in 1960, the University still operated as a colonial institution. The University was primarily run by expatriates as the great majority of the academic staff were expatriates. For instance, there was not a single local staff member on the University Council. And even the Senate only had a small handful of local members. The Vice-Chancellor at the time was Sir Lindsay Ride who was also the University Council Chairman. The University was governed by an autocratic system which gave Sir Lindsay a wide range of decision-making power. However, he delegated most of his power of administering the University to the bursar, Mr. Wilson, who was equivalent to our Finance Director, Mr. Philip Lam, today. To me, Sir Lindsay was an untouchable person as there was a buffer, namely Mr. Wilson, between him and the rest of the University. Sir Lindsay will be remembered as the Vice-Chancellor who brought the University back to life after its temporary death during the Second World War.

At the time, engineering had the good fortune that our Dean, Professor Sean Mackey, was on good terms with Mr. Wilson who in turn had the ears of Sir Lindsay. Under Professor Mackey, the number of teaching departments in the Faculty increased from one to four, including the Department of Architecture. Inside the Faculty, Professor Mackey was a giant. He once said jokingly at the tea table that the local staff, especially those in the lower grades, treated him as their "Big White Chief". Professor Mackey will be remembered as an empire builder of the Faculty. Sir Lindsay's Vice-Chancellorship passed on to Dr. W. Knowles who nobody in the University seemed to know. His vice-chancellorship turned out to be short-lived as it was ended by his sudden death within one year in office. While he was personally Dr. Knowles the Unknown, his name subsequently became the best known in the University since the central administrative building of the University is called the Knowles Building after him. You see, there is a lesson to be learned here. A lot can be said for us to die in post if we wish to be remembered more than we deserve. I am not suggesting of course that we should take this factor into account when we plan our careers.

Our next Vice-Chancellor was Professor Kenneth Robinson, a notable historian. He scrapped the autocratic system of governance in the University by setting up or revitalising a number of key committees including:

1. The Development and General Purposes Committee,
2. The Estates and Accommodation Committees,
3. The Research and Conference Grants Committee,
4. The Finance Committee, etc.

and he delegated his decision-making power to the various committees. He also introduced elected membership on the Senate and the Council and set up a Students' Affairs Office to attend to student problems which were very acute during the 1967 riots in Hong Kong. The expansion of engineering took a break during the Vice-Chancellorship of Professor Kenneth Robinson who concentrated his attention in bringing democracy to the University. He will be remembered as Professor Robinson the Reformer. Professor Robinson was succeeded by Professor Rayson Huang who became the first local to hold the post. Professor Huang played the role of an expansionist, having established during his tenure three new faculties, namely the Faculties of Dentistry, Law and Education. He also took the initiative to establish the Department of Fine Arts and the Department of Music in which he was personally interested. He will be remembered as Professor Huang the Unprecedented.

While the changes of Vice-Chancellors took place in the University, changes in Deans also took place in the Faculty of Engineering and Architecture, from Professor Mackey to Professor Gregory to Professor Gurney and finally to me in 1972. As a relatively junior member of the Faculty I had to beat Professor Mackey and then Professor Bruges of Mechanical Engineering to be elected and re-elected respectively as Dean. In my election against Professor Mackey, I must thank members of the Mechanical Engineering Department for their support. You see, all the mechanical engineers are anti-authority by nature. They voted for me presumably not because they liked me but because they liked the authoritative Professor Mackey even less. In my re-election against Professor Bruges, I must again thank members of the Mechanical Engineering Department for their support. You see, traditionally, the mechanical engineers disagree with each other as a matter of course, not unlike the warlords in a fragmented country. The person with whom they disagreed most was of course their Head of Department, Professor Bruges, my opponent for the deanship. They voted for me presumably not because they agreed with me but because they agreed with Professor Bruges even less. After each election, I really wanted to thank my mechanical engineering colleagues by taking them out to lunch. But I did not do so as I was afraid that the ICAC would come after me with corruption charges.

During my deanship, I was fortunate to have the support of the Vice-Chancellor, Professor Rayson Huang, who was very enthusiastic about development in engineering. During the six years of my deanship, in addition to the setting up of the Industrial Engineering Department, there was a substantial expansion in the Faculty. The number of engineering undergraduates doubled and the number of engineering graduate students increased 11 times, thus paving the way for engineering to become the biggest faculty in the University in the following years. I am sure that our Dean, Professor Lee, will agree with me when I say that the Dean sits on a very hot seat. At one time during my deanship, I was told that all the engineering professors were against me. For one thing the professors thought that the deanship should have naturally gone to one of them as they were most senior in the engineering hierarchy. Meanwhile, I had no idea of how the rest of the faculty members felt about me as Dean. My doubt disappeared 11 years after my deanship when I received a joint petition letter signed by two-thirds of the faculty members urging me to stand for election as Dean again for one more time. I was so moved that my eyes were filled with tears as I read the letter.

Ladies and gentlemen,

That concludes my version of the history of the University and its Engineering Faculty from 1960 to 1978. Thank you so much for your patience and endurance. You are really a great audience.

False Alarm

Professor Vincent W.S. Leung, J.P., Emeritus Professor

Speech at the 25th Anniversary Dinner of the HKU Civil Engineering Graduates on September 20, 2002

Ladies & Gentlemen,

It has been already five years since I last met most of you at your 20th Anniversary Dinner Party. Tonight, it is a great pleasure of mine to see you again safe and sound. Actually, I only intended to say a few words of thanks to you for inviting me to the party and to persuade you to patronize the College more in the future. I had no idea that I had to play the role of the key-note speaker this evening. What an honour!

On an occasion such as this, I have a feeling that you all expect me to say something in praise of the great achievements of the civil engineers in Hong Kong and the world in the last twenty five years. As a layman in the profession, I fear that if I do so I may not be able to say all I should say to do justice to the profession. I thought I would be wise if I speak on a topic with which I am more familiar. I shall therefore speak to you on an episode in the history of the Faculty of Engineering of The University of Hong Kong. The title of the episode is :

False Alarm

As you know, the Faculty of Engineering has been the faculty with the most students in The University of Hong Kong for the last few years. It is an achievement of which we, as members of the Faculty, have every reason to be proud. But do you by any chance know that the Faculty was almost closed down by the government forty five years ago? Well, this was how it happened :

In the first half of the 1950's, everybody had high hope on the newly-established government in China. China was expected to be industrialised rapidly and there would be no chance for Hong Kong to develop its industry and hence even less chance for the engineering education in Hong Kong to survive. During those years, hardly any engineering student wanted to study in The University of Hong Kong - they preferred to pursue their studies either in China or aboard. In the meantime, no reputable academic in engineering would come to the University to take up a teaching post because he saw no future in such a career. For several years, the University was unable to recruit professors in engineering and the Faculty had to borrow a mathematics professor, namely Professor Y.C. Wong, to act as its Dean for several years. In view of the grim prospects of the engineering profession in Hong Kong, the government decided to close our Faculty down. In the process, it called a group of representatives of the Faculty to a meeting at the Government House to break the news to them. At the meeting, the Dean and leader of the group, Dr. S.Y. King, argued persuasively for the case of the Faculty to continue. While he could not dispute the popular view that there was no future for a manufacturing industry in Hong Kong, he emphasized the need of Hong Kong to have sufficient civil engineers to cope with the enormous task of rebuilding the city and its infrastructures which had been devastated during the Second World War. As a compromise, the government finally agreed to allow the Faculty of Engineering to continue but with one department only, i.e. the Department of Civil Engineering. All the staff in the Mechanical and Electrical Engineering disciplines had to be absorbed into the Department of Civil Engineering. The Faculty was thus able to survive after the crisis which turned out to be a false alarm.

In the following years, China was busily engaged in one political movement after another and its expected industrialisation did not materialise. Hong Kong thus seized the golden opportunity and lost no time in building a light industry. As a result, Hong Kong became the first little economic dragon in the South Eastern Asian region. Meanwhile, courses in Mechanical Engineering and Electrical Engineering in The University of Hong Kong were revived leading to the setting up of teaching departments in these two academic disciplines. In the mid 1970's, the Industrial Engineering Department was established in the Faculty to meet the need for personnel in the flourishing manufacturing industry in Hong Kong. The University has thus played a historical role in the industrialisation of Hong Kong.

Today, forty five years after the false alarm, the Engineering Faculty of the University is again faced with a dilemma as Hong Kong's economy is undergoing fundamental changes. Our manufacturing industries have been forced to move northwards in order to survive. If the engineering profession and engineering education in Hong Kong are to turn present peril into another false alarm, I believe that our engineers must have diversified knowledge and skill and our engineering faculty must run joint courses with such disciplines as biology, commerce, information, finance, urban planning, environment, etc. in order to meet the changing need of Hong Kong.

Finally, may I wish everybody good health and further advancement in your career.

APPENDIX C

1. LISTS OF DEANS, HEADS OF DEPARTMENTS, AND CHAIR PROFESSORS (UP TO 2001)

1.1 List of Deans

Deans of the Faculty of Engineering

1912-1919	C.A. Middleton Smith, MSc, MIMechE
1919	A.G. Warren, MSc, MIEE
1920-1923	C.A. Middleton Smith, MSc, MIMechE
1923	W. Brown, BSc, MA, FRSE
1923-1925	C.A. Middleton Smith, MSc, MIMechE
1925-1926	F.A. Redmond, BSc, DIC, FGS
1927	M.H. Roffey, DSO, MSc, MIEE, MemAIEE
1928	F.A. Redmond, BSc, DIC, FGS
1929	C.A. Middleton Smith, MSc, MIMechE
1930	F.A. Redmond, BSc, DIC, FGS
1931	M.H. Roffey, DSO, MSc, MIEE, MemAIEE
1932	F.A. Redmond, BSc, DIC, FGS
1933-1934	C.A. Middleton Smith, MSc, MIMechE
1935-1939	M.H. Roffey, DSO, MSc, MIEE, MemAIEE
1939-1950	F.A. Redmond, BSc, DIC, FGS
1950	J.E. Driver, MA, PhD, MSc, FRIC
1950-1953	Y.C. Wong, PhD, DSc
1953-1954	R.C. Vaughan, BSc, MIStructE
1954-1957	S.Y. King, BSc, PhD, DIC
1957-1958	S. Mackey, BSc, ME, PhD, MICE, MIStructE, FGS

Deans of the Faculty of Engineering and Architecture

1958-1967	S. Mackey, BSc, ME, PhD, MICE, MIStructE, FGS
1967-1970	W.G. Gregory, BArch, FRIBA
1970-1972	H.C.H. Gurney, OBE, MA, DSc, FInstP, FRAeS, MICE, CEng, FIMechE
1972-1978	W.S. Leung, BSc(Eng), PhD, CEng, FIEE, FIERE, SenMIEEE, FHKIE
1978	Y.K. Cheung, BSc, PhD, DSc, DE, CEng, FICE, FIStructE, FIE *Aust*, FASCE, FHKIE

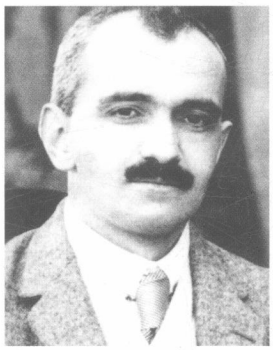
Deans of the Faculty of Engineering

1978-1987	Y.K. Cheung, BSc, PhD, DSc, DE, CEng, FICE, FIStructE, FIE *Aust*, FHKIE
1987-1989	Y.C. Cheng, BSc, PhD, CEng, MIEE, FHKIE
1989-1992	W.S. Leung, BSc(Eng), PhD, CEng, FIEE, SenMIEEE, HKIE, JP
1992-1993	T.N. Lam, BS, MEng, DEng, MASCE, PE
1994-2000	Y.S. Cheung, BSc(Eng), PhD, DIC, ACGI, CEng, MIEE, SenMIEEE
2000-	J.H.W. Lee, BSc(Eng), MSc, PhD, MASCE, MCIWEM, FHKIE

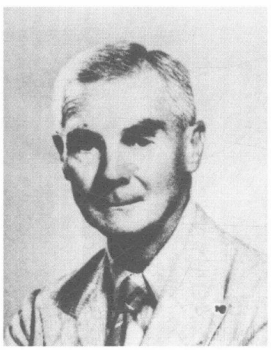
Deans of Engineering

C.A. Middleton Smith

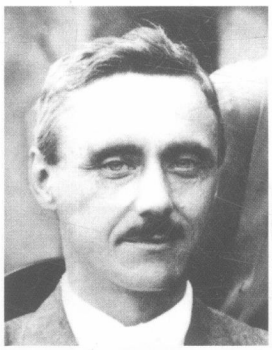
A.G. Warren



W. Brown



F.A. Redmond



M.H. Roffey

J.E. Driver

Y.C. Wong

R.C. Vaughan

S.Y. King

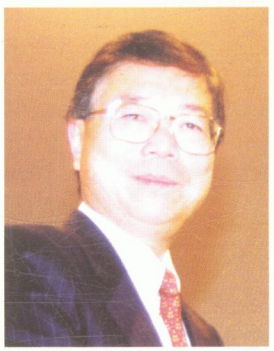
S. Mackey

W.G. Gregory

H.C.H. Gurney

W.S. Leung

Y.K. Cheung



Y.C. Cheng

T.N. Lam

Y.S. Cheung

J.H.W. Lee

1.2 List of Heads of Departments

Department of Civil Engineering

1912-1939	C.A. Middleton Smith, MSc, MIMechE
1939-1942	F.A. Redmond, BSc, DIC, FGS
1948-1950	F.A. Redmond, BSc, DIC, FGS
1950-1952	K. Billig, Dipl-Ing., Dr. techn., MICE, MIStructE, MASCE
1952-1954	R.C. Vaughan, BSc, MIStructE
1957-1976	S. Mackey, BSc, ME, PhD, DSc, MICE, MIStructE, FGS, JP
1976-1977	P. Lumb, MSc(Eng), DSc(Eng)
1977-1993	Y.K. Cheung, BSc *S China IT*, PhD, DSc *Wales*, HonLLD, DE *Adel*, HonDSc, FREng, CEng, FICE, FIStructE, FIE *Aust*, FCAS, HonFHKIE, FIACM, FHKEng
1994-1998	H.C. Chan, BSc(Eng) *HK*, PhD *Lond*, DIC, CEng, FICE, FHKIE, FIStructE
1999-2001	C.F. Lee, BSc(Eng), MSc(Eng) *HK*, PhD *W Ont*, PE, CEng, FICE, FHKIE, FEIC, FHKEng
2001-	P.K.K. Lee, MSc *Sur*, CEng, PEng, FIStructE, FICE, FHKIE, MASCE

Department of Computer Science and Information Systems

1988-1999	Professor F.Y.L. Chin, BASc *Tor*, MSc, MA, PhD *Prin*, FIEEE, FHKIE
2000-	Dr. F.C.M. Lau, BSc *Acadia*, MMath, PhD *Waterloo*

Department of Electrical and Electronic Engineering

1960-1974	S.Y. King, OBE, BSc(Eng) *HK*, PhD *Lond*, DIC, CEng, FIEE, Sen MIEE, FIE *Aust*, JP
1974-1977	C.F. Ho, MSc *Manitoba*, PhD *HK*, DCT *Batt*, CEng, FIERE, MIEE, Sen MIEEE, MHKIE
1977-1980	S.Y. King, OBE, BSc(Eng) *HK*, PhD *Lond*, DIC, CEng, FIEE, Sen MIEEE, FIE *Aust*, FHKIE, JP
1980-1994	W.S. Leung, BSc(Eng) *Lond*, PhD *Leeds*, CEng, FIEE, Sen MIEEE, FHKIE, FHKEng, JP
1994-2000	C.C. Chan, BSc *China Mining & Tech*, MSc *Tsinghua*, PhD *HK*, Hon DSc *Odessa*, FREng, FCAE, FIEEE, FIEE, FHKIE, FHKEng
2000-	T.S. Ng, BSc(Eng) *HK*, MEngSc, PhD, HonDEng *Newcastle*, CEng, SenMIEEE, FIEE, FHKIE

Department of Industrial and Manufacturing Systems Engineering

1973-1981	W.A. Reynolds, MA *Cantab*, CEng, MIMechE, FIProdE, FHKIE
1981-1994	N.N.S. Chen, BSc(Eng) *Aston*, MSc(Eng), PhD *Strath*, CEng, FIEE, MIMechE, FHKIE
1994-	K.L. Mak, MSc(Eng), PhD *Salf*, CEng, MIMechE, MIEE, FHKIE

Department of Mechanical Engineering

1960-1961	C. D. Weir, BSc, PhD *Glas*, AMIMechE, AIM
1962-1967	W. Smith, MSc *Manc*, MIMechE, AFRAeS
1967-1973	H.C.H. Gurney, OBE, MA *Cantab*, DSc *London*, FinstP, FRAeS, MICE, CEng, FIMechE
1973-1982	E.A. Bruges, BSc, PhD *Glas*, CEng, FIMechE, FIMarE, MASME, MASHRAE, FHKIE
1982-1990	C.L. Chow, BSc(Eng) *Waseda*, PhD, DSc(Eng) *Lond*, DIC, CEng, FIMechE, FIMarE, FHKIE, MASME, MSESA
1990-1991	N.W.M. Ko, BSc(Eng) *HK*, PhD *S'ton*, DSc *HK*, CEng, FIMechE, FIOA, FHKIE, MASME, FRSA
1991-1999	A.T.Y. Chwang, BSc *Chu Hai Coll*, MSc *Sask*, PhD *Caltech*, PEng, CEng, FASCE, FASME, FHKIE, FIMechE, FHKAES
2000-	B.J. Duggan, BSc *Aston*, PhD, DEng *Birm*, CEng, FIM, FHKIE

1.3 List of Chair Professors

Department of Civil Engineering

1912-1939	C.A. Middleton Smith (Taikoo Professor of Engineering) MSc, MIMechE, AMIEE
1939-1942	F.A. Redmond (Taikoo Professor of Engineering) BSc, DIC, FGS
1948-1950	F.A. Redmond (Taikoo Professor of Engineering) BSc, DIC, FGS
1950-1952	K. Billig (Chair of Civil Engineering) Dipl-Ing., Dr. techn. *Vienna*, MICE, MIStructE, MASCE
1952-1954	R.C. Vaughan (Chair of Civil Engineering) BSc *Brist*, MICE, MIStructE
1957-1976	S. Mackey (Taikoo Professor of Engineering) OBE, PhD *Leeds*, ME, DSc *NUI,* CEng, FICE, FIStructE, FGS, JP
1976-1986	P. Lumb (Chair of Civil Engineering) DSc(Eng) *Lond*, DIC, CEng, FICE, FASCE, FGS, FHKIE
1977-2000	Y.K. Cheung (Taikoo Professor of Engineering) OBE, BSc *S China IT*, PhD, DSc, HonLLD *Wales*, DE *Adel*, HonDSc *HK*, FREng, CEng, FICE, FIStructE, FIE *Aust*, FCAS, HonFHKIE, FIACM, FHKEng
1988-1992	T.C. Liauw (Chair of Civil Engineering) BSc(Eng) *Tsinghua*, PhD, DSc *S'ton*, PostgrDip *Tsinghua*, DIC, CEng, FICE, FHKIE
1991-1994	T.N. Lam (Chair of Civil Engineering) BS, MEng, DEng *Calif*, MASCE, PE *Calif and Mich*
1995-	J.H.W. Lee (Chair of Hydraulic and Environmental Engineering 1995-96, Redmond Professor of Civil Engineering 1996 onwards) BSc(Eng), MSc, PhD *MIT*, MASCE, MCIWEM, FHKIE
1996-	C.F. Lee (Chair of Geotechnical Engineering) BSc(Eng), MSc(Eng) *HK*, PhD *W Ont*, PE, CEng, FICE, FHKIE, FEIC, FHKEng
2000-	H.H.P. Fang (Chair of Environmental Engineering) BS *Nat Taiwan*, MS, PhD *Roch*, MAIChE, MASCE, MIWA

Department of Computer Science and Information Systems

1996-	F.Y.L. Chin (Chair of Computer Science) BASc *Tor*, MSc, MA, PhD *Calif*, FIEEE
1996-2000	K. Hwang (Chair of Computer Engineering) BS *Nat Taiwan*, MS *Hawaii*, PhD *Calif*, FIEEE

Department of Electrical and Electronic Engineering

1966-1980	S.Y. King (Taikoo Professor of Engineering) OBE, BSc(Eng) *HK*, PhD *Lond*, DIC, CEng, FIEE, Sen MIEEE, FIE *Aust*, FHKIE, JP
1977-1994	W.S. Leung (Chair of Electrical Engineering) OBE, BSc(Eng) *Lond*, PhD *Leeds*, CEng, FIEE, Sen MIEEE, FHKIE, FHKEng, JP
1981-1989	Y.C. Cheng (Chair of Electronic Engineering) BSc *HK*, PhD *Br Col*, PGDipMS *Waterloo*, CEng, FIEE, FIEEE, FHKIE, JP

1992-	C.C. Chan (The Honda Professor of Engineering) BSc *China Mining & Tech*, MSc *Tsinghua*, PhD *HK*, Hon DSc *Odessa*, FREng, FCAE, FIEEE, FIEE, FHKIE, FHKEng
1995-	F.F. Wu (Chair of Electrical Engineering) BS *Nat Taiwan*, MS *Pitt*, PhD *Clif*, FIEEE, FHKIE
1996-2000	K. Hwang (Chair of Computer Engineering) BS *Nat Taiwan*, MS *Hawaii*, PhD *Calif*, FIEEE
1997-	V.O.K. Li (Chair of Information Engineering) SB, SM, ScD MIT, EE, FIEEE, FIAE, FHKIE
1997-	E.S. Yang (Chair of Microelectronics Engineering) BSEE *Taiwan Cheng-kung*, MSEE *Oklahoma State*, PhD *Yale*, FIEEE

Department of Industrial and Manufacturing Systems Engineering

1978-1981	W.A. Reynolds (Chair of Industrial Engineering) MA *Cantab*, CEng, MIMechE, FIProdE, FHKIE
1986-1994	N.N.S. Chen (Chair of Industrial Engineering) BSc(Eng) *Aston*, MSc(Eng), PhD *Strath*, CEng, FIEE, MIMechE, FHKIE
1995-2000	B. Porter (Chair of Intelligent Automation) MA *Cantab*, PhD, DSc, *Durh*, CEng, FIMechE, MCIRP

Department of Mechanical Engineering

1967-1973	H.C.H. Gurney (Chair of Mechanical Engineering) OBE, MA *Cantab*, DSc *Lond*, FinstP, FRAeS, MICE, CEng, FIMechE
1973-1982	E.A. Bruges (Taikoo Professor of Engineering) BSc, PhD *Glas*, CEng, FIMechE, FIMarE, MASME, MASHRAE, FHKIE
1982-1990	C.L. Chow (Sir Robert Ho Tung Chair) BSc(Eng) *Waseda*, PhD, DSc(Eng) *Lond*, DIC, CEng, MIMechE, MASME, MHKIE
1987-2000	N.W.M. Ko (Chair of Fluid Dynamics) BSc(Eng) *HK*, PhD *S'ton*, DSc *HK*, CEng, FIMechE, FIOA, FHKIE, MASME, FRSA
1991-	A.T.Y. Chwang (Sir Robert Ho Tung Chair) BSc *Chu Hai Coll*, MSc *Sask*, PhD *Caltech*, PEng, CEng, FASCE, FASME, FHKIE, FIMechE, FHKEng
1995-	B.J. Duggan (Chair of Materials Science and Engineering) BSc *Aston*, PhD, DEng *Birm*, CEng, FIM, FHKIE

2. LIST OF STAFF MEMBERS (1950-2001)

2.1 Civil Engineering 1950-2001

Surname	Given Name	Year of First Appointment	First Position Held	Resigned/ Retired
Billig	K.	1950	P	1952
King	S.Y.	1951	AL	1960^
Wu	K.C.	1951	L	1958
Chen	L.K.	1952	L	1967
Tsang	H.S.	1952	L	1954
Vaughan	R.C.	1952	P	1954
Hui	C.Y.	1953	AL	1961*
Szeto	W.	1953	L	1954
Tunnell	O.	1953	L	1957
Lumb	P.	1954	L	1986
Chow	C.H.	1955	AL	1958
Leung	K.W.	1955	AL	1977
Mackey	S.	1957	P	1977
Raftery	J.J.	1958	L	1970
Wong	K.C.	1958	AL	1968
Fang	P.S.K.	1959	L	1960*
Chung	H.W.	1966	L	1989
Kong	F.K.	1966	L	1968
Gardner	N.J.	1967	L	1968
Chan	H.C.	1968	L	1999
Choi	C.K.	1968	L	1970
Liauw	T.C.	1968	L	1992
Ho	Duen	1969	L	1994
Leung	K.V.	1969	L	1971
Shum	D.H.	1969	AL	1995
Chan	Y.H.	1970	L	1999
Lee	P.K.K.	1970	AL	
Mok	Y.C.	1970	L	1993
Choi	E.C.C.	1971	L	1989
Kowalski	T.G.	1971	L	1975
Lam	R.	1971	L	1988
Tin	Y.K.	1974	L	1978
Chan	J.K.W	1975	L	1999
Lam	L.C.H.	1976	L	1987
Cheung	Y.K.	1977	P	2000
Jayawardena	A.W.	1977	L	
Tong	C.O.	1977	L	
Chan	L.K.T.	1978	L	1995
Leung	A.Y.T.	1978	L	1997
Tsui	Y.	1979	L	
Lee	J.H.W.	1980	L	
Chan	Ho Cheung	1982	SL	1985
Tham	L.G.	1982	L	
Fang	H.H.P.	1987	L	
Lam	T.N.	1987	R	1994
Rowlinson	S.M.	1987	L	1991~
Au	F.T.K.	1988	L	
Lo	S.H.	1988	L	
Kwan	A.K.H.	1989	L	
Kay	J.N.	1990	L	1999
Lam	K.M.	1990	L	
Wong	S.C.	1991	AL	

Koenig	A.	1992	L	
Kumaraswamy	M.M.	1992	L	
Pam	H.J.	1993	L	
Lee	C.F.	1994	R	
Pan	A.D.E.	1995	L	
Tam	P.W.M.	1995	L	1998
Li	X.Y.	1996	L	
Chandler	A.M.	1998	SL	
Yue	Z.Q.	1999	L	
Ng	T.S.T.	2000	L	
Su	R.K.L.	2000	L	
Yeung	M.R.	2000	L	

^ transferred to the Department of Electrical and Electronic Engineering

* transferred to the Department of Mechanical Engineering

~ transferred to the Department of Real Estate and Construction (formerly known as the Department of Surveying)

2.2 Computer Science and Information Systems 1977*-2001

Surname	Given Name	Year of First Appointment	First Position Held	Resigned/ Retired
Chen	T.Y.	1977	AL	1990
Chan	C.	1978	SL	1999
Tse	T.H.	1979	L	
Lam	E.C.M.	1982	L	1988
Chong	C.F.	1983	L	
Evans	J.B.	1983	L	1996
Chan	T.H.	1985	L	1988
Chin	F.Y.L.	1985	R	
Chow	K.P.	1986	L	
Pun	K.H.	1986	L	
Lau	F.C.M.	1987	L	
Tsang	W.W.	1987	L	
Choi	A.K.O.	1988	L	2000
Lam	T.W.	1988	AL	
Chan	H.W.	1989	L	
Chan	K.P.	1989	AL	
Cheung	W.H.	1990	L	1997
Farhoomand	A.F.	1992	L	1996^
Wang	W.P.	1993	L	
Cheung	D.W.L.	1994	L	
Peffers	K.G.	1994	L	1996
Ting	H.F.	1994	L	
Yee	L.W.M.	1994	L	1998
Kao	C.M.	1995	L	
Wang	C.L.	1995	L	
Yen	J.C.H.	1996	L	1998
Yiu	S.M.	1996	AL	
Yang	C.C.C.	1997	L	1999
Hui	C.K.	1998	L	
Huo	Q.	1998	L	
Mak	B.L.F.	1998	L	2000
Tam	A.T.C.	2001	AL	
Mamoulis	N.	2001	L	
Wong	K.K.Y.	2001	L	

* The Department was formally established in the Faculty of Engineering in 1988

^ Transferred to the School of Business

2.3 Electrical and Electronic Engineering* 1960-2001

Surname	Given Name	Year of First Appointment	First Position Held	Resigned/ Retired
King	S.Y.	1948	AL	1980
Leung	W.S.	1960	L	1994
Loh	S.C.	1960	L	1965
Ho	K.W.	1962	L	1968
Yu	P.K.	1960	AL	1984
Newland	F.J.	1967	L	1989
Chan	W.K.	1968	AL	1993
Cheung	W.N.	1968	AL	1984
Coffee	R.A.	1968	L	1977
Shen	C.M.	1968	L	
Lam	F.K.	1969	AL	
Tso	S.K.	1970	L	1995
Ho	C.F.	1974	L	1993
Atherton	W.A.	1975	L	1981
Foo	P.Y.	1975	AL	1998
Li	H.F.	1977	L	1985
Cheng	Y.C.	1978	L	1989
Lau	C.C.	1979	L	1992
Cheung	P.Y.S.	1980	L	
Choy	C.T.	1981	L	1994
Kwan	P.H.K.	1981	L	1989
Lo	S.H.B.	1981	L	
Chan	C.C.	1982	L	
Kwan	H.	1982	L	1989
Hong	M.K.M.	1983	L	
Kwok	P.C.K.	1984	L	1986
Chan	F.H.Y.	1985	L	
Ho	K.L.	1985	L	
Chui	P.C.	1986	L	
Hau	K.C.	1986	L	2002
Leung	C.H.	1986	L	
Tse	K.W.	1986	L	
Yuk	T.T.I.	1986	L	
Yeung	C.S.K.	1987	L	2000
Chan	J.H.K.	1988	L	1995
Lee	W.K.	1988	L	1995
Hung	Y.S.	1989	L	
Lai	P.T.	1989	L	
Cheung	S.W.	1990	L	
Ng	T.S.	1990	P	
Pang	K.F.	1990	L	1991
Lam	W.H.	1991	L	
Pong	M.H.	1991	L	
Ng	W.T.	1992	L	1993
Yung	N.H.C.	1993	L	
Chan	S.C.	1994	L	
Li	E.H.	1994	L	2001
Yu	S.F.	1994	L	2001
Chau	K.T.	1995	L	
Kwok	P.C.K.	1995	L	1999
Lo	E.W.C.	1995	L	1999
Snider	L.A.	1995	L	1998
Wang	J.Z.	1995	L	
Wu	F.F.	1995	P	

Cheng	Y.C.	1996	P	2000
Hwang	K.	1996	P	2000
Lin	X.	1996	L	2001
Ni	Y.	1996	L	
Pang	G.K.H.	1996	L	
Li	V.O.K.	1997	P	
Ma	Q.Y.	1997	L	
Yang	E.S.	1997	P	
Kwok	Y.K.	1998	L	
Lau	K.N.	1998	L	
Lau	W.C.	1999	L	2002
Shen	G.G.	1999	L	
Wong	A.K.K.	2000	L	
Yeung	L.K.	2000	L	

* The Department was formally re-established in 1960 after its closure during the Second World War

2.4 Industrial and Manufacturing Systems Engineering 1973-2001

Surname	Given Name	Year of First Appointment	First Position Held	Resigned/ Retired
Chen	N.N.S.	1973	L	1994
Niem	P.I.F.	1973	L	1995
Reynolds	W.A.	1973	L	1983
Sculli	D.	1974	L	
Partridge	S.E.	1975	L	1984
Peacock	J.B.	1975	L	1979
Leung	M.C.	1976	L	1990
Evans	W.A.	1977	L	1995
Mak	K.L.	1977	L	
Kwok	M.C.K.	1978	L	1991
Tai	T.C.L.	1978	L	1984
Partington	E.C.	1979	L	1996
Chan	P.L.Y.	1980	AL	
Courtney	A.J.	1980	L	
Wong	T.N.	1984	L	
Chan	J.C.M.	1986	L	1996
Choi	S.H.	1987	L	
Wong	A.C.Y.	1987	L	
Lo	V.H.Y.	1989	L	
Lau	T.L.	1991	L	
Chu	L.K.	1992	L	
Yu	W.W.H.	1992	L	
Porter	B.	1995	P	2000
Chan	F.T.S.	1996	L	
Huang	G.Q.	1997	L	
Humphreys	P.K.	1997	L	2000
Lau	H.Y.K.	1997	L	
Ng	W.C.	2000	L	

2.5 Mechanical Engineering* 1960-2001

Surname	Given Name	Year of First Appointment	First Position Held	Resigned/ Retired
Fang	P.S.K.	1960	L	1963
Lung	Y.S.	1960	AL	1972
Soundranayagam	S.	1960	L	1962
Weir	C.D.	1960	R	1961
Hui	C.Y.	1961	AL	1973
Smith	W.	1962	R	1967
Wong	D.K.C.	1962	L	1973
Button	B.L.	1963	AL	1967
Chiu	P.C.	1964	AL	1993
Chung	C.M.	1966	AL	1968
Gurney	H.C.H.	1967	P	1973
Wong	P.W.	1967	L	1973
Chow	C.L.	1968	L	1990
Knight	H.R.	1968	L	1969
Poon	K.L.	1968	AL	1976
Chen	N.N.S.	1969	L	1973^
Ko	N.W.M.	1969	L	2000
Clark	J.A.	1970	L	1997
Owen	R.C.	1970	AL	1973
Niem	P.I.F.	1971	L	1973^
Wong	P.F.Y.	1972	L	1995
Ying	W.M.	1972	L	1976
Bruges	E.A.	1973	P	1982
Greene	G.W.	1973	L	1997
Kot	S.C.	1974	L	1991
Sykes	J.L.	1974	L	1979
Sze	W.S.	1974	L	
Turner	F.A.L.	1975	ETO	1981#
Lou	M.C.L.	1976	L	1978
Ruxton	T.	1976	L	1983
Sainsbury	M.G.	1976	L	
Woo	C.W.	1976	L	1996
Chan	S.K.	1977	L	1983
Duggan	B.J.	1977	L	
Lingard	S.	1977	L	1996
Tam	P.K.Y.	1977	L	1982
Leung	T.C.T.	1978	L	1982
Fok	W.C.	1979	L	1983
Yuen	M.M.F.	1979	L	1992
Chen	J.J.J.	1980	L	1984
Tan	S.T.	1980	L	
Asundi	A.	1983	L	1996
Chan	C.W.	1983	L	
Fung	D.P.K.	1983	L	1997
Yue	C.Y.	1983	L	1990
Yeung	R.M.K.	1984	L	1996
Bakountouzis	L.N.	1985	L	
Fang	M.	1985	L	1991
Ness	J.N.	1985	L	1995
Chan	K.W.	1986	L	
Dunn	A.	1987	SL	1998
Lam	H.N.	1987	L	
Lo	E.W.C.	1988	AL	1990

Cheung	W.L.	1990	L	
Tan	W.T.	1990	L	1992
Chwang	A.T.Y.	1991	P	
Cheung	K.C.	1992	L	
Chen	Y.H.	1993	L	
Lam	J.	1993	L	
Leung	Y.C.	1993	L	
Ngan	A.H.W.	1993	L	
Gibson	I.	1994	L	
Chow	K.W.	1995	L	
Jiang	D.	1995	L	1998
Shabayek	A.A.E.	1996	L	2002
Soh	A.K.	1996	L	
Sumathy	K.	1996	L	
Sze	K.Y.	1996	L	
Wang	L.	1996	L	
Ng	C.O.	1997	L	
Chan	A.T.Y.	1998	L	
Shen	G.	1998	L	1999
Li	Y.	2000	L	
Chen	K.	2001	L	

* The Department was formally re-established in 1960 after its closure during the Second World War

~ ETO - Engineering Training Officer

\# transferred to Ho Tung Workshop

^ transferred to the Department of Industrial and Manufacturing Systems Engineering

3. HONOURS AND AWARDS OBTAINED BY CURRENT STAFF MEMBERS OF THE FACULTY (1996-2001)

3.1 Department of Civil Engineering

Professor A.M. Chandler	1996	TK Hsieh Award by the Institution of Civil Engineers of the UK
Professor A.M. Chandler	2000	Edward Clarence Dyason Universitas 21 Fellowship of the University of Melbourne
Professor Y.K. Cheung	1998	International Association for Computational Mechanics Fellows Award
Professor Y.K. Cheung	1999	National Natural Science Award
Professor Y.K. Cheung	1999	Second Prize for Scientific and Technological Advancement by the Education Commission of China
Professor Y.K. Cheung	1999	Telford Premium by Institution of Civil Engineers in the UK
Professor Y.K. Cheung	1999	Member of the Chinese Academy of Sciences
Professor Y.K. Cheung	2000	Honorary Doctor of Science, The University of Hong Kong
Professor Y.K. Cheung	2000	Honorary Doctor of Law of the University of Wales
Professor Y.K. Cheung	2001	President of the Hong Kong Academy of Engineering Sciences
Professor H.H.P. Fang	1998	Vice-Chancellor's Outstanding Researcher Award, The University of Hong Kong
Professor H.H.P. Fang	1999	K.C. Wong Fellowship
Professor H.H.P. Fang	1999	Outstanding Researcher Award, The University of Hong Kong
Professor H.H.P. Fang	1999	Croucher Foundation Senior Research Fellowship
Dr. A. Koenig	1996	Earth Science Systems Research Award for Best Paper
Dr. M.M. Kumaraswamy	1996	CDE Prize for Best Paper in "Engineer" Journal, Sri Lanka
Professor A.K.H. Kwan	1999	Telford Premium by Institution of Civil Engineers in the UK
Professor A.K.H. Kwan	2001	Special Award in Research Project by the Hong Kong Institution of Engineers
Professor A.K.H. Kwan	2001	HKIE Transactions Prize by the Hong Kong Institution of Engineers
Professor C.F. Lee	1997	Academician of the Eurasian Academy of Sciences
Professor C.F. Lee	1998	Fellow of the Engineering Institute of Canada
Professor C.F. Lee	2001	Cross-Canada Lecturer of the Canadian Geotechnical Society
Professor C.F. Lee	2001	Fellow of the Hong Kong Academy of Engineering Science
Professor C.F. Lee	2001	K.Y. Lo Medal by Engineering Institute of Canada
Professor J.H.W. Lee	1998	Visiting Erskine Fellowship of the University of Canterbury
Professor J.H.W. Lee	1998	Croucher Foundation Senior Research Fellowship
Professor J.H.W. Lee	2000	Universitas 21 Fellowship, McGill University
Mr. P.K.K. Lee	2001	Lewis Kent Award by the Institution of Structural Engineers of the UK
Dr. X.Y. Li	1997	Outstanding Doctoral Thesis by the Association of Environmental Engineering Professors, USA
Dr. T.S.T. Ng	1999	Fred Wilson Memorial Prize for Best Research Paper by the Australian Institute of Building
Dr. T.S.T. Ng	2001	CIOB Innovation Award 2001: Research Paper Competition – Runner-up, UK
Dr. H.J. Pam	2001	Special Award in Research Project by the Hong Kong Institution of Engineers
Dr. S.C. Wong	2000	Outstanding Young Researcher Award, The University of Hong Kong
Dr. S.C. Wong	2001	Outstanding Paper Award, Fourth Conference of the Eastern Asia Society for Transportation Studies

3.2 Department of Computer Science and Information Systems

Dr. D.W.L. Cheung	1998	Outstanding Researcher Award, The University of Hong Kong
Professor F.Y.L. Chin	1996	Fellow, The Institute of Electrical and Electronics Engineers
Dr. T.W. Lam & Dr. H.F. Ting	1998	Best Paper Award, The Ninth Annual International Symposium on Algorithms and Computation (ISAAC)
Dr. F.C.M. Lau	1998	Golden Core Recognition, IEEE Computer Society
Dr. F.C.M. Lau	2000	IEEE Third Millennium Medal
Dr. W. Wang	2001	ACM Service Award

3.3 Department of Electrical and Electronic Engineering

Professor C.C. Chan	1996	Distinguished Fellow, Japan National Institute for Environmental Studies
Professor C.C. Chan	1996	Outstanding Award, Hungarian Electrotechnical Association
Professor C.C. Chan	1996	Performance Award, Noto Solar Car Rally, Japan
Professor C.C. Chan	1996	Fellow and Vice-President (2001), Hong Kong Academy of Engineering Sciences
Professor C.C. Chan	1997	Faraday Memorial Lecturer Award, IEEE Hyderabad Section & BM Barla Science Centre
Professor C.C. Chan	1997	Academician, Chinese Academy of Engineering
Professor C.C. Chan	1997	Fellow, Academy of Engineering Sciences of Ukraine
Professor C.C. Chan	1997	Fellow, Royal Academy of Engineering, UK
Professor C.C. Chan	2000	IEE International Lecture Medal
Professor C.C. Chan	2000	World Electric Vehicle Association 10th Anniversary Trophy
Professor C.C. Chan	2001	One of the Asia's Best Tech Pioneers by the Asia Week
Dr. Y.S. Cheung	2000	IEEE Millennium Medal
Dr. A.B. Djurisic	1998	Alexander von Humboldt Fellowship, TU Dresden, Germany
Dr. K.L. Ho	2000	IEEE Millennium Medal
Professor V.O.K. Li	1997	Best Research Paper Award, University of Southern California
Professor T.S. Ng	1997	Honorary Doctor of Engineering by The University of Newcastle Australia
Professor T.S. Ng	1997	Best paper award in IEEE 1997 International Symposium on Personnel, Indoor and Mobile Communications PIMRC '97, Finland 1997
Professor T.S. Ng	1999	Croucher Foundation Senior Research Fellowship
Professor T.S. Ng	2000	IEEE Millennium Medal
Dr. M.H. Pong	1999	Paper Award at the 12th China Power Supply Society Conference
Dr. M.H. Pong	2000	Silver Medal at the International Invention Expo, Hong Kong
Dr. F.S. Wen	1997	National Natural Science Award
Dr. F.S. Wen	1997	Zhejiang Provincial Top Young Scientist Award
Dr. F.S. Wen	1998	Scientific Development Award of the Ministry of Education, China
Dr. A.K.K. Wong	1996	IBM Invention Plateay Awards
Dr. K.K. Wong	2000	Vehicular Technology Society Japan Chapter Award, IEEE Vehicular Technology Conference
Dr. H.C. Yung	2000	Silver Award from the Hong Kong Electronic Industry Association for Outstanding Innovation and Technology Product,2000, for the MOVER (Mobile and Online Vending EnableR) solution (2000)

3.4 Department of Industrial and Manufacturing Systems Engineering

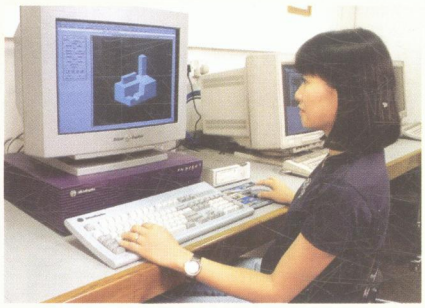
Dr. G.Q. Huang	2001	Outstanding Young Researcher Award, The University of Hong Kong
Dr. Paul Humphreys	1998	Outstanding Paper Award 1998, MCB University Press

3.5 Department of Mechanical Engineering

Professor A.T. Chwang	2000	Fellow, Hong Kong Academy of Engineering Sciences
Professor A.T. Chwang	2000	Outstanding Researcher Award, The University of Hong Kong
Professor B.J. Duggan	1997	Croucher Foundation Senior Research Fellowship
Dr. I. Gibson	1999	Best Internet Conference Award, Internet Conference: The Future of Rapid Prototyping, Bradford, UK, MCB
Dr. A.H.W. Ngan	2001	Outstanding Young Researcher Award, The University of Hong Kong
Dr. K. Sumathy	1998	Best Paper Award in the 7th International Energy Conference & Exhibition, Manama, Bahrain
Dr. K.Y. Sze	1998	T.H.H. Pian Medal, International Society for Computational Engineering & Sciences
Dr. K.Y. Sze	1999	Outstanding Young Researcher Award, The University of Hong Kong
Dr. L.Q. Wang	2000	Outstanding Young Researcher Award, The University of Hong Kong

4. RESEARCH CENTRES OF THE FACULTY

Centre for Advanced Product Development Technologies



The Centre helps to convert product ideas into reality

The Centre for Advanced Product Development Technologies (CAPDT) is an applied research-oriented centre aimed at fostering links between different departments in the University and with the industry. Anyone can come up with a new idea for a product design. When it happens, how do you turn this idea into reality? There are many ways to achieve this. If the design relies on complexity of geometric form, then the CAPDT can help. The CAPDT focuses on mechanical CAD technology, and as such gets most of its resources from the Mechanical Engineering and Industrial Engineering Departments. Complex geometry CAD modelling, or data capture from free form surfaces is often the start of the design. Realisation, proving and testing of the design can be achieved using Finite Element methods or Rapid Prototyping. Once the design has been completed, appropriate manufacturing methods need to be established. This can be as true for a new surgical implant as for an electronic assembly or a new architectural structure.

Centre for Asian Tall Buildings and Urban Habitat

Closing Ceremony of the Symposium on Tall Building Design and Construction Technology in Beijing (June 1999)

The Centre for Asian Tall Buildings and Urban Habitat (CATBUH) was established in 1997 as the culmination of several years' preparatory work by a local committee, with membership drawn from professional, academic and industry circles. It was a response to the rapid growth throughout Asia typically in population and economic development. This growth has led to land use policies and patterns of development, which accommodate increasing numbers of tall buildings for residential, commercial and other uses. The Centre has close links with the USA-based Council on Tall Buildings and Urban Habitat. It aims to provide a focus for research into the planning and development of the urban habitat, with particular reference to tall buildings, sustainable development and densely populated areas in Asia. It stimulates international contacts, promotes academic exchange by maintaining close relations with relevant institutions and departments of central and regional governments, and provides local support for conferences, exhibitions and seminars that it holds jointly with other organisations.

Centre for E-Commerce Infrastructure Development

Dr. David Cheung explaining Project Phoenix (an establishment of an ebXML software infrastructure in Hong Kong) to a delegation from the Hong Kong General Chamber of Commerce (HKGCC) during a site visit at HKU.

Established in January 2002, the Centre for E-Commerce Infrastructure Development (CECID) is a research and development centre on B2B e-commerce technology and logistic infrastructure. The Centre has been awarded an ITF grant of $9.54 M to develop a software infrastructure based on the international standard of ebXML. The first product from the project, an ebXML V2 Registry, was showcased in the JavaOne Conference in San Francisco in March 2002. In addition, CECID is hosting the global testing site of the Registry with an access rate of thousands of trials everyday from all over the world. More information on CECID can be found at its web site: www.cecid.hku.hk.

Centre for Earthquake Engineering Research

Professor A.M. Chandler inspecting damage to a reinforced concrete beam column joint subject to earthquake action in the laboratory.

The Centre was established in 1996, when the Hong Kong Government commissioned a number of key research studies by the Department of Civil Engineering, with the aim of quantifying the seismic activity of the region and determining the safety of construction against potential earthquakes. Partly, this research was motivated by the fact that, whilst building codes in Guangdong (as in other parts of China) consider earthquake-induced loading in design, to date Hong Kong has not introduced such effects into its construction codes. It is believed that this anomaly should be addressed within the next few years, and the Centre is positioned to play an active role in helping to formulate earthquake design provisions for Hong Kong. With this aim, the Centre's researchers are currently engaged in a series of projects that highlight the potential earthquake-induced damages and losses to Hong Kong's construction and economy, which might be caused by large magnitude events that occur in South China about once every 100 to 200 years. The last of such earthquakes occurred in Shantou in 1918. The risk of damage to Hong Kong is highest in older construction and in buildings founded on soft soils such as land reclamation areas.

Centre for Electrical Energy Systems

A supervisory control and data acquisition facility at CEES with digital relay for power system security analysis

The Centre for Electrical Energy Systems (CEES) was established in 1995 with funding from the RGC to promote the applications of advanced technologies and management sciences to future electric energy system developments in China and other Asian countries. Professor Felix F. Wu, IEEE fellow and HKIE fellow, former professor of UC Berkeley and current chair professor of electrical engineering of HKU, is the director of CEES. The Centre is equipped with advanced analysis, design and planning tools and its main research areas include: Power System Restructuring; Power System Planning and Operation; Power System Analysis, Stability and Control; Power Electronics Applications in Power System, including HVDC Transmission Systems and Flexible AC Transmission Systems (FACTS), and New Technique Applications in Power Systems. More information about CEES activities can be found at its web site: www.eee.hku.hk/~cees.

The Electrical Power Research Institute, USA has taken CEES as their partner in Asia. CEES has also opened an applied R&D branch at Shenzhen jointly with the National Key Power System Laboratory of Tsinghua University.

Centre for Environmental Engineering Research

The signing of Memorandum of Understanding among five leading environmental research institutes in Asia on October 30, 2001, Singapore.

The Centre for Environmental Engineering Research (CEER) was established in the Faculty of Engineering in 1997 to facilitate scientific and technological advancement. The Centre focuses on identifying and conducting basic and/or applied research in all key aspects of environmental engineering, including water and wastewater treatment, solid waste management engineering, wind engineering, environmental hydraulics and systems modelling, water quality, air and noise pollution control, and quantitative environmental impact assessment. It promotes and facilitates interdisciplinary research on environmental engineering by providing a focus for academics from different departments within the University. The Centre organises workshops, training courses, and specialty conferences to promote academic exchanges with external academic institutions and professional organisations, especially in the Asian Pacific Region. It also publishes technical research reports of work performed by the Centre. Two major research projects of the Centre are "Dynamics of algal blooms and red tides in sub-tropical coastal waters: monitoring, modelling, and prediction" and "Pollution-induced microbial corrosion of metals in sea water".

Centre for High-Performance Structures

For decades, research and design of structures have revolved around the provision of a certain minimum standard of safety. However, on top of safety, there is an increasing demand from the society, governments and developers for all round higher performance structures in terms of serviceability, functionality, durability, structural health assurance, reparability, environmentally friendliness and sustainability of structures.

The Centre for High-Performance Structures was established in 2002 to address the various issues related to the development of high-performance structures, improvements of the performance of existing structures, assessment and management of building and bridge structures and sustainable construction, which are of common concern to the construction industry.

Centre for Infrastructure and Construction Industry Development

The Centre for Infrastructure and Construction Industry Development was established in November 2002. The aims include fostering continuous improvements, while targeting excellence in the construction industry in general and infrastructure development in particular, through the development of innovative strategies and techniques. The objectives include (a) developing an internationally recognised 'Centre of Excellence' for research, discourse and dissemination of innovations in infrastructure and construction engineering & management, and construction industry development methodologies; and (b) encouraging and supporting interdisciplinary research in planning, implementing and evaluating construction projects including mega/multi-project infrastructure programmes.

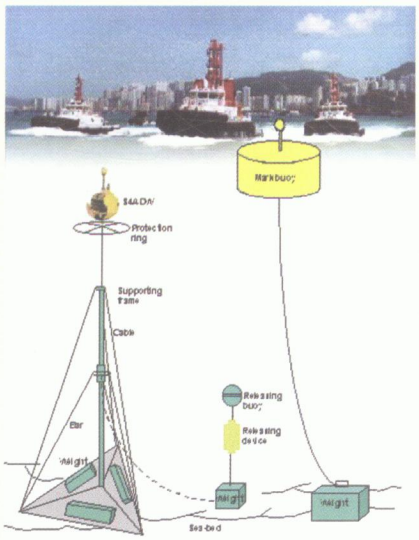
Professor Chimay Anumba of Loughborough University, U.K. delivering a seminar jointly organised by the Centre and the Department of Civil Engineering on "Intelligent and Knowledge-based Systems for Construction"

Centre for Information Security and Cryptography

With support from a number of industrial organisations and the Industrial Support Funds, the Centre for Information Security and Cryptography (CISC) was established to address the issue of providing a secure public-key infrastructure for future e-commerce activities. In particular, the "Strong Cryptographic Library Client Suite (SCL-CS)", solely developed by the Centre, has been adopted by the Hong Kong Post Certification Authority for digital certificates. CISC also carries out research on computer forensics tools, network security, random number properties, advanced cryptographic algorithms and secure workflow. Through publications and training sessions, the Centre works hard to increase public awareness of IT security. More information on CISC can be found at its web site: http://www.csis.hku.hk/cisc.

Ceremony to mark the collaboration between Hong Kong Post and The University of Hong Kong for bundling the Strong Cryptographic Library Client Suite (e-Cert edition) software with the Hong Kong Post e-Cert

Centre for Nonlinear Mechanics



Wave measurement in Victoria Harbour

The primary objective of the Centre for Nonlinear Mechanics is to promote the understanding and studies of nonlinear phenomena. Indeed nonlinear phenomena have occupied a prominent role in fields like control, fluid mechanics, heat transfer, material science and solid mechanics. Members of the Centre are engaged in world-class research activities that bring distinction to the University and the Faculty. For example, Dr. A.T. Chan was invited to present a plenary lecture in the First SERC School on Atmospheric Modelling (May 2001, India). Professor A.T. Chwang is a member of the Technical Program Committee of the International Offshore and Polar Engineering Conference. Dr. J. Lam was appointed Advisory Professor of South China University of Technology. Dr. A.K. Soh serves on the Editorial Board of the International Journal of Nonlinear Modelling in Science and Engineering. Dr. K.Y. Sze served on the Scientific Committee of the International Conference on Computational Engineering Science (August 2001, Mexico). Dr. L.Q. Wang was invited to present a keynote lecture at the First M.I.T. Conference on Computational Fluid and Solid Mechanics (June 2001, USA).

China Information Technology and Law Centre

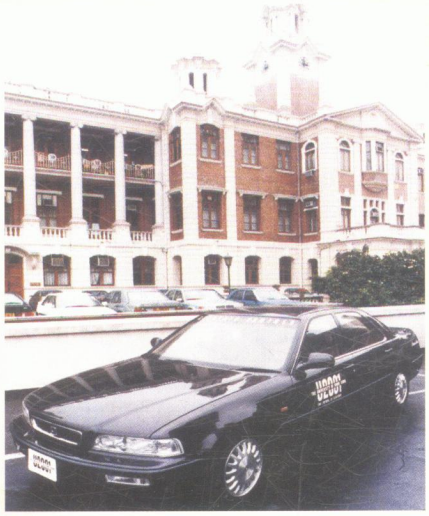
The China Information Technology and Law Centre is jointly established by the Department of Computer Science and Information Systems and the Department of Law in 2002. The Centre's mission is to provide a public interest focus for research, public service and education in Hong Kong and China concerning the inter-relationships of law, policy and technology. Its work encompasses information technology law, intellectual property, computer forensics and the computerisation of legal information and practices.

The scope of the Centre's work will cover four areas of the relationship between law and technology: (a) information technology law, (b) intellectual property, (c) computer forensics and (d) computerisation of legal information and practices.

The combination of legal and computing expertise from the two Departments is unique among 'law and technology' centres in the world. It creates opportunities for research, consultancy and other activities that neither Department could undertake as effective relying only on its own resources.

International Research Centre for Electric Vehicles

The International Research Centre for Electric Vehicles (IRCEV) was established in 1986 in collaboration with the University of Hawaii and with the support from the US Department of Energy and the Electric Power Research Institute, USA. Professor C.C. Chan is the Director of the Centre and Dr. K.T. Chau is the Co-Director. The IRCEV is a leading intellectual centre for research, development, technology transfer and international promotion of electric vehicles (EVs). Its missions are: to become an international authority in the arena of EV technology; to catalyse the collaboration between industries and universities for the promotion of EVs in Asia Pacific; and to serve as the prime agent for EV technology transfer and consultancy for governments, utilities and industries in the region. The group has over 20 years of experience. Its research and technology transfer activities include: (1) Electric propulsion. With the development of advanced

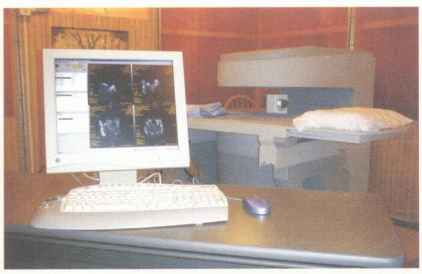


A showcase electric vehicle with advanced technologies developed by IRCEV

electric motors, high-power converters and intelligent controllers, modern EVs can achieve higher efficiency, higher power density, and better controllability. (2) System integration and optimisation, and mixed-signal simulation. Due to the multidisciplinary nature of EV technology, a mixed-signal simulation tool has been identified to be crucially important for system-level analysis and optimisation. (3) Energy sources and management. Including batteries, fuel cells, ultracapacitors and ultrahigh-speed flywheels, recent energy sources are employed and even hybridised for EV applications. Also, artificial intelligence has been adopted by the on-line energy management system to maximise the system efficiency and hence the EV driving range. (4) Impacts to power system and environment. The recharge of EVs during off-peak hours can perform the load leveling of power system, facilitating system management and utilisation, as well as the study of minimising the harmonious impacts to the power system. Electric vehicles are green transportation means for the 21st century, they are clean, efficient and intelligent. The use of EVs can enhance energy diversification, offer higher energy conversion efficiency than gasoline vehicles, and minimise global emissions (actually zero local emissions). A monograph *Modern Electric Vehicle Technology* is published by Oxford University Press in September 2001 to celebrate the 90th Anniversary of The University of Hong Kong and the 10th Anniversary of the World Electric Vehicle Association. The research project, together with the research in the power system, have been selected as an Area of Distinction by the University in 1999.

The Jockey Club Magnetic Resonance Imaging Engineering Centre

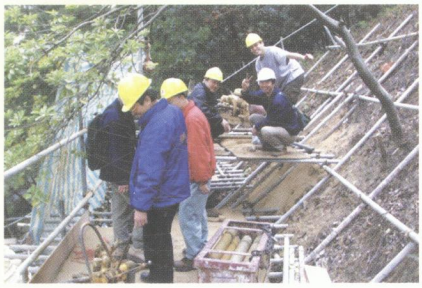
The Jockey Club Magnetic Resonance Imaging Engineering Centre was established in August 1998 under the auspices of The Hong Kong Jockey Club Charities Trust and The University of Hong Kong Foundation for Educational Development and Research. Its mission is to establish a world-class centre for the advancement of medical engineering science, clinical diagnosis, and community health care in Hong Kong and Greater China. Professor E.S. Yang, Chair of Microelectronic Engineering of the EEE Department is the Centre's Director. Developing a cutting-edge technology for magnetic resonance (MR) system to improve both MR research and clinical applications has been the focus of the Centre since its inception. An initial effort was the development of the High Temperature Superconducting (HTS) coil and the building of a low field, low cost and high performance MR system, characterised by light weight and movable design.



The second MR system built with a 0.2T horizontal magnet. Both the hardware and software of the system were designed by a team of HKU-graduated engineers in our Centre

A strong collaborative relationship with local hospitals has enabled the Centre to carry out research projects, working hand in hand with medical researchers or physicians in hospitals such as St. Paul's Hospital, Queen Mary Hospital and Duchess of Kent Children's Hospital. On the other hand, the Centre also welcomes the exploration of interesting and novel research study, and one example is the investigation into the scientific foundation of traditional Chinese medicine techniques with the latest Western technology. Innovative use of functional magnetic resonance imaging (MRI) to study acupuncture therapy on stroke patients has opened up a new window for research in this area. The Centre has also secured substantial support from the Innovation and Technology Support Fund.

The Jockey Club Research and Information Centre for Landslip Prevention and Land Development



Field testing for landslip prevention

The Centre was established in 1998 with funding support from The Hong Kong Jockey Club Charities Trust, as well as strong support from the Works Bureau and the Geotechnical Engineering Office of the Government of the Hong Kong SAR. The objectives of the Centre are to provide Hong Kong with strong technical support and a comprehensive source of information for improving slope and developing land in Hong Kong, and to promote the professional service capacity of Hong Kong and Mainland China and gain world recognition in the area of slope safety. The Centre is composed of 2 parts, the Information Facility and the Research Facility. The Information Facility provides the public with access to underground utilities and geotechnical information; it also serves as an agent to provide necessary information to the Research Facility. The Research Facility conducts research related to landslip formation, risk assessment and mitigation. It serves as an agent of technology transfer among the Government, industry and research institutes in Hong Kong as well as with Mainland China. Current active research projects include "Analysis of Saprolite Microstructure and Properties", "Behaviour of Loose Fill Slopes and Stabilisation with Soil Nails", "A Spatial-Temporal Approach to Landslide Hazard Modelling using Multi-Temporal Ariel Photographs and GIS Technology", and "A New In-Situ Technique for Weathered Rocks with Special Applications to Soil Nailing Technology."

Rock Engineering Research Centre

MTS triaxial compression testing machine (capacity 4500kN) for testing rock samples

The Rock Engineering Research Centre was established in 1998 with funding by the RGC. The objectives of the Centre are to provide an independent focus for research into all aspects of rock mechanics, establish a comprehensive database on the properties of local rocks, provide facilities for applied research in enhancing design techniques of local geotechnical engineers, and facilitate international collaboration and academic exchange. The Centre has major systems and equipment for rock testing and research, including MTS Universal Testing System, Acoustic Emission System, Thin-section Petrographic Study Set, Rock Specimen Preparation Set and Microscopic Study System. The Centre undertakes many collaborative research projects with local and international scholars and has established close links with leading research organisations in Mainland China and prominent overseas research institutes. Ongoing research programmes involve mainly the studies on rockburst characteristics, creep behaviour of soft rock, microscopic study on cracks, acoustic emission, rock cracking and crack propagation as well as the effect of lateral strain control on the post peak behaviour of rock specimens.

5. INTERNATIONAL CONFERENCES/SYMPOSIUMS ORGANISED BY FACULTY, DEPARTMENTS AND RESEARCH CENTRES (1996 - 2001)

5.1 Faculty of Engineering

Event	Date	Co-sponsor/Co-organiser
90th Anniversary Symposium "Engineering and You"	Nov 30 – Dec 1, 2001	-

5.2 Department of Civil Engineering

Event	Date	Co-sponsor/Co-organiser
Centre for Asian Tall Buildings and Urban Habitat's (CATBUH) Inaugural Conference on Asian Urban Habitats – 21st Century Trends	Oct 23, 1997	-
3rd Conference of Hong Kong Society for Transportation Studies	Dec 5, 1998	HKPU and HKUST
5th International Conference on Tall Buildings	Dec 9-11, 1998	Tongji University
7th International Symposium on River Sedimentation and the Second International Symposium on Environmental Hydraulics	Dec 16-18, 1998	International Research and Training Centre on Erosion and Sedimentation
Symposium on Tall Building Design and Construction Technology	Jun 2-4, 1999	Works Bureau of the Government of HKSAR, The Design Administration Bureau of the Ministry of Construction and China Academy of Building Research
Symposium on Recent Development of Theory and Practice in Geotechnology	Dec 9-10, 1999	Kyushu Branch of The Japanese Geotechnical Society and Tongji University
Workshop on Research and Monitoring of Long Span Bridges	Apr 26-28, 2000	Carleton Bridge Research Institute of Carleton University and Tongji University
Symposium on Slope Hazards and their Prevention	May 8-10, 2000	CAS-HKU Centre for Slope Engineering Research, and Comprehensive Institute of Geotechnical Investigation and Surveying, Ministry of Construction
The Croucher Foundation Advanced Study Institute on Recent Developments in Coastal Eutrophication Research: Prediction, Decision Support Systems, and Management	Feb 5-12, 2001	The Croucher Foundation
3rd International Conference on Soft Soil Engineering	Dec 6-8, 2001	HKPU, HKUST and The Association of Geotechnical Specialists
14th Southeast Asian Geotechnical Conference	Dec 10-14, 2001	The Hong Kong Institution of Engineers (HKIE) and Geotechnical Engineering Office

5.3 Department of Computer Science and Information Systems

Event	Date	Co-sponsor/Co-organiser
ACM Symposium on Virtual Reality Software and Technology	Jul 1996	ACM
International Conference on Distributed Computing Systems	May 1996	-
Pacific Rim International Symposium on Dependable Computing	Dec 1999	-
4th International Conference/Exhibition on High-Performance Computing in Asia-Pacific	May 2000	-
Geometric Modelling and Processing Conference	Apr 10-12, 2000	KC Wong Education Foundation
1st International Conference on Parallel and Distributed Computing, Applications and Technologies	May 22-24, 2000	-
Pacific Graphics Conference	Oct 2-5, 2000	KC Wong Education Foundation
1st Asia-Pacific Conference in Quality Software	Oct 30-31, 2000	IEEE HK Section Computer Chapter, British Computer Society HK Section
Speech Technology Forum	Dec 11, 2000	IEEE HK Chapter of Signal Processing, HKIE IT Division, IEEE HK Section, IEE(HK) Specialized Section in Electronics
5th Pacific-Asia Conference on Knowledge Discovery and Data Mining	Apr 16-18, 2001	SAS, IEEE HK, ACM HK, ET Net, HK Computer Society, HK Productivity Council
10th International World Wide Web Conference	May 2001	-
1st International Conference on Human.Society@Internet	Jul 2001	-
2nd International Conference on Parallel and Distributed Computing, Applications, and Technologies	Jul 9-11, 2001	-
25th Annual International Computer Software and Applications Conference	Oct 8-12, 2001	IEEE Computer Society
8th Pacific Conference on Computer Graphics and Applications	Oct 2001	-
ACM Symposium on Virtual Reality Software and Technology	Nov 15-17, 2001	ACM and SIGGRAPH
2nd Asia-Pacific Conference in Quality Software	Dec 10-11, 2001	British Computer Society HK Section, IEEE HK Section Computer Chapter

5.4 Department of Electrical and Electronic Engineering

Event	Date	Co-sponsor/Co-organiser
Symposium on Personal, Mobile and Spread Spectrum Communications	Dec 3-5, 1996	ISF/IEE
New Developments of Mobile and Spread Spectrum Technologies	Dec 4, 1996	ISF
Symposium on MRI Research and Clinical Applications 1998	Apr 28, 1998	Jockey Club Charities Trust, HKU Foundation, General Electric Medical Systems (HK) Ltd.
Symposium on MRI Research and Clinical Applications 1999	Apr 30, 1999	Jockey Club Charities Trust, HKU Foundation, General Electric Medical Systems (HK) Ltd.
Switching Power Supply Workshop	Jun 17, 1999	ITF
Symposium on MRI Research and Clinical Applications 2000	Apr 28, 2000	Jockey Club Charities Trust, HKU Foundation, General Electric Medical Systems (HK) Ltd.
2nd Workshop on the Switching Power Converter Development Program	Jul 7, 2000	ITF
Workshop on Third Generation (3G) Mobile Technologies and Applications	Nov 29, 2000	IEEE Circuits and Systems Society
Symposium on Advanced MRI Clinical Applications: Non-Proton MRI, Neuro MRI and MR Spectroscopic Imaging 2001	Apr 14, 2001	Jockey Club Charities Trust, HKU Foundation, General Electric Medical Systems (HK) Ltd.
Asian Telecommunications Workshop	Jun 1, 2001	International Technology Research Institute (ITRI) of USA
Symposium on IT Excellence for Development of Hong Kong, 90th Anniversary of HKU.	Dec 15, 2001	-

5.5 Department of Industrial and Manufacturing Systems Engineering

Event	Date	Co-sponsor/Co-organiser
CIRP International Symposium on Advanced Design and Manufacture in the Global Manufacturing Era	Aug 1997	HKUST, CityU HK, Vocational Training Councils
Symposium on Logistics Management	Nov 2000	Sun Logistics Company Ltd. and Sun Hung Kai Properties Ltd.

5.6 Department of Mechanical Engineering

Event	Date	Co-sponsor/Co-organiser
2nd International Symposium on Hydrodynamics	Dec 16-19, 1996	The Croucher Foundation, K.C. Wong Education Foundation, National Natural Science Foundation of China, Tainan Hydraulics Laboratory, NCKU Research & Development Foundation, and HKUST
International Conference on Manufacturing Automation (ICMA'97)	Apr 28-30, 1997	K.C. Wong Education Foundation, Leeport (Holdings) Ltd., Dept. of Mech. & Automation Engg. of CUHK, William W.M. Mong Engineering Research Fund of the Faculty of Engineering of HKU
Geometric Modeling and Processing 2000	Apr 10-12, 2000	K.C. Wong Education Foundation, Spatial Technology
IFAC Conference on New Technologies for Computer Control NTCC 2001	Nov 19-22, 2001	Organised by CAI Division of HKIE; Sponsored by IFAC, HKU and CityU HK

6. DISTINGUISHED LECTURES ORGANISED BY FACULTY, DEPARTMENTS AND RESEARCH CENTRES (1996-2001)

6.1 Faculty of Engineering

6.1.1 William Mong Distinguished Lectures

Speaker	Date	Topic
Professor Pravin Varaiya, James Fife Professor of Electrical Engineering and Computer Science at the University of California Berkeley	May 22, 1996	The Automated Highway - An Ultimate Solution for Traffic Jams
Professor Hector Garcia-Molina, Leonard Bosack and Sandra Lerner Professor in the Department of Computer Science and Electrical Engineering at Stanford University	May 23, 1996	The Universal Library of the Future: Overview of the Stanford Digital Library Project
Professor Raj Reddy, Dean of the School of Computer Science of the Herbert A. Simon University and Professor of Computer Science and Robotics at Carnegie Mellon University	Jan 13, 1997	All Authored Works On-line: A Global Infrastructure for Universal Access to Information
Professor Theodore Yaotsu Wu, California Institute of Technology	Apr 16, 1997	Remarkable Nonlinear Waves
Professor Herbert B. Voelcker, Charles Lake Chair in Mechanical Engineering at Cornell University	May 1, 1997	The Evolution of Technologies for Specifying Form in Manufactured Goods
Professor H. Vincent Poor, Professor of Electrical Engineering at Princeton University	May 28, 1997	Adaptive Multiuser Detection in Wireless Communication Systems
Professor Eric Mazur, Gordon McKay Professor of Applied Physics and Professor of Physics at Harvard University	Nov 5, 1997	Stopping Time
Professor Friedrich H. Busse, Professor of Theoretical Physics at the University of Bayreuth in Germany and Professor in Residence of Geophysics and Planetary Physics at the University of California at Los Angeles	Mar 23, 1998	Dynamics of Rotating Fluids and the Band Structure of Jupiter
Professor Wolfgang K. Giloi, Professor Emeritus, Berlin Technical University, and Award Winner of the Diesel Medal in Germany	Apr 22, 1998	Architectural Innovations that Maximise True Performance in Distributed-Memory Computers
Professor Toshiro Terano, Executive Director, Laboratory for International Fuzzy Engineering (LIFE), Tokyo Institute of Technology	Nov 5, 1998	The Past, Present & Future of Fuzzy Engineering
Professor Jorg Imberger, Award Winner of the Stockholm Water Prize and Chair of the Western Australian Estuarine Research Foundation	Dec 14, 1998	Dispersion and Mixing of Wastewater in the Coastal Regime
Professor Christopher J. Harris, Fellow of the Royal Academy of Engineering, and Professor of Computational Intelligence at the University of Southampton	Mar 11, 1999	Intelligent Traffic Control and Management

Professor Robert G. Gallager, Professor of Electrical Engineering at the Massachusetts Institute of Technology, and Recipient of the Medal of Honour from The Institute of Electrical and Electronics Engineers, Inc.	Mar 29, 1999	The Changing Role of Research in Communication and Network Technology
Professor Chiang C. Mei, Edmund K. Turner Professor of Civil and Environmental Engineering at the Massachusetts Institute of Technology	Mar 27, 2000	The Storm Gate Project for Venice Lagoon
Professor Stephen R. Forrest, Fellow of Institute of Electrical and Electronic Engineers, and Chairman of Department of Electrical Engineering's Centre for Photonics and Optoelectronic Materials at Princeton University	May 25, 2000	Organic Thin Film Devices and Circuits: The Path to Molecular Optoelectronics
Professor Rafael L. Bras, Bacardi and Stockholm Water Foundation Professor, and Head of Department of Civil and Environmental Engineering at the Massachusetts Institute of Technology	Dec 15, 2000	Water, Environment, and Climate Change
Professor Arogyaswami Paulraj, Fellow of Institute of Electrical and Electronic Engineers, and Professor of Electrical Engineering at Stanford University	May 15, 2001	Smart Antennas for Broadband Wireless Communications
Professor R.W. Brodersen, John Whinnery Professor of Electrical Engineering at the University of California at Berkeley, Member of the US National Academy of Engineering, and Recipient of the Millennium Award of IEEE	Jun 7, 2001	Wireless Systems-on-a-Chip Design
Professor K.C. Hwang, Director of Institute of Engineering Mechanics at Tsinghua University, and Member of the Chinese Academy of Sciences	Jun 18, 2001	Recent Advances on Strain Gradient Plasticity
Professor R.V. Thompson, Professor Emeritus of Marine Engineering at University of Newcastle upon Tyne, and Former Centenary World President, Institute of Marine Engineers	Oct 22, 2001	The Supersonic Boundary Layer and Its Application

6.1.2 Faculty of Engineering Distinguished Lectures and Special Lectures

Speaker	Date	Topic
Madame Qian Zhengying, Vice-Chairman of the Chinese People's Political Consultative Conference National Committee	Dec 1, 1997	Water Conservancy and Flood Control in China
Professor Chang-Lin Tien, NEC Distinguished Professor of Engineering, University of California, Berkeley	Mar 20, 1998	Development Trend of Higher Education in the 21st Century
Professor Charles K. Kao, Former Vice-Chancellor of The Chinese University of Hong Kong	Nov 24, 1998	Fiber Optics: A Personal Story

Professor Paul S. Ho, Cockrell Family Regents Chair in Materials Science and Engineering, and Director of the Laboratory for Interconnect and Packaging at the University of Texas at Austin	Mar 5, 1999	Materials Science and Electronic Packaging
Dr. Craig R. Barrett, President and Chief Executive Officer, Intel Corporation	Apr 27, 1999	Winning in the Digital Economy: Challenges and Opportunities for Hong Kong
Dr. Mu-Yue Ben Hsiao, IBM Fellow, and Member of the IBM Academy of Technology	Nov 19, 1999	The Evolution of Information Technology into the 21st Century
Dr. Han-Chung Wang, Senior Consultant, Industrial Technology Research Institute, Hsinchu, Taiwan	Mar 24, 2000	Micro-Mechanics and Micro-Optics for Advanced Product Development
Professor Gérard Huet, Research Director at the French National Institute for Research in Computer Science and Automatic Control, and Member of the French Academy of Sciences and of Academia Europaea	May 31, 2001	25 Years of Formal Methods and Tools at INRIA: An Overview
Professor Tony M. Ridley, Emeritus Professor of Transport Engineering, Department of Civil and Environmental Engineering, Imperial College, UK	Nov 15, 2001	The Globalisation of Urban Transport

6.2 Department of Civil Engineering

6.2.1 The Hong Kong - Mainland China Geotechnical Lecture Series

Speaker	Date	Topic
Dr. Yin Yueping, Deputy Chief Geologist, Chinese Institute of Geo-environmental Monitoring, China	Feb 12, 2001	Stability Analysis and Optimal Anchoring Design for Lianziya Huge Unstable Rock Mass on the Bank of the Yangtze River at the Three Gorges
Professor Luo Guoyu, Research Professor, Nanjing University, China	Feb 12, 2001	Seepage Deformation and Slope Stability of Suspended Rivers in Mainland China
Dr. Zeng Xianming, Senior Engineer, Luoyang Hydraulic Engineering Technology Institute, China	May 7, 2001	Investigation of the Dangerous Conditions for Geotechnical Works in Xuzhou and the Flow-convex Failure Model
Professor Zhou Fengjun, Director, Luoyang Hydraulic Engineering Technology Institute, China	May 7, 2001	Spread Application and Recent Development of the Cable Anchor Support Techniques for Mountain Slope Engineering
Professor Lin Zaiguan, Chief Engineer, Northwest Research Institute of Engineering Investigations and Design, China	Sep 11, 2001	Analysis of the Results of In-situ Soil Nailing Test Projects

Professor Lu Yaoru, Professor, Chinese Academy of Geological Sciences	Sep 11, 2001	Basic Features of Karst Development and Karst Collapse Hazards
Professor Qian Qihu, Professor at Polytechnical University of PLA and Member of the Chinese Academy of Engineering	Dec 21, 2001	The Fourth Wave in the Development of Geotechnical Engineering
Professor Chen Zuyu, Senior Research Engineer, China Institute of Water Resources and Hydropower Research, China	Dec 21, 2001	The Limit Analysis for Slopes: Theory, Methods and Applications

6.2.2 Other Public Lectures

Speaker	Date	Topic
Professor John Black, Foundation Professor of Transport Engineering, The University of New South Wales, Australia	Nov 11, 1998	Urban Transport – Economic Progress or Environmental Disaster?
Inaugural Ceremony of Rock Engineering Research Centre – Opening Lectures **Professor S. Sakurai**, President, International Society for Rock Mechanics, Japan; **Professor J. Sun**, Academician, Chinese Academy of Sciences, China; **Professor C. Fairhurst**, University of Minnesota, USA	Oct 23, 1998	Determination of Strength Parameters of Rocks by Means of Back Analysis of Measured Displacements; A Study of 3-D Nonlinear Rheological Behaviour of Soft Rocks – Applications in Environmental and Safety Problems due to Underground Construction; Closing the Gap between Theory and Reality in Rock Mechanics
Professor N. R. Morgenstern, Emeritus Professor of Civil Engineering, University of Alberta, Canada	May 10, 2000	Inaugural Lumb Lecture: Performance in Geotechnical Practice

6.3 Department of Electrical and Electronic Engineering

6.3.1 Leung Wai Sun Distinguished Lectures

Speaker	Date	Topic
Professor M.A. Rahman, Professor of Engineering and University Research Professor, Memorial University of Newfoundland	Apr 27, 1998	Modern Permanent Magnet Motor Drives in Electronics and Computer World
Professor C.C. Liu, Professor of Electrical Engineering, University of Washington	Jun 15, 1998	Reliability, Economics and Power Quality in a Competitive Power Industry Environment
Professor T. Hey, Professor of Computation and Head of the Department of Electronics and Computer Science, University of Southampton	May 27, 1999	Quantum Computing: Progress and Prospects
Professor J Thorp, Director, School of Electrical Engineering, Cornell University	Jul 31, 2000	Reliability of Large Scale Power Interconnection and Deregulation of Power System
Professor D. Schroder, Institute of Electrical Drives, Technical University of Munich, Germany	Apr 11, 2001	Hybrid-Autarky-Car

6.3.2 Other Public Lectures

Speaker	Date	Topic
Professor Vincent W.S. Leung, Emeritus Professor, Master of the Robert Black College	Oct 26, 2000	The Making of a Favourable Impression

6.4 Department of Mechanical Engineering

6.4.1 Mechanical Engineering Distinguished Lectures

Speaker	Date	Topic
Professor Tien Chang-Lin, NEC Distinguished Professor of Engineering at the University of California, Berkeley	Mar 20, 1998	Development Trend of Higher Education in the 21st Century
Professor Charles K. Kao, Director, Transtech Services Ltd	Sep 25, 1998	Engineering the Future
Professor John Spence, Pro Vice-Principal, University of Strathclyde and President, IMechE	Jan 8, 1999	Engineering Education: Changes in the UK
Professor Lu Yong-Xiang, President, Chinese Academy of Sciences	Apr 16, 1999	Era of Knowledge-based Economy and Future Development of Science & Technology
Professor R.E. Smallman, Former Vice Principal, The University of Birmingham	Nov 12, 1999	The End of a Millennium - Global Trends and Challenges

7. DISTINGUISHED VISITORS

7.1 Distinguished PRC Scholars awarded the Croucher Foundation Chinese Visitorship (1995-2001)

Award Year	Host Department	Name of the Visiting Scholar	Affiliation
1995-1996	Civil Engineering	Professor Wang Guangqian	Tsinghua University
1996-1997	Electrical and Electronic Engineering	Professor Luo Yi	Tsinghua University
1997-1998	Mechanical Engineering	Professor Yin Guofu	Sichuan Union University
1998-1999	Civil Engineering	Professor Wang Peng	Harbin Institute of Technology
1999-2000	Mechanical Engineering	Professor Fang Dai-ning	Tsinghua University
2000-2001	Mechanical Engineering	Professor Liu Jinxi	Shijiazhuang Railway Institute
2000-2001	Civil Engineering	Professor Xu Zhaoyi	Nanjing University
2001-2002	Mechanical Engineering	Professor He Pengfei	Tongji University

7.2 Other Distinguished Visitors (1998 – 2001)

7.2.1 Department of Civil Engineering

Year	Name	Position/Organization
1998	Professor J. Black	Professor of Transport Engineering and Head, Department of Transport Engineering, School of Civil Engineering, University of New South Wales, Australia
1998	Professor J.P. Carter	Head, School of Civil and Mining Engineering, University of Sydney, Australia
1998	Professor Guoren Dou	Director, Nanjing Hydraulic Research Institute, Nanjing, China
1998	Professor C. Fairhurst	Emeritus Professor, Department of Civil Engineering, University of Minnesota, USA
1998	Professor S. Sakurai	President, International Society for Rock Mechanics, Department of Architecture and Civil Engineering, Kobe University, Kobe, Japan
1998	Professor J. Sun	Vice-President at Large, International Society for Rock Mechanics, Tongji University, Shanghai, China
1998	Professor Zhaoyin Wang	Vice-Secretary General, International Research and Training Centre on Erosion and Sedimentation, Beijing, China
1998	Professor R.F. Warner	Department of Civil and Environmental Engineering, University of Adelaide, Australia
1999	Professor R.E. Allsop	Professor of Transport Studies, Centre for Transport Studies, University College London, UK
1999	Professor J. Croll	Chadwick Professor of Civil Engineering, Head, Department of Civil and Environmental Engineering, University College London, UK
1999	Dr. B. Fellenius	President, Urkkada Technology Ltd, Canada
1999	Professor G. Hancock	BHP Steel Professor of Steel Structures, Centre for Advanced Structural Engineering, Civil Engineering, University of Sydney, Australia
1999	Professor I.R. Wood	Department of Civil Engineering, University of Canterbury, New Zealand
2000	Professor K.P. Chong	Mechanics and Materials Program Director, Engineering Directorate, National Science Foundation, USA
2000	Professor F.H. Kulhawy	School of Civil and Environmental Engineering, Cornell University, USA

2000	Professor Wu-Seng Lung	Professor of Civil Engineering, University of Virginia, USA
2000	Professor R. McCaffer	Deputy Vice Chancellor and Professor of Construction Management, Department of Civil and Building Engineering, University of Loughborough, UK
2001	Professor Jianhua Tao	Department of Mechanics, Tianjin University, Tianjin, China
2001	Professor Y.B. Yang	Dean, College of Engineering, National Taiwan University, Taipei, Taiwan
2001	Professor B.C. Yen	Professor of Civil Engineering, Department of Civil and Environmental Engineering, University of Illinois, Illinois, USA

7.2.2 Department of Electrical and Electronic Engineering

Year	Name	Position/Organization
1998	Professor Huk Yuk Cheh	Chair Professor & Former Chairman of Chemical Engineering, Columbia University, USA
1998	Professor Han Fu Chen	Institute of Systems Science, Chinese Academy of Sciences, China
1998	Professor Zhijian Hou	Dean, College of Electric Power, Shanghai Jiao Tong University, China
1998	Professor Ferenc A. Jolesz	Chair Professor of Radiology, Harvard Medical School, Member of NAS, MRI Research & Clinical applications
1998	Professor Charles Kao	Former VC, Member of NAE, The Chinese University of Hong Kong
1998	Professor Jian Dong Li	Xidian University, Xi'an, China
1998	Professor San Li Li	Former Head, Department of Computer Engineering, Tsinghua University, China
1998	Professor CL Liu	President, National Tsinghua University, Taiwan
1998	Professor Ruey-wan Liu	Chair Professor of Electrical Engineering, University of Notre Dame, USA
1998	Professor Eric Mazur	Chair Professor of Applied Physics, Harvard University, USA
1998	Professor Wei Dou Ni	Former Vice-President (R&D), Tsinghua University, China
1998	Professor S M Sze	Distinguished Chair Professor, Director of Microelectronics and Information Systems Research Centre, National Chiao Tung University, Taiwan
1998	Mr John Taylor	IEE President
1998	Professor Xi Fan Wang	Xi'an Jiaotong University, China
1998	Professor Xuan Wang	Academician, Chinese Academy of Sciences, CEO of Peking University Founder Group, Beijing, China
1998	Professor Yousheng Wang	Zhejiang University, China
1998	Professor Yusheng Xue	Academician, Chinese Academy of Engineering, Nanjing Automation Research Institute, China
1998	Professor Er Keng Yu	China EPRI, China
1998	Professor Yixin Yu	School of Electrical and Energy, Tianjin University, China
1998	Dr. Robert Yung	Research Director, Intel Research Center, China and CTO Asia-Pacific, Intel, USA
1999	Professor J.F. Eastham	Professor, Department of Electronic and Electrical Engineering, University of Bath, UK
1999	Professor Feili Huang	Division Chief of Electrical Engineering, National Natural Science Foundation of China, China
1999	Professor Tony Hey	Head, Department of Electronics and Computer Science, University of Southampton, UK
1999	Professor Qiang Lu	Director of National Key Power System Lab, Academician, Chinese Academy of Sciences, Tsinghua University, China
1999	Professor Yongjun Lu	Professor, Department of Biomedical Engineering, Institute of Basic Medical Sciences
1999	Professor Zhen Qi Song	Academician, Chinese Academy of Engineering, Shangdong Institute of Mining and Technology, China

1999	Professor Yao Zhang	Dean of the college of Electrical Engineering, South China University of Technology
2000	Professor Yunping Chen	Dean, College of Electric Power, Wuhan University, China
2000	Professor Chunbo Feng	Academician, Chinese Academy of Sciences, Southeast University, China
2001	Professor R.W. Brodersen	Professor of Electrical Engineering and Computer Science, University of California, Berkeley, USA
2001	Professor Daniel C. Tsui	Professor of Electrical Engineering, Princeton University, USA

7.2.3 Department of Industrial and Manufacturing Systems Engineering

Year	Name	Position/Organization
1998	Professor Toshiro Terano	Tokyo Institute of Technology, Japan
1999	Professor Z.J. Chen	Beijing University of Aeronautics and Astronautics, Beijing, China
1999	Professor R.H. Hollier	Manchester University of Science and Technology, UK
1999	Dr. X.G. Zhang	Flight Automatic Control Research Institute, Aviation Industries of China, Xi'an, China
2000	Professor A.W.J. Chisholm	The University of Salford, UK
2001	Professor A.S. Carrie	University of Strathclyde, UK
2001	Professor A.H. Christer	The University of Salford, UK

7.2.4 Department of Mechanical Engineering

Year	Name	Position/Organization
1998	Professor Da-Hong Qiu	Academician, Chinese Academy of Sciences, Dalian University of Technology
1998	Professor Theodore H.H. Pian	Professor, Massachusetts Institute of Technology, USA
1998	Professor Chiang C. Mei	Professor, Massachusetts Institute of Technology, USA
1998	Professor Da-Jun Wang	Professor, Peking University, China
1998	Professor Charles K. Kao	Director, Transtech Services Ltd. (Former Vice-Chancellor of the Chinese University of Hong Kong)
1999	Professor Lu Yong-Xiang	President, Chinese Academy of Sciences
1999	Professor Yiu-Wing Mai	Professor, The University of Sydney, Australia
1999	Professor John Spence	Vice-Principal, University of Strathclyde and President of IMechE
1999	Professor C.J. Harris	Head, Department of Electronics & Computer Sciences, University of Southampton, UK
1999	Professor R.E. Smallman	FRS, Former Vice Principal of the University of Birmingham, UK
2000	Professor D. Dutta	Managing Director, Graduate Professional Programme, College of Engineering, University of Michigan, USA
2000	Professor G.C. Sih	Professor, Lehigh University, USA
2000	Professor Les A. Piegl	University of South Florida, USA
2000	Professor Alan E. Middleditch	Professor, Brunel University, UK
2000	Professor Nabil Gindy	Professor, University of Nottingham, UK
2000	Professor Huajian Gao	Professor, Stanford University, USA
2001	Professor R. Grimshaw	Professor, Loughborough University, UK

8. TITLES OF POSTGRADUATE RESEARCH THESES (1998-2001)

8.1 Doctor of Philosophy

8.1.1 Department of Civil Engineering

Quazi Hamidul BARI	Effect of different modes of aeration on composting of solid waste in a closed system
CHAN Hau Cheung	Investigation of a round jet into a counterflow
CHAN On Chim	Characterization of microbial consortia in anaerobic granular sludge - a ribosomal RNA-based molecular approach
CHEN Hong	Mechanisms and modelling of landslides in Hong Kong
CHENG Yuansheng	Vibration analysis of bridges under moving vehicles and trains
DING Qiang	Buffeting analysis of cable-supported bridges under turbulent wind in time domain
DISSANAYAKE Pujitha Bandara Gamagedera	Stochastic approach of modelling large-scale moisture transport in partially saturated porous media
EKAMBARAM Palaneeswaran	Contractor selection systems for design-build projects
Feleke-AREGA-Woldemariam	A diagenetic two-layer eutrophication model for Tolo Harbour, Hong Kong
GURUNG Ai Bahadur	Analysis and prediction of hydrometeorological time series by dynamical systems approach
HE Xiaogang	Constitutive modeling of reinforced concrete for nonlinear finite element analysis
HU Jindong	Elastic fracture of annulated structures analyzed by distributed dislocation
LAU Wai Cho Ivan	Removal of refractory chemicals in landfill leachate by UASB and advanced oxidation processes
LI Lian	Microscopic study and numerical simulation of the failure process of granite
LIU Hao	Acoustic emission and crack development in rocks
MAHANAMA Sarith Prasad Panditha	Distributed approach of coupling basin scale hydrology with atmospheric processes
MORA Carlos Fernando	Particle size and shape analysis of coarse aggregate using digital image processing
REZAUR Rahman Bhuiyan	Studies on interrill sediment delivery and rainfall kinetic energy
TEAGUE Frederick Thomas	Characterization of road materials and environmental conditions for the analysis and design of flexible pavements in Hong Kong
UDAKARA Deepthi De Silva	Experimental study of a modified flat dilatometer under plane strain condition
XU Lichong	Anaerobic corrosion of mild steel in seawater induced by sulfate-reducing bacteria (SRB)
YEUNG Ngai	Viscous-damping walls for controlling wind-induced vibrations in buildings
ZHAI Yang	Fundamental shear behavior of saturated loose fills of completely decomposed rocks
ZHANG Tong	Characteristics of Sulfate-Reducing Bacteria biofilm and other microbial communities in wastewater treatment
ZHANG Xueqing	Procurement of privately financed infrastructure projects
ZHANG Yixia	Refined non-conforming linear and nonlinear finite element analysis
ZHENG Dingyang	Vibration and stability analysis of plate-type structures under moving loads by analytical and numerical methods
ZHENG Wei	Shock vibration resistance and direct tensile strength of concrete
ZHOU Guolin	Complete stress-strain behaviour for shear failure of rocks
ZHOU Maichun	Modified Xinanjiang Model and its incorporation with GIS and TOPMODEL

8.1.2 Department of Computer Science and Information Systems

CHAN Wun Tat	Efficient algorithms for disjoint paths problems in grids
LEE Kwok Wai Joseph	Information retrieval on the World Wide Web
MA Bin	A study on acoustic modeling and adaptation in HMM-based speech recognition
SUNG Wing Kin	Fast labeled tree comparison via better matching algorithms
TO Kar Keung	On-line deadline scheduling under relaxed metrics of optimality
WONG Pak Kwong	Statistical language models for Chinese recognition - speech and character
YAN Yonghe	A multi-agent based approach to transmission cost allocation
YIP Chi Lap	Discovering patterns in databases - the cases for language, music, and unstructured data
ZHOU Jipeng	Fault-tolerant wormhole routing for mesh computers

8.1.3 Department of Electrical and Electronic Engineering

CHANG Chunqi	Blind signal estimation using second order statistics
CHEN Jihe	Chaos in DC and switched reluctance motor drives
CHENG Ming	Design, analysis and control of doubly salient permanent magnet motor drives
FANG Bin	Verification of off-line handwritten signatures
FUNG Shun Ming	Fast evoked potential estimation by Artificial Neural Networks
HONG Chao	Parallel processing in power systems computation on a distributed memory message passing multicomputer
JIANG Chen	Applications of frequency hopping systems
LAI Hon Seng	An effective methodology for visual traffic surveillance
LEE Siew Wan	Optical properties of intermixed quantum wells and its application in photodetectors
LEUNG Kwong Keung	Fast and efficient video coding based on communication and computation scheduling on multiprocessors
LI Bin	A study of integrated semiconductor thin-film sensors on SiO_2/Si substrate
LO Chi Ming	Analytical evaluation of wireless digital communication performance over fading channels
MAO Jinsong	New design and factorization methods for perfect reconstruction filter banks
NALLANATHAN Arumugam	Filter bank based spread sequences: design and performance in DS/CDMA communications systems
NG Man Hung	Bandwidth-efficient pilot-symbol-aided techniques for fading estimation in multipath fading channels
PATHAK Ajay Kumar	Automated defect detection in textured materials
THAYAPARAN Subramaniam	Delay-locked loop techniques in direct sequence spread-spectrum receivers
WU Baoming	Image-based monitoring and wavelet multi-rhythm analysis of long-term locomotor activity
XING Weiguo	Evaluation and scheduling of private power production
YE Cang	Behavior-based fuzzy navigation of mobile vehicle in unknown and dynamically changing environment
YU Ai	A study of power control in CDMA overlay
ZHANG Ruoju	A new PM hybrid motor drive for electric vehicles
ZHENG Jun	Performance analysis and algorithm design for data-driven IP/ATM label switching systems
ZHONG Junmei	Application of wavelets in image compression
ZHOU Xiangrong	An integrated approach to identification and control system design
ZOU Yuexian	Robust statistics based adaptive filtering algorithms for impulsive noise suppression

8.1.4 Department of Industrial and Manufacturing Systems Engineering

CHENG Tsz Kit	The influence of Chinese cultural values on management behaviour in the People's Republic of China and Hong Kong
CHIU Ka Fai	Structured development of cellular FMS
LAI Po Yan	Effect of visual item arrangement on search performance
LAM Sai Ming	Recognition of machining features - a hybrid approach
LEUNG Wai Man Wanthy	Evolutionary optimisation of industrial systems
LI Wenli	The impact of supplier development on buyer-supplier performance
MOI Havard	Rule-based control of manufacturing systems
NG Koon Hung	Dynamic process planning for flexible manufacturing cells
WONG Yat Sing	Production scheduling for virtual cellular manufacturing systems
XING Shanzhen	A fundamental study on prototyping flexible computing systems
YANG Qinghao	Design of an integrated CAD/CAPP system using spatial and graphic decomposition algorithm
YEUNG Cheong Leung	Quality management system and its association with organizational performance
YU Tat Wai	A study on autostereogram: stereopsis and generation techniques

8.1.5 Department of Mechanical Engineering

CHAN Wing Chi	Modelling of nonlinear stochastic systems using neural and neurofuzzy networks
CHEN Tong	Numerical computations on free-surface flow
CHEN Yongjin	Effects of rolling conditions on texture and microstructure development in α brass
CHIU Wai Kei	Hollowing and reinforcing 3D CAD models and representing multiple material objects for rapid prototyping
CHIU Yu Lung	Effects of Boron doping on the microstructure and mechanical properties of γ/γ' superalloys
CHIU Yuen Wang Alex	Near wake flow interactions of two square cylinders
CHOW Kin Keung	Acceleration of coherent structures in free shear layer
LAI Wing Chiu Derek	The propagation of nonlinear waves in layered and stratified fluids
LAW Chi Wing	The flow structures and vortex interaction in the subcritical regime in the near wake of a circular cylinder
LI Zhongfu	Investigation on a solar powered absorption air-conditioning system with partitioned hot water storage tank
LIN Xiaodan	Morphology and structure development of a PET/PP blend in extrusion, solid-state drawing and annealing
LIU Chun Ho	Numerical modelling of atmospheric boundary layer with application to air pollutant dispersion
LIU Chunyu	Surface reconstruction from 3-D measurement data
LUI Chun Keung Pierre	Surface irregularity models in CAD applications: surface finish and tolerance allocation
MASTI-Sarangapany-Ravish	Vibration damping analysis of cylindrical shells partially coated with constrained visco-elastic layers
NG Hoi Pang	Mechanical and electrical properties of Nickel-Aluminium thin films
NING Hua	The origins of recrystallisation textures in batch annealing steels
SHI Dongping	Design based integration for improving overall quality of selective laser sintered rapid prototypes
SONG Yu	The development of a robot system for the prototyping of large models
SUN Ren	Hydrodynamic interaction between two bodies with rotation
TAM Hei Ka Patrick	Optimization approaches to robust pole assignment in control system design
TANG Chi Kong	The interactions of the two perturbed vortex rings
TSE Yau Yau	Origins of recrystallisation textures in interstitial - free steels
WANG Cuiling	Study on the gasification of scrap tyre
WANG Ying	On-line fault diagnosis of nonlinear dynamical systems using recurrent neural networks

WU Jiaming	Simulation of a two-part underwater towed system
WU Jiangning	Inducing fuzzy reasoning rules from numerical data
XIA Jiyang	Numerical study on wind field and air pollutant dispersion in urban street canopies
YANG Tianliang	Multiplicity and stability of flow and heat transfer in rotating curved ducts
ZHANG Liqian	Optimal H_2 model reduction for dynamic systems
ZHANG Qijun	The Galerkin Element method and power flow in acoustic-structural problems with damped sandwich plates
ZHENG Jianming	VR interfaces for conceptual design using geometric modeling techniques
ZHU Shutang	Interaction between waves and porous seawalls

8.2 Master of Philosophy

8.2.1 Department of Civil Engineering

CHEUNG Wing Man	Dynamic traffic assignment for congested highway network
CHIU Chi Kan	Index properties and a three dimensional failure criterion of rocks
CHU Chin Keung	Parallel computation for time domain boundary element method
HO Ching Ming Johnny	Design and detailing of high strength reinforced concrete columns in Hong Kong
JUNAIDEEN Sainulabdeen Mohamed	The design and performance of a pressure chamber for testing soil nails in loose fill
LAI Tsan Kei	Condition auditing and repair of marine concrete structures in Hong Kong
LEE Siu Lam Anderson	Temperature distribution in steel structures
LI Lin	A semi-analytical self-similar solution of a bent-over jet in crossflow
SUN Shu Ho	A two-dimensional continuum approach to facility location problems
THUNG Kin Tung	Digital PIV techniques for studies of circular cylinder under oscillating flow
TONG Man Vincent	Temperature distribution in highway bridges
WONG Wai Tak	Calibration of new sheared delay formulae for the estimation of queues and delays in transyt
YING Wai Lai	The uncertainties of vertical drain design
YU Feng	Failure characteristics of Hong Kong Granite: laboratory investigation and numerical simulation
YUAN Yuan	Hydrodynamic behaviour of biological aggregates: settling and coagulation with small particles

8.2.2 Department of Computer Science and Information Systems

CHAN Bin	A virtual walkthrough system for complex indoor environments
CHAN Ching Yi	Image retrieval system based on texture and chromatic features
CHAN Wai Man	Medical documents management system using XML
CHENG Chun Kong	View update and temporal correctness in real-time database systems
CHENG Kin Shing Dominic	Studies on facial surface reconstruction from image correspondence
CHEUNG King Bong Sebastian	A computer visualization system for multiple submerged buoyant jets from ocean outfalls
CHEUNG Wang Leung Benny	Migrating-home protocol for software distributed shared-memory system
CHOI Yi King	Computer visualization techniques in surgical planning for pedicle screw insertion
CHUNG Kit Lun	Intelligent agent for Internet Chinese financial news retrieval
FUNG Ping Yuen	Approximation for minimum triangulations of convex polyhedra
HO Man Chung	A recognizer of Guangdonghua-development of speech controlled telephone directory system
HO Sai Chuen	Single I/O space for scalable cluster computing
HO Shuk Ying	Knowledge representation with genetic algorithms

HON Wing Kai	Distance metrics for phylogenies with non-uniform degrees
HONG Kam Kee	Visualization tools for information exploration
HSI Yung Shing Paul	On proportional sampling strategies in software testing
HU Jiuru	Virtual property agency - electronic market with negotiation supports
HUNG Edward	Data cube system design: an optimization problem
KU Yuk Chiu	Partitioning of HOPD program for fast execution on the HKU-UNIX workstation cluster
LAM Wai Wa	Multi-agent based human immune system
LAU Hing Yip	The power of greediness - a general methodology for designing approximation algorithms
LEE Chun Ming	Efficient communication subsystem for cluster computing
LEE Kwok Shing	Convergence of stochastic optimization algorithms
LEE Lei Wah	On improving the relevancy ranking algorithm in web search engine
LEUNG Yuk Leong Daniel	Studies on collision detection using ellipsoidal bounding volumes
LOO Kin Kong	Efficient mining of association rules using conjectural information
LUK Wing Kong	Concept space approach for cross-lingual information retrieval
MA Jin Ming	JESSICA: Java-enabled single-system-image computing architecture
MAK Chi Wah	NAS benchmark evaluation of HKU cluster of workstations
MAK Vivian	Algorithms for proximity problems in the presence of obstacles
NG Chi Yuen	Recommending information sources on WWW
POON Chun Ho	Efficient occlusion culling and non-refractive transparency rendering for interactive computer visualization
TSANG Pong Fan	Enhanced font services for X-window system
WANG Fu Lee	Efficient stabbing algorithms for a set of objects
WANG Lian	A study on quantitative association rules
WANG Yang	Digital video segmentation and annotation in news programs
WONG Kwan Po	High-speed network interface for commodity SMP clusters
WU Sing On	Smoothing the silhouettes of polyhedral meshes by boundary curve interpolation
YAU Cho Ki Joe	Efficient solutions for the load distribution problem
YEUNG Kwok Ho	Panorama interpolation for novel view composition
YIP Wang	Towards a proportional sampling strategy according to path complexity: a simulation study
YUE Hong Wai	Image morphing based on compatible triangulation and mesh interpolation
YUNG King	Apply multi-agent technology to supply chain management

8.2.3 Department of Electrical and Electronic Engineering

CHAN Chi Ho	Fabric surface inspection by Fourier analysis and neural network
CHAN Chuk Hung	Design and evaluation of active power factor correction circuit operating in discontinuous inductor current mode
CHAN Kiu Chui	Design of high temperature superconductor RF probe for low field magnetic resonance imaging scanner
CHAN Tai Wai David	System level simulation for electric vehicles
CHENG Chin Long	Reference code correlator techniques
CHEUNG Chun Lung	Data warehousing mobile code design
CHEUNG Lap Sun	Load balancing in distributed object computing systems
CHEUNG Yee Him	Secure object spaces for global information retrieval (SOSGIR)
CHOI Koo Ting	Improved processing techniques for picture sequence coding
CHOW Chi Yin	Adaptive recovery with hierarchical checkpointing on workstation clusters
CHOW Ka Po	Load-balancing in distributed multi-agent computing
CHU Kai Cheung	Workload balancing in parallel video encoding
CHUNG Hing Yip	Fast motion estimation with search center prediction
CHUNG Hok Yan	Analysis of losses in power inductor for high-frequency switching power converters
CHUNG Sheung Wai	Motion control of a travelling-wave ultrasonic motor
HU Yurong	Datagram routing for low earth orbit satellite networks

HUANG Hu	Multicarrier DS/SFH-CDMA systems
KO Ming Him	A multi-agent model for DNA analysis
LAI Ho Yin	Artificial intelligence based thermal comfort control with CFD modelling
LAI Tsz Ming	Harmonic simulation of traction system
LAM Fung	Internet inter-domain traffic engineering and optimization
LAM Ying Chi	Agent-based simulation of electricity markets
LAU Chun Keung	Design, simulation and implementation of digital controlled power converters using fuzzy logic approach
LEI Sai Weng	Adaptive interleaving for orthogonal frequency division multiplexing systems
LEUNG Hoi Wang	Implementation and performance evaluation of doubly-linked list protocols on a cluster of workstations
LI Ka Lun	Newly modified log-MAP algorithms for turbo codes in mobile environments
LIN Wai Sum	Adaptive parallel rendering
LIU Hongjin	Implementation of a multi-agent based power market simulator
LIU Hugh Sing	Integrated vehicle positioning system using sensors and image processing of beacon signal
LIU Wei	On the design of multiplier-less perfect reconstruction filter banks using genetic algorithm and sum-of-powers-of-two representation
MAK Lai On	Fuzzy logic STATCOM controller design with genetic algorithm application for stability enhancement of interconnected power systems
MAN Wai Man	Modeling of vertical cavity surface emitting lasers
MOK Tsz Kin	Modeling, analysis and control design for the UPFC with fuzzy theory and genetic algorithm application
MOK Wai Hung	Motion estimation in feature domain
NG King To	A novel bit allocation buffer control algorithm for low bit-rate video compression
SIM Koon Hung	Antimonide based quantum-well and its application in infrared photodetector
SIVANESAN Kathiravetpillai	A study of performance for *M*-ary DS/CDMA cellular mobile radio systems
TAM Yau Yee	Dual use of visible light-emitting diodes
THAVARAJAH Arunasala Iyer	A study of fixed channel assignment algorithms for cellular mobile radio systems
TSOI Yiu Lun	Real-time scheduling techniques with QoS support and their applications in packet video transmission
TUNG Pang Fei	IntelliMap: a new GIS model with intelligence
VONG Chun Yin	Performance study of uniform sampling digital phase-locked loops for $\pi/4$ differentially encoded quaternary phase-shift keying
WANG Xufang	Multi-resolution joint source and channel coding for wireless communications
WONG Chor Fai Terence	A gyroscopic approach to biped dynamic walking
WONG Hon Ho	Analytical models for the assessment of information technology on sustainable electrification
WONG Ka Kwun Kelvin	Magnetic resonance imaging of sodium and its application
WONG Yuk Sum	Performance simulation and energy coordination for electric vehicles
WU Yik Chung	Demodulation and symbol timing recovery in software radio
YEUNG Sze Man	Mobile magnetic resonance imaging system and its application
YU Ming Lung	Automatic processing of Chinese language bank cheques
YUEN Kwok Hoo	Probabilistic analysis of harmonics in railway traction system
YUEN Yee Shan Cherry	High impedance fault detection and overvoltage protection in low voltage power systems
YUNG Chor Ho	A mobile object container for dynamic component composition
ZHAO Guang	Automatic boundary extraction in medical images based on constrained edge merging

8.2.4 Department of Industrial and Manufacturing Systems Engineering

CHAN Man Hing	A holistic approach to selecting advanced manufacturing technologies
CHOW Ho Ming	A study on tactile symbolic tiles and guide paths for the blind
HO Tsan Hang	Decision support systems in business management games
KWOK Kwok Tung	Hierarchical slice contours for layered manufacturing
LAI Man Kit	Electronic commerce and its implications for supply chain management in Hong Kong
LAM Chiu Ming	Visualization studies on the dynamic processing characteristics of conventional full-flighted and barrier type single-screws
LEE Sze Wai Wilson	Development of a synchronous system for collaborative product definition on the Internet
LEUNG Yiu Cheung	A reconfigurable neural network for industrial sensory systems
SAMAVEDAM Srinivas	A virtual system for rapid prototyping
SHIU Wing Kei	An investigation of collaborative buyer-supplier relationships in Hong Kong manufacturing firms
WONG Yin King	Integrating environmental criteria into the supplier selection process
YEE Wai Yee	Development of a systematic framework for engineering change management

8.2.5 Department of Mechanical Engineering

CHAN Hang Ting	Deformation and recrystallisation of Cu - 2% Fe
CHAN Ka Fai	Design and development of sensor for air leak detection
CHAN Kin Hang	Computational studies of forced, nonlinear waves in shallow water
CHOI Yuk Ning Alta	Repair technology for cracked metallic structures using composite materials
FENG Gang	Creep effects in nanoindentation
FU Sau Chung	On the spreading of viscous dense liquid under surface waves
KOO Chun Piu Benedict	Study on a biodiesel fuel produced from restaurant waste animal fats
LAM Chi Kan	Detection of air leaks using pattern recognition techniques and neurofuzzy networks
LEE Wing Chi	Analytical study of wind flow and pollutant dispersion past hills
LEUNG Siu Ho	Some applications of the generalised Peierls-Nabarro model for screw dislocations
LI Sui Yu	Mechanical properties of TiAl-based thin films
LOO Hui	Effect of surface waves on pollutant dispersion
NG Cheuk Tung	Data reduction in integrated reverse engineering and rapid prototyping
WONG Ming Hong Daniel	A study of passive sampling and modelling techniques for urban air pollution determination
WONG Yuen Wah	Performance prediction model for a solar water pump
YEUNG Wing Wah	Queuing model simulating Kwai Chung Terminal's utilization

9. STUDENT ENROLMENT STATISTICS (1999-2001)

9.1 Undergraduate Enrolment 1999-2001

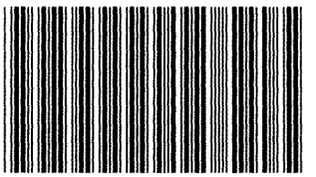
Department	1999-2000	2000-2001
Civil Engineering	328	320
Computer Science and Information Systems	240	268
Electrical and Electronic Engineering	638	626
Industrial and Manufacturing Systems Engineering	194	189
Mechanical Engineering	336	305
Total	1736	1708

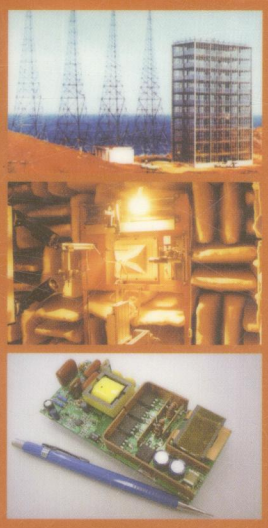
9.2 Postgraduate Enrolment 1999-2000

Department/Programme	MSc	MPhil	PhD	Total
Building Services Engineering	79	0	0	79
Civil Engineering	120	25	54	199
Communication Engineering	55	0	0	55
Computer and Information Technology	45	0	0	45
Computer Science and Information Systems	48	57	21	126
Computers in Manufacturing	33	0	0	33
Electrical and Electronic Engineering	107	63	52	222
Electronic Commerce	93	0	0	93
Geotechnical Engineering	75	0	0	75
Industrial and Manufacturing Systems Engineering	122	27	17	166
Internet Computing	79	0	0	79
Mechanical Engineering	52	34	46	132
Total	908	206	190	1304

9.3 Postgraduate Enrolment 2000-2001

Department/Programme	MSc	MPhil	PhD	Total
Building Services Engineering	108	0	0	108
Civil Engineering	109	22	45	176
Communication Engineering	88	0	0	88
Computer and Information Technology	88	0	0	88
Computer Science and Information Systems	46	52	29	127
Computers in Manufacturing	15	0	0	15
Electrical and Electronic Engineering	73	61	63	197
Electronic Commerce	19	0	0	19
Electronic Commerce and Internet Computing	274	0	0	274
Geotechnical Engineering	84	0	0	84
Industrial and Manufacturing Systems Engineering	111	19	20	150
Internet Computing	25	0	0	25
Mechanical Engineering	48	29	44	121
Total	1088	183	201	1472





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