

**SCHOOL OF  
ENGINEERING**  
Status Report  
2000-2002

---

**Contents**

- Cover
  - Contents
  - Foreword
  - Honors
  - Research & Innovation
  - Technology Transfer & Entrepreneurship
  - Teaching & Learning
  - Laboratories & Facilities
  - Events
  - School of Engineering Related Websites
-

SCHOOL OF  
**ENGINEERING**  
Status Report 2000-2002

# LIVE at the Frontiers



# LIVE at the Frontiers



Foreword	2
Honors	4
Research & Innovation	10
Technology Transfer & Entrepreneurship	18
Teaching & Learning	24
Laboratories & Facilities	30
Events	34



# Foreword

## LIVE at the Frontiers

Since our last status report in 1999, the School of Engineering has undergone rapid development and also faced many new challenges. The world in the second millennium is already a very different place. The world-wide economic slowdown has affected the job market in Hong Kong. Globalization and the pace of technological change have increased. Such a competitive, economic climate in Hong Kong requires fresh directions in both the education of the next generation of engineers and research of innovative technologies. The School of Engineering has been quick to adapt to the changes and to take up these new challenges.



Our faculty is committed to teaching and research at the engineering frontiers to accelerate Hong Kong's transition to a knowledge-based society and to bring advances to society in new fields unfolding in the engineering area.

Building on our solid foundation of engineering core competencies, the School has introduced the LIVE philosophy - Leadership, Innovation, Vision, and Entrepreneurship - to propel our graduates forward and inspire them to become 'frontier leaders', front-runners who will not only think of innovative ideas but develop them into pioneering industries for Hong Kong. Through LIVE, we equip our students with the passion and personal skills required to be technical leaders in the Hong Kong community and today's global society.

In line with these developments, this status report takes a different form from its predecessors. Along with our regular departmental round-ups, we highlight some of the major contributions we have made in the many different spheres we move in. We demonstrate our LIVE philosophy in our innovative teaching and learning; our exciting research and many success stories in technology transfer and entrepreneurship; the international and local honors received by our faculty, students and alumni; and the new facilities we have helped provide to assist these endeavors.

Such a spirit of innovation and enterprise is exciting, rewarding and thought-provoking. In this report, I am very pleased to be able to share our times and our enthusiasm with you.

**Kang L Wang**  
*Professor and Dean  
School of Engineering*

September 2002







# Honors



*Prof Kin-Man Lee*



*Prof Mohamed Ghidaoui*



*Prof Kei May Lau*

## Thomas A Middlebrooks Award

— **Kin-Man Lee**

Ground-breaking work in advanced geotechnical research saw Kin-Man Lee, Associate Professor in the Department of Civil Engineering, and his research team honored internationally with the distinguished Thomas A Middlebrooks Award. It marked only the second time the annual award had gone to a non-US team since it was established by the American Society of Civil Engineers (ASCE) in 1955.

Prof Lee and his fellow researchers gained recognition for their paper on Effects of Placement Method on Geotechnical Behavior of Hydraulic Fill Sands which appeared in the Journal of Geotechnical and Geoenvironmental Engineering.

The team's findings showed placement technique to be the single most important factor in controlling the geotechnical behavior of hydraulic fill sands. The discovery helped the establishment of quality control guidelines for such work in Hong Kong and serves as a reference internationally for

others engaged in reclamation and geotechnical engineering.

## Honorable Mention, Hilgard Award

— **Mohamed Ghidaoui**

Department of Civil Engineering Associate Professor Mohamed Ghidaoui and his co-researchers gained an Honorable Mention in the prestigious Hilgard Award for their paper published in the American Society of Civil Engineers' (ASCE) Journal of Hydraulic Engineering in April 2000.

The paper on Extended Thermodynamics Derivation of Energy Dissipation in Unsteady Pipe Flow was chosen as one of two top runner-ups for the award. Prof Ghidaoui studied and quantified energy dissipation in unsteady flows in pipe systems by utilizing extended irreversible thermodynamics. His work, funded by the Research Grants Council of Hong Kong, looked into the problems of high-pressure fluctuations in pipelines, caused by accidental or planned changes in the setting of hydraulic control devices.

Prof Ghidaoui's research assists the development of safer pipelines and adds to the reliability of leakage detection and prediction of water quality.

## FIEEE

### — Kei May Lau

The year 2001 saw Prof Kei May Lau, of the Electrical and Electronic Engineering Department, in the spotlight when she was elected a Fellow of the Institute of Electrical and Electronics Engineers (IEEE). She was cited for her work on III-V compound semiconductor heterostructure materials and devices.

## FIEEE

### — Bertram Shi

The School of Engineering showed the dynamic power of its faculty when Prof Bertram Shi, Associate Professor in the Department of Electrical and Electronic Engineering, became one of the youngest researchers to be elected a Fellow of the Institute of Electrical and Electronic Engineers (IEEE). Prof Shi was recognized in 2001 for his contribution to the analysis, implementation and application of cellular neural networks. He was 35 at the time of the award.

## IEEE Solid-State Circuits Award

### — Ping Ko

Prof Ping Ko, of the Department of Electrical and Electronic Engineering, was honored with the 2002 IEEE Solid State Circuits Award for development work carried out on device models for integrated circuit design.

Over the past two decades, Professor Ko and his research partner Chenming Hu have created and refined the Berkeley Short-channel IGFET Model

(BSIM) for IC simulation and seen the BSIM model adopted almost universally across the industry.

The creation of a standard model has enabled the different sectors of the industry to integrate more efficiently and effectively with each other.

The source code for all BSIM models is in the public domain and provided to users free. There is no requirement that users must belong to an industry association or manufacturing consortium.

## PMVFAST for MPEG-4

### — M L Liou, O Au, A Tourapis

Two members of faculty and a research student from the Department of Electrical and Electronic Engineering put Hong Kong multimedia research in the international picture when their innovative video compression technology was accepted as part of MPEG-4 in March 2000.

Professor Ming Lei Liou, Associate Professor Oscar Au, and PhD candidate Mr Alexis Tourapis' technological breakthrough marked the first time the Moving Picture Experts Group (MPEG) had accepted multimedia technology created by Hong Kong researchers. MPEG is a working group of the International Organization for Standardization/International Electrotechnical Commission (ISO/IEC), which handles standards for coded representation of digital audio and video.

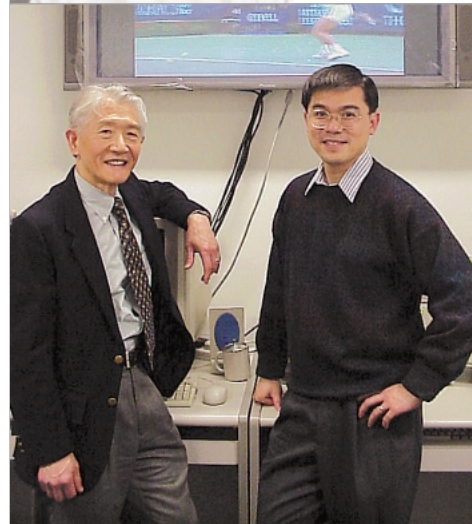
The HKUST team's Fast Search Motion Estimation algorithm enables cost-effective compression of multimedia data while maintaining the quality of video images. Under MPEG-4, the technology is known as the Predictive Motion Vector Fast Adaptive Search Technique (PMVFAST). It can be used in all encoding products including videophones, video cameras, digital libraries and Internet streaming and can be applied world-wide. Further applications include object tracking and surveillance, where accurate motion



Prof Ping Ko



Prof Bertram Shi



Prof Ming Lei Liou and Oscar Au



correspondence is required between different images.

The team's work had to go through 18 months of competition and rigorous review from 300 industry, engineering, research and multimedia experts from 20 countries before acceptance.

Prof Au explained that the team's achievement was not only a great boost for the individual members, but a significant step forward for hi-tech innovations from Asia. "Our team's involvement in MPEG-4 has really helped put Hong Kong and China on the world IT map," he said.

## LEAD Award

### — IEEM

Each year only one university in the world gains the Leadership and Excellence in the Application and Development of Integrated Manufacturing (LEAD) Award. In 2001, HKUST became that university when the Advanced Manufacturing Institute (AMI) in the Department of Industrial Engineering and Engineering Management received the honor.

The award is given in recognition of innovation and excellence in teaching and research by the Society of Manufacturing Engineers (SME) in the United States, the manufacturing industries' leading professional organization, and demonstrates the world-class work being carried out in HKUST's School of Engineering. SME has members in 70 countries and its work reaches out to more than 500,000 industry professionals each year.

AMI was recognized by SME and its Computer and Automated Systems Association (CASA) for its work in enterprise-wide integrated manufacturing technology in Hong Kong. In receiving the LEAD award, HKUST joins a prestigious list of winners, including Georgia Institute of Technology,

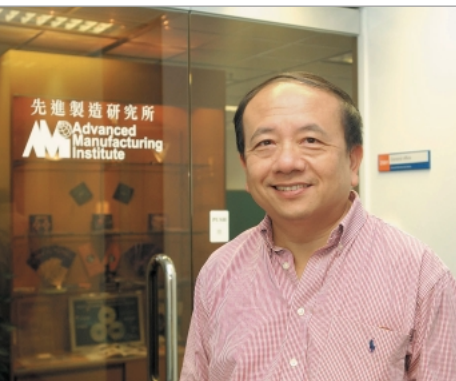


Pennsylvania State University and Purdue University.

The award committee noted the quick progress made in plans for education in production engineering and engineering management and the joint efforts made by AMI and the School's departments.

Prof Mitchell Tseng, Director of AMI, said the program was able to generate creative thinking by tackling methods and applications of information technology to product development, supply chain management and customer needs in a holistic fashion.

Another essential factor was its Hong Kong setting. As Prof Tseng pointed out: "By leveraging the unique position of Hong Kong in the area of rapid industrialization, our program has generated strong momentum in research and education."



*Prof Mitchell Tseng*

## Hong Kong Ten Outstanding Young Persons Award

— Jack Lau

Prof Jack Lau, HKUST's first PhD graduate turned faculty member and hi-tech entrepreneur, had his achievements acknowledged by the Special Administrative Region in 2000 when he was named one of Hong Kong's Ten Outstanding Young Persons (TOYP).



Prof Jack LAU

The award, organized by the Hong Kong Junior Chamber, is one of the SAR's most prestigious accolades for a young professional. It pays tribute to the energy and creative talent of the Department of Electrical and Electronic Engineering Associate Professor, who has been at HKUST since its opening days in 1991.

One of the criteria on which TOYP selection is based is how a person manages to be an exceptional example to other young professionals. Like HKUST itself, Prof Lau's story is one of maximum achievement in minimum time.

His research on integrated magnetic sensors in bulk silicon and silicon-on-insulator (SOI) technologies not only gained him a PhD in 1994 but a US patent as well. He was also a key

component in the start-up of HKUST's Consumer Media Laboratory. This secured funding from the Hong Kong Government's Industrial Support Fund to research into home and consumer electronics and assist local industries in developing new technologies.

In addition, Prof Lau has started his own award-winning technology-based company, Perception Digital under the HKUST Entrepreneurship Program. The company's first product was a home electronic 'jukebox'.

After receiving the TOYP award, Prof Lau said he was honored by his selection and paid tribute to the role of HKUST in helping him go so far so fast. "The University is a place where opportunities open up for you. It gives you options," he said.

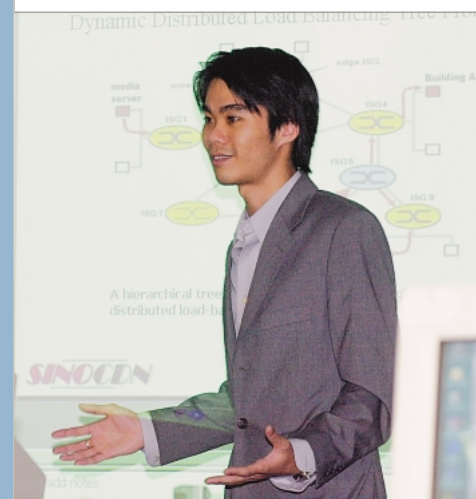
## Hong Kong Ten Outstanding Young Digi Persons Award

— James She

In December 2001, Department of Electrical and Electronic Engineering postgraduate James She became the youngest high achiever to be named a winner in the Ten Outstanding Young Digi Persons Awards, which celebrate those who make IT contributions to the Hong Kong community.

The PhD student gained the award at the age of 25 for his original research and entrepreneurial talent in turning his academic work into a business. His company, SinoCDN, was set up in June 2000 to provide high-quality, cost-effective multimedia delivery over the Internet.

As such, Mr She represents the new generation of engineers who are willing not only to innovate in



Mr James She

design or through ideas, but to take those concepts and apply them through launching their own start-up companies.

Mr She found his experiences as Chief Technology Officer of his own company as much a learning process as his studying at HKUST. "I discovered it is a serious game and much tougher than I imagined. However, I was very happy to see my work move from the theoretical to the point where we got our first customer."

Though it took adjustment to the contrasting environment between academia and the outside world, Mr She sees this step into the world of enterprise as a necessary one for many in the engineering field today. Commenting on the contemporary job market, Mr She noted: "We face a different world now. Engineers need to be dynamic."

The Motorola Accompli™ Young Inventor Award went to Lilian Tam, William Wong and Michael Yau who proposed a library gateway system for users of wireless application protocol (WAP) phones to access information in the HKUST library. The system included reservation and browsing capabilities, along with a book search and reminder service. As well as recognition of their ideas, the winning students gained a HK\$100,000 scholarship.

Honorable mentions went to electronic engineering MPhil student Gigi Chim for devising a low specific absorption rate antenna for mobile communications, and computer science MPhil students Peter Kwan and William Lai for their secure wireless application for multi-user groups.

## IEEE Student Paper Awards

The years 2000-2002 have been impressive ones for Department of Electrical and Electronic Engineering postgraduates and undergraduates who have secured a series of awards for papers entered for Institute of Electrical and Electronics Engineers' (IEEE) competitions.

Lam Suk Han found herself the focus of attention when she took first prize in the IEEE 2001 Undergraduate Region 10 (Asia Pacific) Student Paper Contest for her project Demosaic: Color Filter Array Interpolation for Digital Cameras. The third-year student was accompanied on the winners' list by Alton Chan Kam Fai, Wong Yu Tung and Wong Pui Yan who gained third prize for their work Multi Resolution Mesh Representation Using Vertex Cluster Contraction.

In the IEEE Hong Kong Section 2001, Man Tsz Yin's sound ideas brought him first prize in the undergraduate division for his paper on Design and Fabrication of an Integrated Programmable



*Young Inventors Lilian Tam, William Wong and Michael Yau (from second left to right) received a HK\$100,000 scholarship from Mr Cedric So of Motorola (left).*

## Motorola Accompli™ Young Inventor Award

— L Tam, W Wong, M Yau

There were no wires crossed between three third-year students from the Department of Computer Science whose inventive ideas for personal communication saw them win the first prize of a new award from Motorola in 2001.



Floating-Gate Microphone. A year earlier, postgraduate Alexis Tourapis emerged triumphant when he won the postgraduate section.

## 'Chip Olympics'

Research students from the Department of Electrical and Electronic Engineering raced up front alongside the world's leading microchip minds, with invitations to present papers at the top IEEE International Solid-State Circuits Conference in all three gatherings between 2000-2002.

The presence of School of Engineering researchers at the conference, popularly known as the 'Chip Olympics', continues HKUST's notable run which began in 1997 and has led to five appearances by School of Engineering students in the years since. And in a highly unusual move, postgraduate Vincent Cheung Sin-Luen was accorded the honor of being asked to attend twice in consecutive years.

The gathering attracts industry and academic researchers from a range of renowned institutions and companies, including MIT, Stanford, IBM, NEC, Sony and Intel. Only research which will generate a large amount of interest among industry leaders is given the chance to be heard. HKUST is the sole university from Hong Kong and the Chinese Mainland to have had research papers accepted and presented at the top conference.

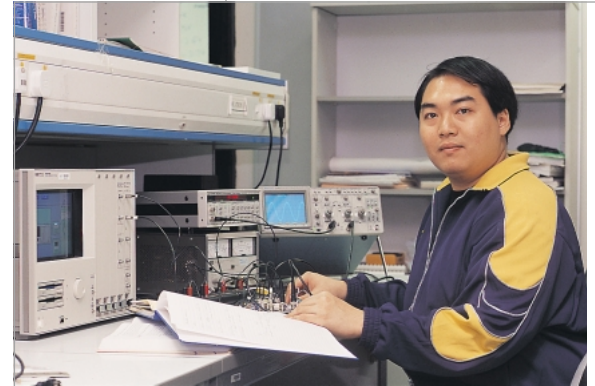
In 2000, Mr Cheung and fellow postgraduate student Mahender Kumar were invited to present their work. Mr Cheung's paper demonstrated an innovative procedure that enables analog circuits to achieve high performance under a low voltage supply. Mr Kumar's studies, carried out with research partner Yue Tan, tackled an area of particular interest to those involved in mobile phone construction: a low-cost microfabrication technology to implement the circuitry of a radio frequency power amplifier on a single chip.

In 2001, Mr Cheung followed up his 2000 appearance by presenting a microchip that provides high-frequency, high-resolution analog-to-digital conversion on a single 1V supply. The technique will help reduce size and power requirements of portable electronic devices such as phones and laptops.

Regarding his feelings about being asked back twice, Mr Cheung said it was exciting to be given another invitation. "Most of the research presented at the Chip Olympics comes from labs of top industry players such as Bell, Lucent, Toshiba and Sony. Having papers presented there for several consecutive years not only demonstrates HKUST's state-of-the-art research capability but also serves as a good incentive to continue research in analog ICs."

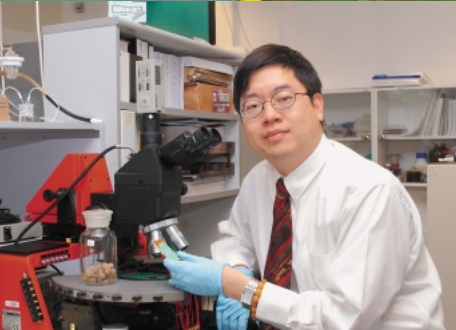
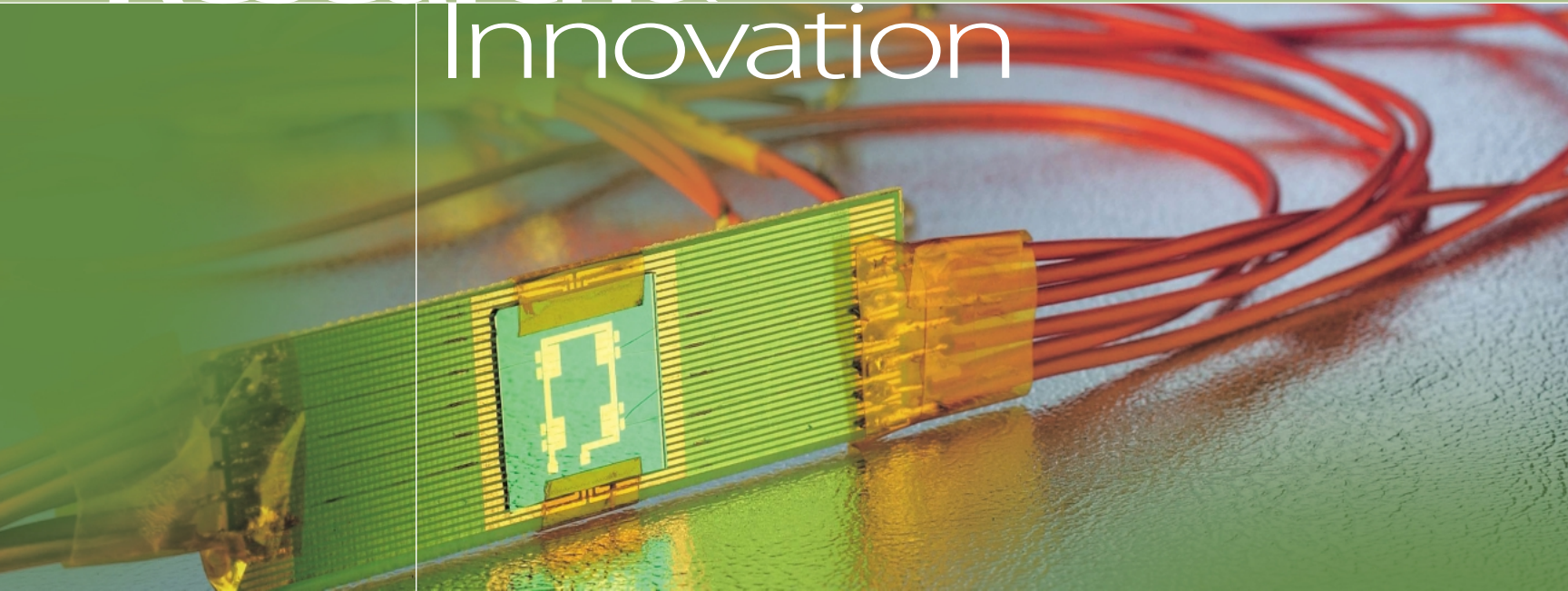
Mr Cheung was joined at the 2001 conference by Zhaofeng Zhang who presented the only paper on narrowband applications in the section on third-generation mobile communications. His work demonstrated the first CMOS fully integrated single-chip pager receiver which resolved the problem of direct current offset and flicker noise.

The latest HKUST visitors were PhD candidates Xu Chen and Dongsheng Ma in 2002. Xu Chen's paper zoomed in on a portable imaging technique that can produce high performance using only very low voltage, which is useful for products such as visual mobile phones. Dongsheng Ma's work suggested a space-saving switching converter that can also save power.



*Mr Vincent Cheung*

# Research & Innovation



Prof I-Ming Hsing

## Genechip tonic for Chinese medicine

➔ Prof I-Ming Hsing, Assistant Professor of Chemical Engineering has been involved in the creation of novel genechip-based technology to provide an efficient, cost-effective and accurate way to test the authenticity of traditional Chinese medicines (TCM).

The technology, created by an inter-departmental team of HKUST researchers, eases the difficult process of identifying TCM raw materials, which are often dried or processed and hard to determine even for TCM specialists. It combines the latest advances of molecular biology and microfabrication.

HKUST is the only research institution in Hong Kong using silicon chip technology to develop genechip-based TCM identification technology. The project team is led by Prof Nancy Ip, Director of HKUST's Biotechnology Research Institute (BRI). The research received a grant from the Innovation and Technology Commission, the then Industry Department, in 1999. The Chinachem Group is BRI's industrial partner for the project.

## Moving in on air pollution

➔ In April 2002, Hong Kong set out on a fresh journey to learn more about the air it breathes with the inauguration of the Mobile Real-time Air Monitoring Platform (MAP), created with the assistance of Prof Chak K Chan, Associate Professor in the Department of Chemical Engineering.

MAP provides a way to chart air pollutant concentrations in different areas of Hong Kong. Mobility is provided by siting advanced monitoring equipment in a 24-seat, low-emission van that travels around the



SAR. This means real-time findings can be gained from locations previously difficult to monitor, such as tunnels and the tops of hills. It can also collect data while the van is on the move.

The project, first launched in 2000, offers a new concept in air monitoring, which usually relies on stationary procedures. MAP equipment includes an electric, low-pressure impactor to study particle size distribution, a Fourier transform infrared spectrometer to measure volatile organic compounds, an SO<sub>2</sub> analyzer, a NOx analyzer, a global positioning system (GPS), and an automatic weather station. It took more than a year to modify the van.

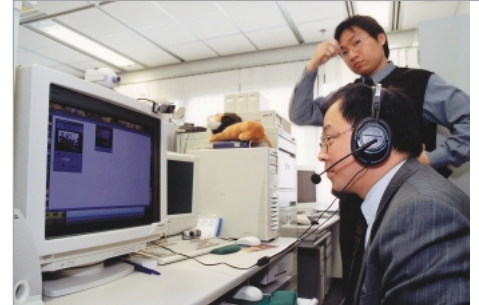
## Multimedia technology research on the button

➔ Research and development of enterprising information technologies in Hong Kong was put on the fast track by the opening of the Multimedia Technology Research Center (MTrec) in 2000.

MTrec emphasizes audio/video processing and communication for multimedia applications. It was set up to develop and commercialize multimedia technologies and to foster collaborations with industrial enterprises in Hong Kong and overseas. It also promotes a greater knowledge base in the field in the SAR, providing a laboratory for advanced practical training for students and engineers.

MTrec's work supports existing as well as emerging multimedia information applications. Technologies developed by the Center include those using MPEG-2, the international standard for high-bit rate broadcast-quality video applications, such as digital television, and MPEG-4, the international standard for multimedia applications. Products benefiting from such research include video-phones, multimedia players, web page creation tools among many others.

In 2001, MTrec researchers were awarded Best Paper at the International Conference on Parallel Processing (ICPP), the most significant conference in the field. The paper, Active Caching of On-line-Analytical-Processing Queries in WWW Proxies, was



*Mr Francis Ho (front), then Director-General of Industry and subsequently Permanent Secretary for Commerce, Industry and Technology (ITB), visits the Multimedia Technology Research Center after the inauguration ceremony.*





based on research by Thanasis Loukopoulos, Panos Kalnis, Prof Ishfaq Ahmad and Prof Dimitris Papadias from the Department of Computer Science. It proposed a technique to significantly reduce response time for answering queries involving large-scale and complex data transfer over the Internet, which is particularly useful for those using data warehouses.

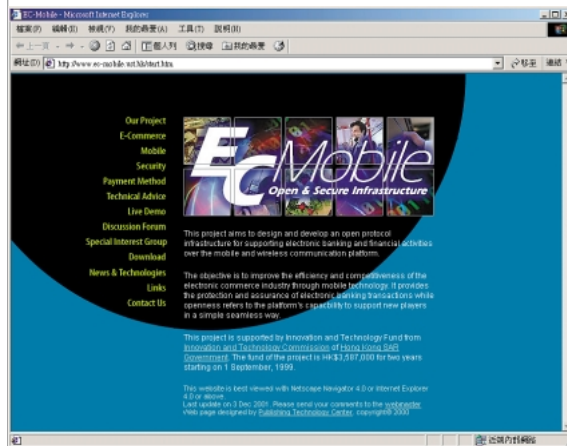
The infrastructure is able to avoid the problems of proprietary systems that are incompatible with each other and relatively insecure. The use of PKI and smart-card technologies also means it provides a secure channel for financial activities conducted over mobile or wireless communication platforms.

## Innovation all part of the program for joint lab

Computer powerhouse Microsoft tapped into the intellectual forces of HKUST with the opening of a joint laboratory in 2000.

The MSR-HKUST Joint Research Laboratory, established by Microsoft Research, China (MSR) and HKUST, focuses on collaborative research, multimedia and information technology development, and exchanges between students, academics and researchers. It is co-directed by Prof Roland Chin, Professor of the Computer Science Department and Dr Ya-Qin Zhang, Managing Director of MSR.

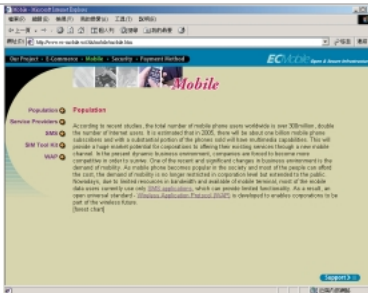
The joint laboratory was MSR's first in Hong Kong. In 2000, MSR also established joint laboratories with Tsinghua University, Zhejiang University and Harbin University of Industry in the Chinese Mainland.



## Safety first for mobile e-commerce

The Cyberspace Center provided Hong Kong with a way into the world of safer mobile electronic commerce in 2000 with the development of the HKUST Open and Secure Mobile E-commerce Infrastructure.

The infrastructure combines Public Key Infrastructure (PKI), Wireless Application Protocol (WAP) and smart-card technologies to offer Hong Kong an open and secure end-to-end wireless channel. It has been designed for use in business activities, including shopping, payment and other financial transactions.



## Bouncing ahead with Rubber Soil

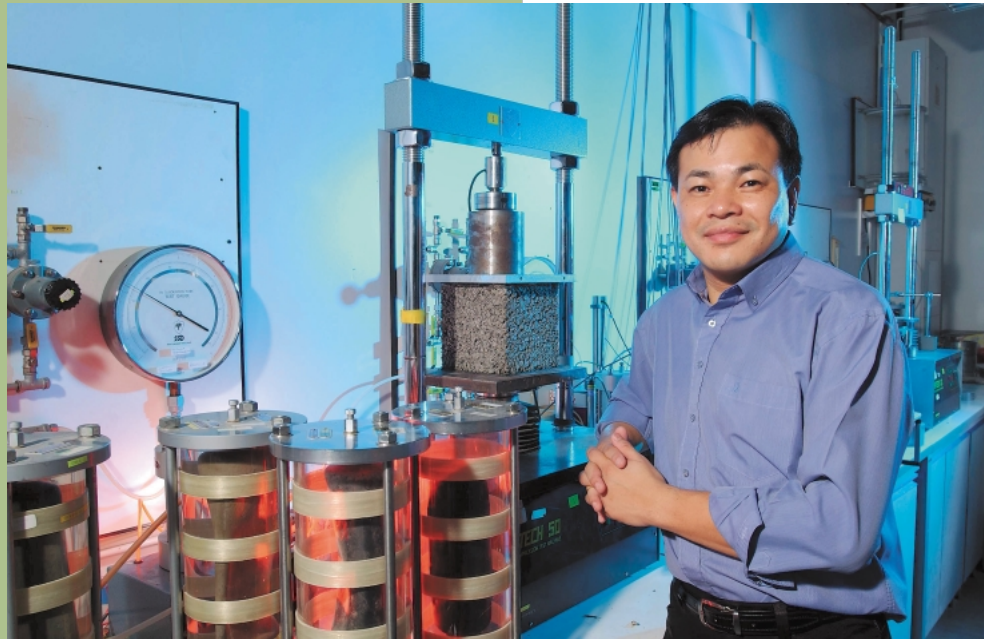
➔ A faculty member in the Department of Civil Engineering has added bounce to construction materials by helping to create technology that recycles scrap rubber tires into high-performance geo-construction material known as “Rubber Soil”.

Prof Kin-Man Lee has been developing the Rubberized Lightweight Filling Block technology together with Earth-Link Technology Enterprises Ltd, a company founded in 2000 by a group of geotechnical and environmental professionals. The material can be used for road-fills, retaining walls and slopes, among other applications.

The technology offers a large-scale, economic solution to the world-wide problem of scrap rubber tires. More than one billion need to be scrapped globally each year. It is also a major environmental issue in Hong Kong, Prof Lee said.

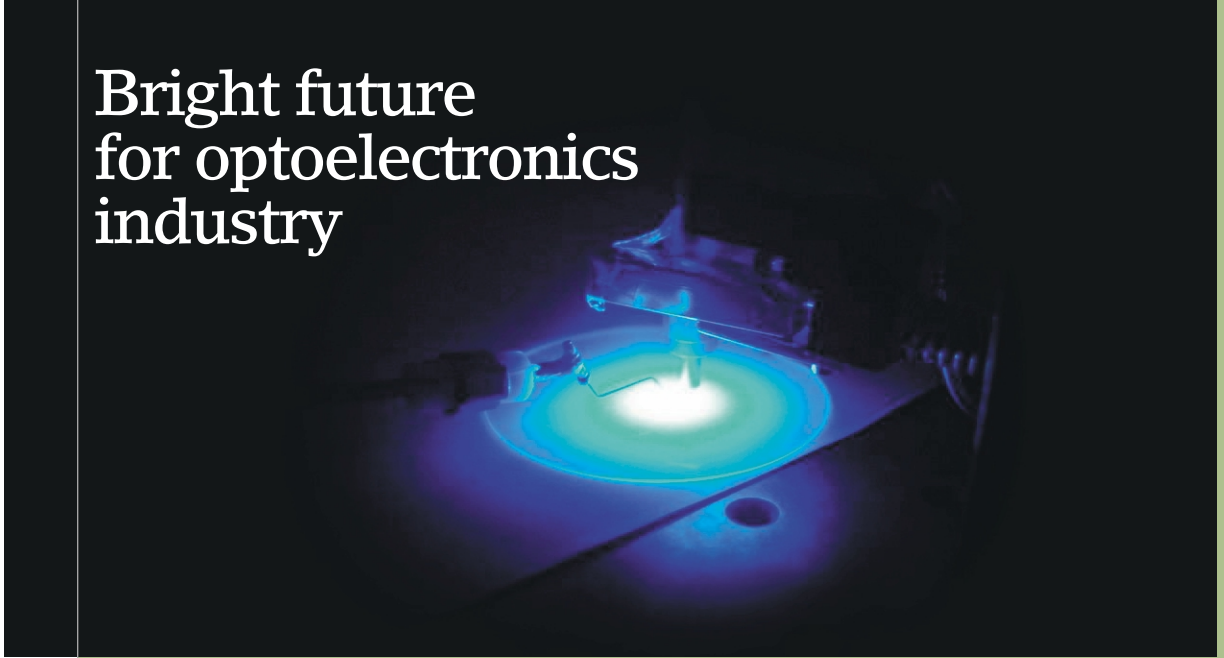
The invention involves the creation of a homogenous rubberized bonding technology, binding rubber tire crumbs with cementitious materials. It offers several advantages over compacted soils, being flexible for construction and dust free.

The development means construction projects should require less heavy moving equipment, generate less noise and offer a cleaner working environment. Major laboratory and field pilot studies have been carried out to demonstrate the technology’s practical feasibility.



*Prof Kin-Man Lee and his Rubber Soil testing equipment.*

## Bright future for optoelectronics industry



➔ Advanced research by faculty from the Department of Electrical and Electronic Engineering has thrown fresh light on two exciting areas of the optoelectronics industry.

In 2000, Department researchers achieved a breakthrough in organic light emitting diode (OLED) display when they succeeded in using low-temperature polycrystalline silicon technology to develop an active matrix OLED, a new technology for flat panel display. The academics behind the research are Prof Hoi Sing Kwok and Associate Professor Man Wong.

OLEDs are thin films of molecules which can be induced to emit light and potential uses range from digital cameras to smart pagers and car stereo displays. Prof Kwok said OLED could replace liquid crystal display (LCD) in many high-end applications, including desktop computers and laptops. The HKUST work was aimed at these applications and the researchers have been collaborating with electronics manufacturers over commercializing the technology.

Meanwhile, Prof Kei May Lau, of the Department of Electrical and Electronic Engineering, has been undertaking a three-year project to find new techniques for the manufacture of high-brightness inorganic blue/green light-emitting diodes (LEDs).

Prof Lau, who specializes in compound semiconductor materials and devices, said Hong Kong has previously not had the infrastructure or technology to create its own inorganic LEDs which means the local optoelectronics industry has had to look overseas to find suppliers of processed LED chips. Adding such a research base to optoelectronics in Hong Kong should lead to new investment and improve the SAR's position in the world market.



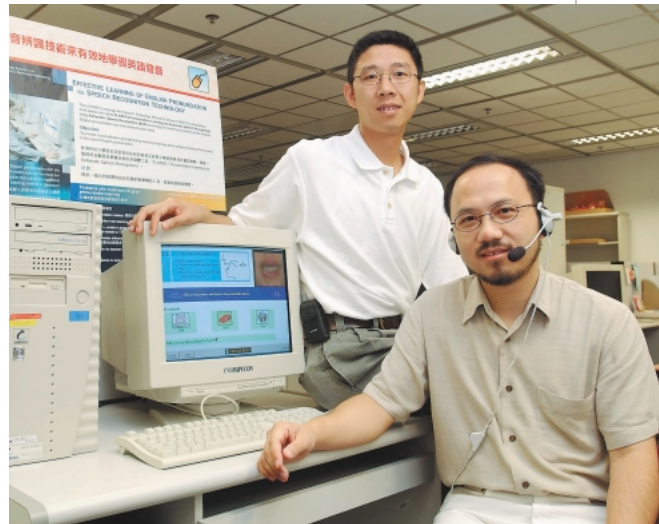
## Learning English with PLASER

→ The quest for better English skills in Hong Kong took a pronounced step forward with the development of a multimedia software application by two faculty members from the Electrical and Electronic Engineering and Computer Science Departments respectively.

The Pronunciation Learning via Automatic Speech Recognition (PLASER) application has been created by Prof Brian Mak, Assistant Professor in the Computer Science Department and Prof Man Hung Siu, Assistant Professor in the Electrical and Electronic Engineering Department. It is designed to help secondary school students with their English pronunciation and listening skills.

The multimedia teaching and self-learning tool provides a way to tell students if they have said each individual sound in a word correctly and monitor individual progress. It requires advanced techniques in acoustic modeling, language

modeling, garbage rejection and noise robustness. The two-year project, which began in 2000, is aimed at Form 1 and Form 2 students.



Prof Man Hung Siu (back) and Prof Brian Mak



Prof Neville Lee

## Silicon-based solutions for hard disk manufacturing

→ Low labor costs and high quality products have seen the Pearl River Delta emerge as a production center for disk drives. To help keep the Pearl River Delta internationally competitive in hard disk manufacturing, researchers in the Industrial Engineering & Engineering Management Department have come up with two miniaturized silicon devices to solve problems with technology used in disk storage manufacturing.

The devices, created by Associate Professor Neville Lee and his research associate Dr Kelvin Ng, are known as the Silicon-based Capacitive Sensor and the Silicon-Based Heating Device. The sensor provides new monitoring capacities to ensure good quality recording. The heating device is an economical, compact and easy-to-use device which enables out-of-specification g load to be adjusted.



## 3D designer technology boosts garment industry

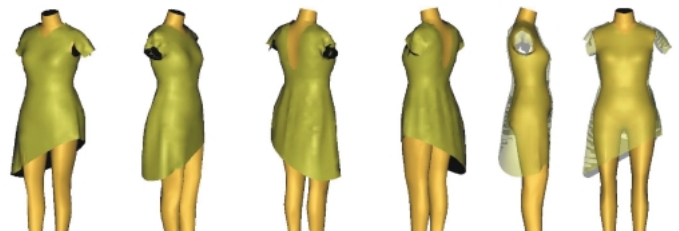
➔ In 2000, Department of Mechanical Engineering researchers completed a major project designed to find ways to bring the Hong Kong garment industry into the information age.

The 3D Garment Project Series was led by Prof Matthew Yuen, also Director of HKUST's Technology Transfer Center. The project was geared to helping the garment industry in Hong Kong create higher quality and better fitting apparel, which would thus improve its competitiveness in the world market place. The

research, which focused on human modeling and simulation, received an HK\$11.6 million grant from the Hong Kong Government's Innovation and Technology Fund.

Hong Kong has about 3,000 garment manufacturers. Traditionally, the business employs two-dimensional pattern design. During the project, which began in 1996, researchers used computer-aided design (CAD) techniques to undertake three-dimensional garment design, with vision techniques used to gain measurements for constructing the mannequin.

Researchers envisaged a number of benefits for the garment business. These included shorter product development cycle in garment pre-production; removal of the inaccuracy inherent in 2D pattern and garment manufacturing by verification on a 3D model; use of parametric design to accelerate the resizing process; and better understanding of a fabric's properties and its effect on garment design. A team member also pointed out the project's work would help manufacturers to lower their production costs.











# Technology Transfer & Entrepreneurship



## China Hi-Tech Fair provides showcase for innovations

➔ The China Hi-Tech Fair, the Chinese Mainland's largest international technology gathering, has proved an ideal place for the School of Engineering to demonstrate its innovations.

In 2001, the Automation Technology Center's high-accuracy, high-speed force control platform and a silicon microdisplay projector from the Center for Display Research went on show at the Shenzhen event, held in October. A year earlier, in 2000, the School contributed to HKUST's impressive display of leading research, technology transfer and commercialization initiatives, with exhibits on construction materials, transportation logistics, automation and liquid crystal display.

The fair generated US\$8.5 billion in technology transfer and investment agreements in 2000 and more than US\$10 billion the following year. Around 300,000 people attended each of these years. The event was first held in 1999.

## Flip-chip technology leaps to attention

→ The successful industrial transfer of state-of-the-art integrated circuit (IC) packaging technology developed at HKUST, brought major local IC manufacturer Hua Ko Electronic Co Ltd the Outstanding Innovations and Technological Products Silver Award from the Hong Kong Electronics Association in 2000.

The innovative flip-chip technology project was led by Prof Philip Chan, Head of Electrical and Electronic Engineering Department, and supported by HKUST's Advanced Electronic Packaging & Assembly Cooperative Research Center.

The new technology enables electronic products to be smaller, faster and operate at higher frequencies by offering an alternative to traditional wire bonding and demonstrates the advantages HKUST research can bring to local industries. HKUST developed the technology, Hua Ko looked after the commercialization and the Hong Kong Productivity Council provided the pick-and-place equipment needed for the final packaging process.



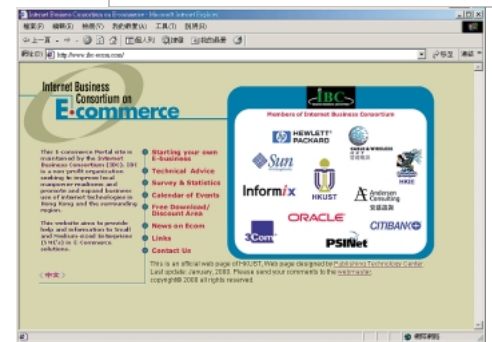
Prof Philip Chan (left) with senior managers from Hua Ko.

## Open for business

→ The Entrepreneurship Center opened in 2000 to serve as a home to a growing number of start-up companies under HKUST's Entrepreneurship Program. Hi-tech enterprise businesses under the program include those created by academics and students attached to the School of Engineering.

## E-trade talk

→ Small and medium-size enterprises in Hong Kong were encouraged to extend their sights to the world with the start of a free website ([www.abc-ecom.com](http://www.abc-ecom.com)) in 2000 to build up business-to-consumer electronic commerce. The website was developed by the HKUST-led Internet Business Consortium (IBC), chaired by Prof Samuel Chanson, Director of the Cyberspace Center.



## Driving the knowledge society forward

→ To keep Hong Kong at the international forefront of commercial activities in the e-commerce era, the School of Engineering joined up with the School of Business and Management in 2000 to build up an all-round knowledge base in product design, manufacturing capability and their integration with logistics and commerce in the new online environment.

The e-commerce driven manufacturing and logistics (EDML) research team comprises specialists in transportation logistics, design and manufacturing and e-commerce. The team aims to speed forward the upgrading of the community's manufacturing and logistics industries through research, teaching and technology transfer. Cutting-edge facilities at HKUST help its work,



along with support from international collaborators and industrial consortia.

HKUST has made EDML one of its high-impact areas of study to assist Hong Kong's transformation to a knowledge-based society. Other special focus areas include Internet technology, microsystems and infrastructure development.

aggregate high-quality filler materials, wall panels and masonry blocks with two-way joints.

He is working with 3E Envirotech Products Co Ltd, which has invested HK\$8 million in the project. Both sides are collaborating in producing an extruder to manufacture coal ash-based wall panels and other building materials. In recycling coal ash, the project will reduce pollution caused by the industrial waste product, minimize construction waste, and also save land and energy.



Prof Zongjin Li (left) with the extrusion machine.

## All systems go

➔ In 2000, Associate Professors Raymond Cheung and Chung-Lun Li, from the Department of Industrial Engineering and Engineering Management (IEEM) visited TNT International Express facilities in several European countries. The tour gave them first-hand knowledge of the latest developments in the world logistics industry and fostered collaborative links between the industry and the School of Engineering.

## Building a cleaner future out of coal ash

➔ A joint project between the Civil Engineering Department and a company specializing in commercial environmental technology got underway in 2001 to develop innovative building materials using pulverized coal ash.

Prof Zongjin Li, Associate Professor in the Department of Civil Engineering, is using extrusion technology to turn coal ash, a waste product produced by electricity generating plants, into materials such as high-strength bricks, light-weight

## Tuned in to the home electronics market

HKUST's Entrepreneurship Program has inspired graduates and faculty to launch their own technology-related businesses since it started in 1999. One of the many success stories is Perception Digital, co-founded by Prof Jack Lau, Associate Professor in the Department of Electrical and Electronic Engineering, together with his departmental colleagues, Associate Professors C Y Tsui and Roger Cheng, and former students.



Perception Digital focuses on R&D for high-end digital audio applications, voice-based Internet applications and audio-visual consumer products and launched its first product, a home electronic digital jukebox, on the market in 2000. The machine is designed to fit alongside the video recorder or DVD player in people's homes and enables them to archive songs. In its first month, it achieved sales of HK\$3 million.

Both the company's and Prof Lau's efforts as chief operating officer and chairman have been recognized by the community. The company won a HKITCC Certificate of Merit for Technological Achievement in the 2000 Hong Kong Awards for Industry, with Prof Lau, HKUST's first PhD graduate, selected for one of Hong Kong's prestigious Ten Outstanding Young Persons Awards in the same year.

Perception Digital has established sales and marketing offices in Shenzhen and Central and research and development offices at HKUST and in Shenzhen.

Its products now include a portable MP3 recorder and player, digital recording car jukebox and a wireless digital audio broadcasting system.







## Activating opportunities for electronics industry

→ In 2001, Prof David C C Lam and Prof Pin Tong, of the Mechanical Engineering Department, and Dr David K K Young, Director of the Applied Technology Center, gained a HK\$29.5 million grant for their project to upgrade the design and manufacturing capabilities of the Hong Kong electronics industry.

The five-year Embedded Passives on Flexible Substrates Program has been set up to increase the technological sophistication and end-use value of products created by the Hong Kong electronics industry by helping manufacturers reduce the size of their electronic products, lower costs and enhance performance.

It was the largest grant yet awarded by Hong Kong Government's Innovation and Technology Commission. Compass Technology Co Ltd, a leading manufacturer of flexible substrate for IC assembly packaging based in Hong Kong, is sharing the cost.

## Streaming ahead

→ Electrical and Electronic Engineering research student James She got the new millennium off to an enterprising start with the launch of his start-up company SinoCDN in June 2000.

The award-winning company was co-founded by Mr She's and his MPhil supervisor, Associate Professor Danny Tsang, to turn ideas in Mr She's thesis into a business reality. CDN stands for Content Delivery Network, which provides high-quality multimedia content that can be broadcast over the Internet at low cost. SinoCDN has gone on to develop scalable broadband infrastructure projects for intelligent and wireless content delivery and reliable streaming media communication. The company's first customer was PCCW-HKT.

The company holds US and China patents for its technologies and its achievements quickly attracted attention. SinoCDN gained the 2001 Certificate of Merit in Technological Achievement from the Hong Kong Science and Technology Park and the 2001 Machinery and Equipment Design Award from the Chinese Manufacturers Association of Hong Kong.

In the same year James She was named one of Hong Kong's Ten Outstanding Young Digi Persons for his contributions to the IT sector.







# Teaching & Learning



Prof T C Pong

## Faculty show creative thinking at teaching awards

➔ School of Engineering lecturers put themselves in a class of their own at HKUST's first Teaching Innovation Awards in 2001 when they became the only school to have two faculty members win top honors. Professor T C Pong and Prof David Rossiter, from the Computer Science Department, received Excellence in Teaching Awards for the additional perspectives they had brought to methodologies and models.

Prof Pong's team developed the territory-wide Cyber University Program, which enables talented secondary school students to enroll in university programs via a web-based course delivery system. In Prof David Rossiter's case, the winning formula was to teach multimedia principles by immersing students in the subject through hands-on experience.



Prof David Rossiter

A departmental colleague, Prof Rudolf Fleischer, received a Teaching Innovation Award for encouraging active learning.

## Joint degree adds to information society

→ The School of Engineering became part of a pioneering venture to multiply Hong Kong's abilities as a knowledge-based society when HKUST teamed up with the Hong Kong Institute of Education to offer a four-year, full-time BSc (Hons) in Mathematics/Information Technology Education in 2001.

The joint venture between HKUST and the Special Administrative Region's main teacher-training institution was established to train and strengthen Hong Kong secondary school teachers in areas essential to information-age communities. As part of the program, students take courses in the School of Engineering's Computer Science Department to give them a firm foundation in computing and programming.

Graduates of the course emerge with a degree and a qualifying teaching. Teaching practice at secondary schools is included in the program.



Former President Professor Chia-Wei Woo (left) and then Director of the Hong Kong Institute of Education, Prof Ruth Hayhoe at the signing ceremony.



Winning team MicroMax Technology receive their HTEP award at the HKUST Forum from Prof Yuk Shee Chan (right), Vice-President for Academic Affairs.

The main candidates are third-year students who would like to swap the regular final-year project for an enterprise project which shows them how to move an idea from initial thought to delivered product. More junior students can be involved as members of project teams.

In a summer venture before the program got underway, five HTEP engineering undergraduates attended a meeting of the Asia-Pacific Student Entrepreneurship Society in Korea. Also present were students from Stanford and other leading Asia-Pacific universities.

## Generating undergraduates' start-up spirit

→ With enterprise the key to the community's economic future, the School of Engineering introduced its Hi-Tech Entrepreneur Program in 2001 to spark the start-up spirit in engineering undergraduates.

The program aims to give senior students across the School's departments the skills and confidence to turn engineering concepts into marketable ventures. The





Prof Helen Shen (left), Director of MTM Program / MTM-IT Program and Associate Dean (Development), speaks at the information session. Also present is Prof Raymond K Cheung (second from right), Director of the MTM-GLM Program.

## Bound for the top with technology management

➔ The fast pace of technological change and the implications it has for the working world are a growing challenge for professionals, managers and engineers. To fully prepare the community's corporate leaders of the future, the

School of Engineering joined forces with the School of Business and Management to offer Hong Kong's first Master of Technology Management (MTM) program in September 2000.

The part-time, 18-month program equips participants for more senior roles by boosting skills through a combination of the latest technical knowledge and business concepts. Students are brought up-to-date on technology developments while also learning approaches and gaining insight into business concerns. Incorporated into the program is a professional activity series, which includes seminars, forums and discussions with business, public and academic leaders and a compulsory trip to see technology companies in the Pearl River Delta. The MTM program is offered with two different emphases: information technology (MTM-IT) and global logistics management (MTM-GLM).

Along with the main components, there is also an optional overseas trip to give students a chance to visit leading technology institutions and see the latest developments outside Hong Kong. In 2001, 20 program members visited companies and laboratories in the United States. The seven-day trip included trips to Intel and MIT and a short course on Competitive Business Strategy at the University of Pennsylvania's (Penn) Wharton School.

In 2002, an Executive MTM was offered in Shanghai in partnership with Shanghai Jiao Tong University.



Members of the MTM Programs 2000-02 and 2001-03 visit Intel during their US study trip in October 2001.

## Computer forensics diploma makes its mark

Innovative education for professionals comes in many forms at the School of Engineering and one of the ways the School is securing the future for Hong Kong is through the introduction of the Special Administrative Region's first computer forensics diploma courses.

In June 2000, the School broke new ground when it joined up with the Information Security and Forensics Society to offer the Professional Diploma in Computer Forensics. On the trail of success during the 18-day intensive program were 37 officers from the Independent Commission Against Corruption and five government departments comprising the Department of Justice, Hong Kong Police Force, Inland Revenue Department, Immigration Department and the Customs and Excise Department.

The diploma consisted of three courses taught over six days each. These dealt with Computer Forensics, Digital Evidence and Legal Issues;

Network Security and Cyber Crime Investigation; and Internet, E-commerce and IT Security. Hands-on laboratory sessions were also included.

Prof Samuel Chanson, Associate Head and Professor of the Department of Computer Science and Prof Manhoi Choy, also from the Department of Computer Science, taught the courses alongside industry professionals from the Hong Kong Police Force, private security firms and legal experts from Hong Kong and the United States.

In 2001, the School launched a computer forensics diploma course for the general public, targeted at banking personnel, lawyers, IT strategists, computer auditors, and those in e-commerce security and government jobs, among others. The program runs over several months with classes held at weekends to enable working participants to attend.



*Prof Samuel Chanson and the guest of honor, The Hon Chung Kai Sin, Legislative Councilor (Information Technology), at the Graduation Ceremony.*



## Exchanges see students go international

Awareness of what life is like in other parts of the world is increasingly important for students who will work in a globalized economy

when they graduate. To put its students in the international picture, the School of Engineering has established exchange programs with over 30 institutions around the world.

Countries in the School's exchange program include the United States, Canada, Europe, Singapore, Australia and Japan.

Students from overseas are also welcomed each year. The Engineering Students' Union, together with other School unions, helps organize the Association of East Asian Research Universities (AEARU) summer camps, which see HKUST students link up with counterparts at leading universities from the Chinese Mainland, Taiwan, South Korea and Japan. The 2001 camp at HKUST was attended by nearly 50 students.





*Prof Raymond K Cheung presents a souvenir to guest Mr Alex Fong, then Deputy Secretary for Economic Services and subsequently Principal Hong Kong Economic and Trade Representative, Tokyo, at the opening ceremony.*

## On the move with logistics

➔ Logistics is an essential and fast-changing field, demanding up-to-date knowledge among professionals if the Special Administrative Region is to remain at the forefront of the international economic arena. The School of Engineering keeps on the move in its response to Hong Kong's professional education needs and, in June

2000, celebrated the graduation of the first group of industry professionals to gain its Executive Diploma in Transportation Logistics Management (TLM).

The part-time, one-year program involves both engineering and management concepts to equip students for the sophisticated hi-tech nature of many modern logistics operations and to give them a wider view of the business arena.

Prof Raymond K Cheung, Associate Professor in the Department of Industrial Engineering and Engineering Management (IEEM) and Director of the TLM program, explained the course offered both a local and an international perspective, looking at Hong Kong's role as the transshipment gateway between Southern China and the world.

Classes, held at weekends to enable participants to attend with minimum disruption to their schedules, tackle third-party logistics, e-commerce and computer applications, outsourcing and supply chain management. The first intake attracted managers and engineers with an average of 11 years' experience. The companies they worked for included Maersk, NEC, Hong Kong Air Cargo Terminals (HACTL) and other industry leaders.

A Master of Technology Management program in Global Logistics Management was launched in 2001 to provide further opportunities for graduates of the diploma course and logistics professionals.

## Postgraduate programs push back knowledge frontiers

➤ Postgraduate studies must reflect the changing needs of the community in Hong Kong and beyond, and tackle new areas of knowledge opening up in different fields. The School of Engineering has addressed both these issues with the start of cutting-edge interdisciplinary programs in environmental engineering and bioengineering in 2002.

The School has expanded its environmental engineering programs with MPhil and PhD studies added to the previously offered MSc. Deterioration of the environment is one of the top concerns of societies world-wide and of particular public interest in Hong Kong in recent years.

Meanwhile, dramatic breakthroughs in bio-engineering in recent years promise to alter the landscape in the fight for longer and healthier lives. To keep Hong Kong at the cutting edge of the developing field, studies at MPhil, MSc and PhD level are being offered.



## Penn alliance brings world of opportunity

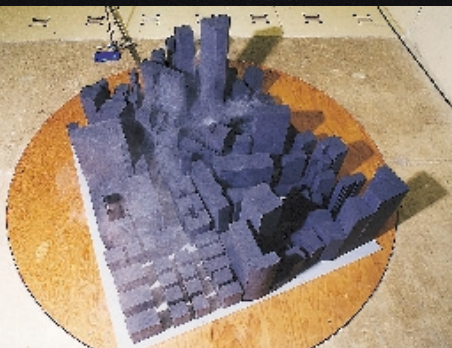
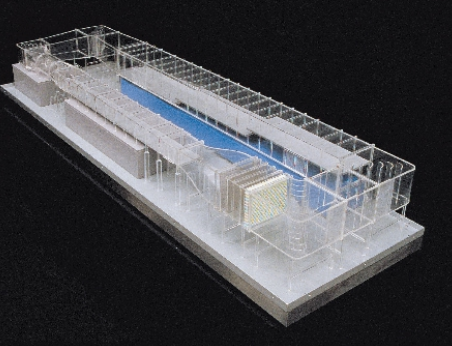
➤ The School of Engineering has brought the border-less world a step closer in the professional education arena with the creation of a strategic alliance between HKUST's School of Engineering and the University of Pennsylvania (Penn) School of Engineering & Applied Science.

The partnership arrangement, signed in February 2002, opens up new opportunities for the Schools' executive technology management programs by providing more student and faculty exchanges between the School of Engineering and the Ivy League university.

The Statement of Strategic Alliance enables students from both schools to take credit-bearing courses at the other, and to gain a wider perspective by immersing themselves in a different culture for a time. It further enhances the School of Engineering's popular Master of Technology Management program.



# Laboratories & Facilities



## On the crest of a wind/wave tunnel



A sophisticated wind/wave tunnel research facility opened at HKUST in 2000 to help researchers and professionals solve wind engineering, wave engineering and pollution dispersion problems.

The versatile CLP Power Wind/Wave Tunnel Facility, a central HKUST facility under the supervision of the Department of Civil Engineering, assists projects in the construction industry and environmental studies, and provides students with opportunities to work with the latest technology in the field.

The 61.5 meter long wind/wave tunnel is a subsonic boundary layer wind tunnel for experimental work, providing a high and low-speed 'dry' section, and a three-meter deep wave channel.

The facility is open to users conducting relevant research and engineering projects inside and outside HKUST. Projects have ranged from scale model testing of the effects of Hong Kong's terrain on the local wind climate to studies on the relationship between wind resistance and Hong Kong Olympic cyclist Wong Kam-po's posture. The latter provided data to determine Wong's most aerodynamic position for racing.

CLP Power Hong Kong Ltd donated HK\$10 million of the HK\$40 million budget, the University Grants Committee provided over HK\$21 million and HKUST contributed HK\$7 million.

## Centrifuge breaks fresh ground

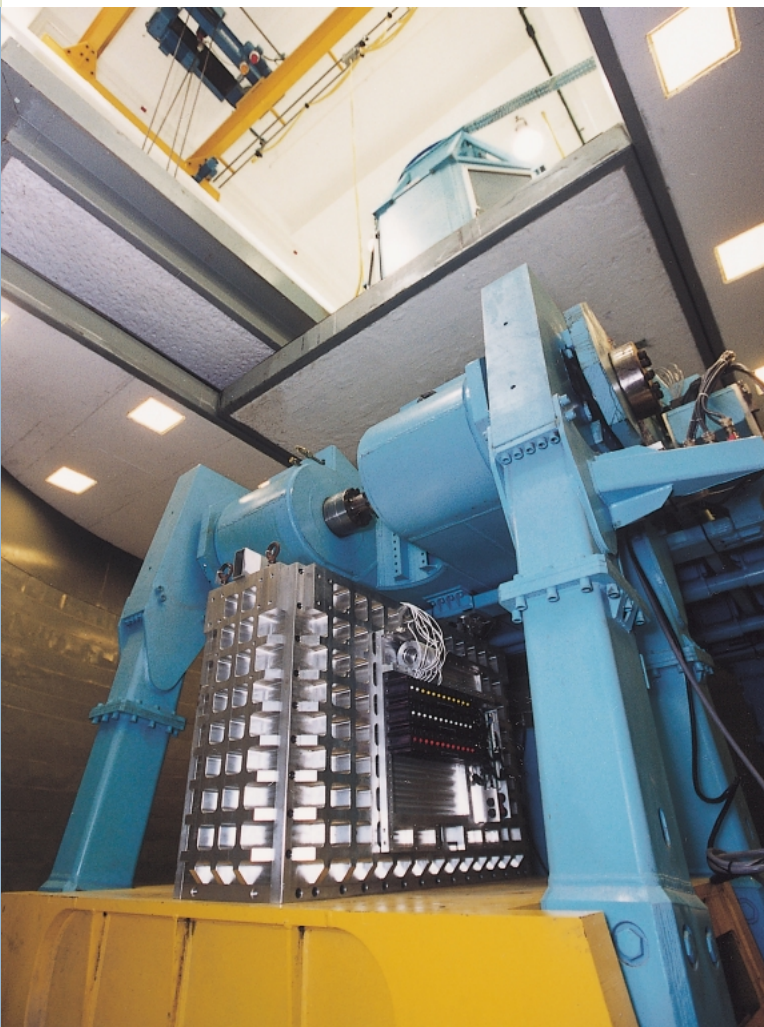
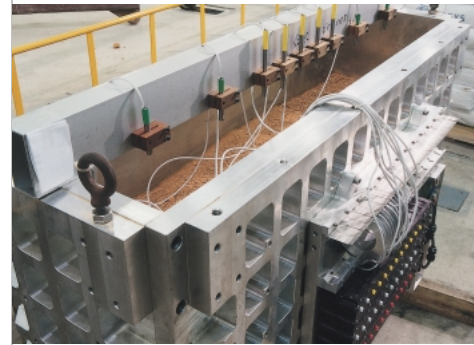
→ Hong Kong and international scholars and engineers gained a powerful technological ally in their battle to understand earth and man-made soil structures with the opening of HKUST's pioneering Geotechnical Centrifuge Facility in 2001.

The central research facility pushes Hong Kong forward in an increasingly popular area of engineering research and will help improve design and safety of engineering projects. It incorporates the latest developments in centrifuge and information technology, including the world's first bi-axial shaking table and a cutting-edge four-axis robotic manipulator that enables detailed construction activities to be conducted in-flight. This allows small-scale physical models to be tested under laboratory conditions with field conditions more accurately reproduced than was previously possible.

The centrifuge, which is supported in terms of teaching and research by the Civil Engineering Department, can assist studies investigating slope behavior, long-term ground settlement, tunneling and piling, and the effects of earthquakes.

For those wanting to anticipate the effect of tremors on structures, the bi-axial shaking table enables simulation of earthquake motion in two horizontal directions, allowing more realistic tests to be carried out. There is also an interactive data acquisition and control system linked to the Internet which means researchers in other countries can both view tests and gain data almost in real time.

The multi-million dollar facility was funded by Hong Kong's University Grants Committee and HKUST.

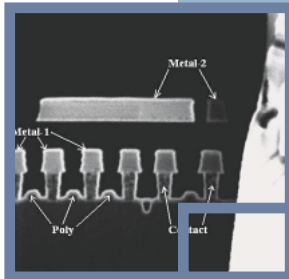
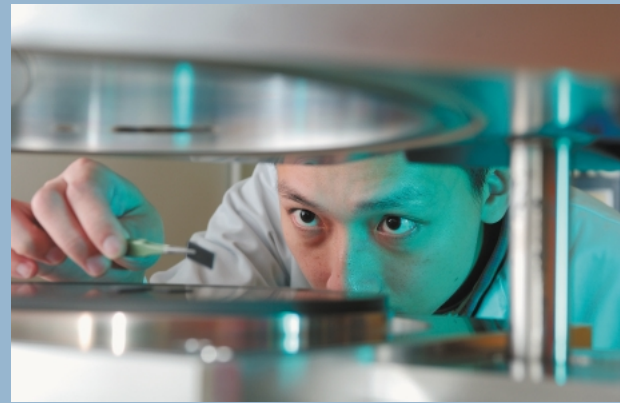




# Product analysis center joins semiconductor circuit

➔ The opening of HKUST's Semiconductor Product Analysis and Design Enhancement (SPADE) Center in 2001 gave the Hong Kong semiconductor business the opportunity to grow locally and expand its presence globally.

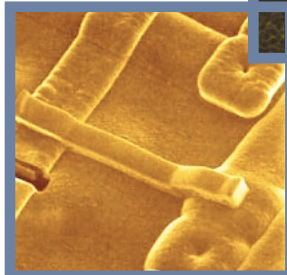
SPADE was set up to enhance the local industry's competitiveness in the world market by creating Hong Kong's first facility to provide debugging, testing and the repair of integrated circuits (ICs). HKUST is already at the forefront of semiconductor research and is the only university in Hong Kong with a complete microelectronics fabrication line.



Before the arrival of SPADE, Hong Kong's small and medium-sized semi-conductor firms had to turn to countries such as Singapore, Taiwan or South Korea for product and failure analysis, and design enhancement. SPADE, which operates as a non-profit service facility, contains state-of-the-art equipment including a focused-ion-beam system and high-resolution emission microscope.



The Center provides a way for Hong Kong semiconductor companies to lower manufacturing costs, shorten production time and provide training for staff. It also encourages international companies to set up IC design and development offices in the Special Administrative Region.



SPADE was awarded HK\$14.9 million in funding from the Hong Kong Government's Innovation and Technology Support Program, and gained industry sponsorship from more than 20 companies.

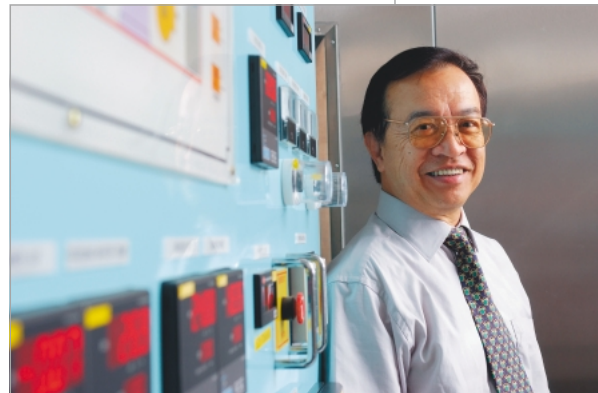
## Boost for energy efficiency testing

➔ The Mechanical Engineering Department helped energy conservation surge forward when its Center for Energy and Thermal Systems (CETS) became the first establishment to offer energy efficiency testing certified under the Hong Kong Laboratory Accreditation Scheme (HOKLAS).

CETS' world-class Jockey Club Controlled-Environment Test Facility can perform and certify tests such as ISO:5151 for air-conditioners. The facility comprises two rooms which simulate the indoor and outdoor environment respectively and a control room that can alter the environmental conditions in the rooms. The control room can also collect data on air flow rate, humidity and the electricity consumption of appliances being tested.

Prof Ping Cheng, Professor of the Mechanical Engineering Department and then Director of CETS, said the availability of such testing in the Special Administrative Region was an incentive for vendors to follow the Hong Kong Government's Energy Efficiency Labeling Scheme. Many previously did not adopt the labels because it meant shipping appliances overseas to gain accreditation.

The facility was established with the help of a HK\$3.3 million donation from the Hong Kong Jockey Club Charities Trust, and the accreditation program funded by a HK\$1.95 million grant from the Government's Innovation and Technology Fund.



## Lab gives digital enterprise a hand

➔ The Digital Enterprise Laboratory opened in 2000 to provide Hong Kong manufacturers with training and support in advanced software-based design technology. Major sponsors included Dassault Systèmes, the IBM Corporation and MTEch Engineering Co Ltd.





# Events

## Inline with the online world

Hong Kong became the first location in Asia to host the International World Wide Web Conference (WWW10) after a successful bid led by HKUST. The gathering in 2001 was co-chaired by Prof Vincent Shen from the Department of Computer Science.



## Chain reaction

In 2000 the School of Engineering's Department of Industrial Engineering and Engineering Management (IEEM) inaugurated an enterprising international conference on global supply chain management focusing on trends and opportunities in Asia-Pacific.



## It's a wrap

Advanced techniques in electronic packaging became the focus of a major forum in Hong Kong in 2000 at the International Symposium on Electronic Materials and Packaging (EMAP2000), jointly arranged by the Department of Mechanical Engineering, HKUST's EPACK Lab and international organizations.





## Notable success

High spirits and memorable occasions were the order of the day on 23 April 2001 as the much-anticipated 10th anniversary celebrations got off to a flying start. The launch of the celebrations drew more than 1,000 students, faculty and staff together in an emotional lunchtime gathering in the campus Piazza. The School of Engineering's first Homecoming Dinner on 7 October 2001 saw 400 alumni, faculty members and university officials gather for a fun-filled evening. The School's often unsung artistic side was heralded with a performance of the song 'Soaring', mainly composed by engineering graduates and presented to the University as a 10th Anniversary gift by the Alumni Association.

## Clean sweep

Energy engineering received a boost in 2000 when the Department of Mechanical Engineering and HKUST's Center for Energy and Thermal Systems organized the Special Administrative Region's first major conference related to the field. More than 260 specialists attended.

## Shape of the future

The Department of Mechanical Engineering became the 2001 host of the annual International Union of Theoretical and Applied Mechanics (IUTAM) Symposium, which tackled Mechanics and Martensitic Phase Transformations in Solids.



## School of Engineering Related Websites:

University	<a href="http://www.ust.hk/">http://www.ust.hk/</a>
Admissions, Registration and Records Office	<a href="http://www.ab.ust.hk/arr/">http://www.ab.ust.hk/arr/</a>
School of Engineering	<a href="http://www.seng.ust.hk/">http://www.seng.ust.hk/</a>
Engineering Alumni Associations	<a href="http://www.ust.hk/alumni/aa/">http://www.ust.hk/alumni/aa/</a>

### Engineering Departments

Chemical Engineering	<a href="http://www.ust.hk/~webceng/">http://www.ust.hk/~webceng/</a>
Civil Engineering	<a href="http://ce.ust.hk/">http://ce.ust.hk/</a>
Computer Science	<a href="http://www.cs.ust.hk/">http://www.cs.ust.hk/</a>
Electrical & Electronic Engineering	<a href="http://www.ee.ust.hk/">http://www.ee.ust.hk/</a>
Computer Engineering	<a href="http://www.cpeg.ust.hk/">http://www.cpeg.ust.hk/</a>
Industrial Engineering & Engineering Management	<a href="http://www-ieem.ust.hk/">http://www-ieem.ust.hk/</a>
Mechanical Engineering	<a href="http://www.me.ust.hk/">http://www.me.ust.hk/</a>

### Central Research Facilities

Advanced Engineering Materials Facility (AEMF)	<a href="http://aemf.ust.hk/">http://aemf.ust.hk/</a>
CLP Power Wind/Wave Tunnel Facility (WWTF)	<a href="http://www.ust.hk/~webwwtf">http://www.ust.hk/~webwwtf</a>
Design and Manufacturing Services Facility (DMSF)	<a href="http://www.dmsf.ust.hk/">http://www.dmsf.ust.hk/</a>
Geotechnical Centrifuge Facility (GCF)	<a href="http://www.ust.hk/~webgcf/">http://www.ust.hk/~webgcf/</a>
Materials Characterization and Preparation Facility (MCPF)	<a href="http://www.mcpf.ust.hk">http://www.mcpf.ust.hk</a>
Microelectronics Fabrication Facility (MFF)	<a href="http://www.mff.ust.hk/">http://www.mff.ust.hk/</a>

### Research and Development

Applied Technology Center (ATC)	<a href="http://www.ust.hk/~webatc">http://www.ust.hk/~webatc</a>
Engineering Industrial Consortium (EIC)	<a href="http://www.seng.ust.hk/eic/">http://www.seng.ust.hk/eic/</a>
RandD Corporation Limited	<a href="http://rdc.ust.hk/">http://rdc.ust.hk/</a>
Technology Transfer Center (TTC)	<a href="http://www.ttc.ust.hk/">http://www.ttc.ust.hk/</a>

### Engineering Industrial Consortium Technology Units

Automation Technology Center	<a href="http://www.seng.ust.hk/eic/">http://www.seng.ust.hk/eic/</a>
Center for Display Research	<a href="http://www.cdr.ust.hk/">http://www.cdr.ust.hk/</a>
Center for Energy and Thermal Systems	<a href="http://www.seng.ust.hk/eic/">http://www.seng.ust.hk/eic/</a>
Center for Wireless Information Technology	<a href="http://cenwit.ee.ust.hk/index.shtml">http://cenwit.ee.ust.hk/index.shtml</a>
Centrifuge Modeling for Infrastructure Construction Laboratory	<a href="http://www.seng.ust.hk/eic/">http://www.seng.ust.hk/eic/</a>
Computer-Aided-Design (CAD) in Structural Engineering	<a href="http://www.seng.ust.hk/eic/">http://www.seng.ust.hk/eic/</a>
Consumer Media Laboratory	<a href="http://www.cml.ust.hk/newcml">http://www.cml.ust.hk/newcml</a>
Cyberspace Center	<a href="http://www.cyber.ust.hk/">http://www.cyber.ust.hk/</a>
Electronic Packaging Laboratory (EPACK Lab)	<a href="http://ihome.ust.hk/~epack">http://ihome.ust.hk/~epack</a>
Human Language Technology Center	<a href="http://www.cs.ust.hk/~hltc/">http://www.cs.ust.hk/~hltc/</a>
Internet Business Consortium	<a href="http://www.ibt.ust.hk/">http://www.ibt.ust.hk/</a>
Multimedia Technology Research Center	<a href="http://www.cs.ust.hk/mtrec">http://www.cs.ust.hk/mtrec</a>

### Academic Services Units

Center for Enhanced Learning and Teaching (CELT)	<a href="http://celt.ust.hk/">http://celt.ust.hk/</a>
Industrial Training Center (ITC)	<a href="http://www.ust.hk/itc">http://www.ust.hk/itc</a>
Information Technology Support Center (ITSC)	<a href="http://www.ust.hk/itsc/">http://www.ust.hk/itsc/</a>
Language Center (LC)	<a href="http://lc.ust.hk/">http://lc.ust.hk/</a>
Publications Technology Center (PTC)	<a href="http://ptc.ust.hk/">http://ptc.ust.hk/</a>
Safety and Environmental Protection Office (SEPO)	<a href="http://www.ab.ust.hk/sepo">http://www.ab.ust.hk/sepo</a>
University Library	<a href="http://library.ust.hk/">http://library.ust.hk/</a>

SCHOOL OF  
**ENGINEERING**  
Status Report 2000-2002

