Environmental noise is an everyday discomfort for many people—be it the constant drone of highway traffic, the thud of a pile driver, the low hum of air-conditioners, or throbbing bass notes from a neighbor's music. HKUST physicists offer aural relief in the form of a new material that could revolutionize the way we insulate our lives against these and other types of noise pollution.

Low frequency sounds such as bass notes and engine noise have more penetrating power than high frequency sounds due to their longer wavelengths. Under conventional mass density law, this means the thickness of insulating materials needs to be in inverse proportion to the frequency of sound. That is, it takes five times more mass to screen out a low frequency sound of 200 Hz than a 1000 Hz sound. Concrete walls would need to be about 30 cm thick to shut out a low frequency humming sound of ~150 Hz, for example.

How is it then that a 2.5 cm thick layer of a new composite material developed by a team of HKUST physicists can achieve similar results? By applying a simple law of physics—that of local resonance—in a new way.

Prof Ping Sheng, Head of the HKUST Department of Physics and team leader, explains: "The basic structural unit of our sonic material is a small sphere consisting of a stiff heavy core and a soft cladding layer. Each of these coated spheres has an inherent mechanical resonance when embedded in a matrix medium. Impinging sound energy of similar frequencies excites the mechanical resonances of the spheres. This opens up a sonic spectral gap that reflects the impinging sound wave.

"Our approach offers a new solution to the acoustical challenges of low frequency noise. Practically speaking, it allows us to reduce the thickness required to block out low frequency sound by about ten times."

Prof Sheng's team started working on this novel approach three years ago. Their starting points were photonic band gap theory and the special role that metal plays in manipulating low frequency electromagnetic waves. This led them to question whether they could invent a material that had a similar effect on sound waves. They were successful.

The result is a locally resonant sonic material that can be tuned to screen out specific frequency ranges. By varying the materials, size, and geometry of the structural unit, the team has already demonstrated the sonic material's efficacy over a frequency range of 150 Hz to 1000 Hz. In theory, the principle could be applied to the entire sonic range.

Since reporting their breakthrough in the 8 September 2000 issue of Science (289: 1734–36), the team has received enthusiastic follow-up from the international and scientific media. Prof Sheng ascribes this attention to the fact that "acoustics is a very old and classical field in which few people expect new discoveries. It is also a topic people can relate to personally because of noise pollution".

The locally resonant sonic material was conceptualized and developed at HKUST by Prof Ping Sheng, Associate Professor Che Ting Chan, Associate Professor Zhiyu Yang, Assistant Professor Xixiang Zhu, and Visiting Scholars Dr Zhengyou Liu, Dr Y Y Zhu, and Mr Yiwei Mio. The research was supported by funding from the Hong Kong SAR Government Research Grants Council.

Tunable spheres: The basic structure of the locally resonant sonic material is a small sphere consisting of a stiff heavy core and a soft cladding layer. The size of the core and total diameter of the coated spheres is directly relevant to their mechanical resonance frequency range when embedded in a matrix medium.
Issues under Discussion in the Higher Education Community

During the past several months, a number of issues have been under discussion in Hong Kong's higher education community. All these issues will affect the further development of Hong Kong's universities and are worth our attention. In this report, I will select just a few topics to write on.

Four-year system

This topic has received no end of attention during the last decade, but a new and alarming issue has arisen only recently: how to fund a four-year system? Or, to put it bluntly: whether to fund a four-year system?

After years of debate, Hong Kong people have reached a consensus, by a rather wide margin, that our universities should abandon the three-year system instituted according to the British tradition (but now under reform even in Great Britain itself) and move on to the internationally preferred four-year system. Many academics, including myself, have written and spoken on this extensively, so there is no need to present yet another round of argument. Since a four-year system could impact both the structure and the funding of secondary schools, the Government has been most cautious in dealing with this reform.

What is worrying to university academics is that some influential personalities have been saying publicly that, while they support the move toward a four-year system, it will take at least six to seven years for actual implementation to begin. More worrying still is their view, apparently shared by some government officials, that no increase in recurrent funding would be needed for a four-year system even though total enrollment would increase by one-third.

The heads of the tertiary institutions have stated in no uncertain terms that, if such a view were to become policy, the quality of teaching and research would suffer. The tremendous gains harvested from many years of hard work would be damaged, and the development of Hong Kong into a New Economy and Knowledge Society would be delayed. Speaking as an organization, the Heads of Institutions made it clear that the tertiary sector would not ask for funding increases in proportion to the enrollment expansion since all sectors of society must share the Government's current financial pains. Their request is to make do with a 20% funding increase for a 33% enrollment expansion. Of course, separate estimates must be made for the capital construction and equipment required. We are confident that the SAR Government, which is bent on leading Hong Kong into this New Economy and Knowledge Society, and is mindful of this initiative's total dependence on human resources, will not reject this sensible proposal.

Credit unit system

The Education Commission has advised the universities to adopt the credit unit system, and to strive toward some form of universal transferability of credit units. In actuality, many of Hong Kong's universities have long adopted the credit unit system, and have implemented credit transfers in accordance with the norms of the international academic community. The main difficulty has been the curricular rigidity imposed by the three-year system, which severely limits the capacity for student transfer between academic departments or institutions.

Again, what is worrying to university academics is that some personalities have repeated publicly that, once the credit unit system is implemented, students could choose to take three or four years to complete their degree programs, or as little as two years and as much as five to six years. They cite as an example the experience of the American universities.

At HKUST, where most of the faculty members have come from America, we are at a loss to understand this logic. On average, students in American universities take some 15 to 16 credits of study per semester, and graduate with 120 to 128 credits after eight semesters. That translates into four full years. Of course, a small percentage may take less time, and many take more time—or even give up before graduation. But such a small minority does not in any way affect the norm.

It is not possible to reduce funding by adopting the credit unit system. Allow me to use an analogy. One pound equals 16 ounces. Measuring in pounds or in ounces does not affect an object's actual weight. Otherwise those of us who are overweight would be able to reduce simply by weighing ourselves in ounces rather than pounds. Wouldn't that be wonderful?

Lifelong learning

Lifelong learning represents a major drive in Hong Kong's upcoming educational reform. We at HKUST fully support this initiative, as is evident from our very early participation in offering lifelong education to the community.

We offer lifelong education in three ways. The first way is to take advantage of our particular strengths in faculty quality and external networking (with local off-campus organizations as well as international partners) and provide executive education courses to professionals and leaders. For example, our joint Executive MBA program with Northwestern University's Kellogg School, an international leader among providers of business executive education, is already highly respected as the leading program in Asia. Numerous executive education courses offered by our School of Engineering and School of Business and Management, in many cases custom-designed for major multinational corporations, have received high praise from Hong Kong's business and industrial community. We will soon form a university-owned company to support the efforts of individual schools.

The second way consists of continuing education for society at large. Our belief is that the mission and objectives of a university would be compromised if it were to operate community colleges on its own. The Education Commission calls for the establishment of American-style community colleges and we fully support this initiative. However, community colleges in the US are organized and supported mainly by the government; courses are offered to students practically free of charge. No American university would use its own faculty or budget to run operations which are incompatible to its mission. In fact, it is by no means obvious that university professors are well suited to community college teaching. Furthermore, no American university of quality would attempt to make money by operating community colleges.

HKUST intends to contribute in the following manner. Firstly:
by cooperating with the Open University of Hong Kong, newly established and independent community colleges, and secondary schools, to assist in the quality assurance of the courses they offer for self-learning. Secondly: by working with selected overseas community colleges which have joined consortia backed by top-ranked research universities to provide high-quality courses to Hong Kong students. Thirdly: by putting such courses on the Web. The University has already formed a wholly owned, independent company to take charge of these activities. The Senate will be asked to deal with matters concerning academic quality and policies.

The third way, also potentially the most powerful and versatile, is online education (or "e-education"). Online education is a product of high technology; it will without a doubt affect the development of all educational programs worldwide. Most of the so-called e-education being touted here in Hong Kong and overseas is still quite primitive. It does little more than deploy the Internet for course delivery, the basic concept differing very little from correspondence courses in the early days and TV courses somewhat later. Real online education must take advantage of artificial intelligence and cognitive science to devise new ways of information transmission and feedback to enhance teaching and learning. It must be fully interactive.

Since one of the primary objectives of HKUST is the development and utilization of high technology, there is every reason for the University to assume a leadership role in online education in this part of the world. However, the technological and financial requirements of creating online courses are much more demanding than what can be met by individual providers. In view of this, HKUST will soon establish another independent company to partner with the most advanced national and international pioneers in this new venture.

This summarizes how we look at lifelong education. The reader may detect certain discrepancies between our views and what has been said by the Education Commission; but our goals are the same. We both want to find ways to radically increase the opportunity of further education for all people in Hong Kong.

Academic freedom

Recent events in Hong Kong, fueled by political polarization and media muscle in full play, may lead one to suspect that academic freedom is in jeopardy on the campuses of Hong Kong's universities. Nothing can be farther from the truth.

It has been 12 years since I returned to Hong Kong. During those 12 years, until the recent incident at the University of Hong Kong, not once have I heard of anyone being accused of interfering with academic freedom in any of the higher education institutions. This was true during British rule, and has remained true after the establishment of the SAR Government. There has been no accusation of interference from outside the campuses, and no accusation of interference from within.

At HKUST, the supreme academic body is the Senate. The membership of the Senate consists almost exclusively of academic staff, plus three elected student representatives. Any member can place any academic policy issue on the Senate's agenda. Having come from American universities, the overwhelming majority of HKUST's teaching staff are familiar with the American academic tradition, in which respect for academic freedom is both absolute and automatic. Perhaps for this reason, it has never occurred to anyone since the founding of the University that there might be a need to raise the subject in the Senate.

I am not sure the public is totally clear on what constitutes academic freedom, or the definition of the word "academic". Many kinds of activity are proper on a university campus. Among them, teaching and basic research are definitely academic work. Applied R&D is also academic work, as long as the work falls within the realm of the academic's expertise, is creative in nature, and can be published in scholarly or professional journals of quality. Knowledge transfer, technology-based consultancy or entrepreneurship, surveys of a general nature, essays or commentaries in non-scholarly or non-professional publications, and so on, happen to be activities in which many academics wish to be engaged; they coincide with what universities often see as direct contributions to society. But they do not always constitute academic work.

If you would allow me to simplify in layman's language: Academic freedom protects the freedom to select scholarly subjects for one's inquiry, the freedom to prepare and structure one's teaching materials, the freedom to determine one's teaching or research methodology, and the freedom to publicly disseminate one's scholarly findings. Academic freedom does not guarantee that society or the institution must provide support for every topic, or the Senate must approve every course or curriculum, or one's colleagues in the school or department must approve every methodology, or scholarly and professional journals must accept every submission for publication. Whether a person or a piece of work meets the required academic standard is determined internally and/or externally in accordance with well-defined procedures of quality assessment; it has nothing to do with academic freedom.

The stronger the university and the more accountable the relevant government agency, the more rigorous the quality assessment and the higher the required standards.

Recent years have seen substantial and rapid rises in the quality of teaching and research carried out in Hong Kong's higher education institutions. As quality rises, so do standards. A cycle for continuous improvement is formed. However, these ultimately beneficial changes cause an increasing number of staff to become casualties of performance assessment. The resulting "breaking of iron rice bowls", loss of automatic salary increases, and linking of compensation to performance may give rise to dissatisfaction on the part of the people affected: a price organizations pay for reform and improvement. As society and the media take steps to better understand the traditions and practices of the worldwide academic community, and take time to analyze and measure the routine operations of local universities, I believe the public will come to better appreciate the true meaning of academic freedom and, at the same time, strongly support the rising standards and rigor required by the universities' criteria in academic assessment.
Fuzzy Logic Enhances Business Competitiveness

When someone says, "It's very hot today!" people do not need to measure the air temperature to understand what they mean. We all have an intuitive idea of what "very hot" is from our own experience. However, in the numerical world of computers, such intuition does not exist. Computers need a precise definition of what temperatures are hot—for instance, 30 or 30.1 degrees Celsius. Fortunately, there is a technology that can effectively bridge the gap between human intuitive experience and the numerical world. It is called "fuzzy logic". By integrating human knowledge with the computer's data-processing power, fuzzy logic can be applied to develop control and decision support systems that help us make complicated decisions.

What is fuzzy logic?
No matter how complex they appear to be, most computers today are based on logical operations that use 0 and 1 as operands. Therefore, everything inside the numerical world of a computer is precisely defined by strings of either 0 or 1. This type of logical operation, though simple in nature, is not sufficient to handle the fast-changing and complicated phenomena of the real world.

The theory of fuzzy logic was developed in the 1960s with the objective of overcoming the limitations inherent in traditional logical operations. Fuzzy-logic specialist Assistant Professor Lixin Wang of HKUST's Department of Electrical and Electronic Engineering explains: "In simple terms, fuzzy logic introduces a new set of logical operations which allows the existence of varying levels of 0 and 1." The word "fuzzy" refers to this new characteristic of vagueness in certain logical operations.

Numerous applications
Since fuzzy logic's introduction in the 1960s, researchers and engineers have focused on its capabilities in linking human knowledge and the computer processing function to develop state-of-the-art system control technologies.

Today, fuzzy logic systems already surround us. A number of household appliances now use simple fuzzy logic control systems to enhance their performance. For example, some washing machines use fuzzy logic systems to optimize the water input in relation to the amount of clothes being washed.

Optimizing industrial processes
When fuzzy logic is applied to the complex control systems used in industries such as steel making and petroleum refining, the economic returns become much greater. In 1999, Prof Wang helped the Shanghai Baosteel Group Corporation on a consultancy basis to implement a fuzzy logic control system technology in order to improve the quality and quantity of their production output. The new technology immediately demonstrated remarkable improvements in production quality and quantity.

"China is amongst the largest steel manufacturers in the world. However, we still need to import high-end steel products," says Prof Wang. "If we can develop the technology to produce these high-end steel products ourselves, the economic returns to the nation will be enormous."

Baosteel was already using state-of-the-art furnace control technology, based on the so-called algebraic modeling technique. However, it recognized the need for a more sophisticated system control technology to further upgrade the mill's production capabilities and improve its competitiveness. Enter Prof Wang and fuzzy logic.

Working with the Shanghai Baosteel Research Center, the company's research arm, Prof Wang developed fuzzy logic systems to integrate the knowledge base system that constitutes Baosteel's experience of steel making with the computer system that controls the steel-making process. The newly integrated system is now enabling the company to utilize its previous experience more effectively and enhance its production performance.

Simulation tests using Baosteel's historical process data have demonstrated that the new fuzzy logic control system can help upgrade the mill's production quality to the level of world-class steel makers. These results convinced Baosteel to further test the capability of the control system by installing it on one of the mill's production lines in July 2000.

Data mining for hidden gold
While the benefits offered by fuzzy logic in incorporating human experience into computer systems can be tremendous, the reverse of the application path may now offer even greater opportunities. Prof Wang says, "My research over recent years has focused on reversing the process to extract useful knowledge or rules from a huge volume of data stored in a computer system." This type of application is called "data mining".

"Since the beginning of the Information Age, our computer systems have been accumulating a wealth of useful data. We have learned a lot from this data, but there may be more knowledge hidden in the data that we have overlooked and which is worth investigating," explains Prof Wang.

His research has led him to develop a software package which he calls "The FuzzMiner". This data-mining software is designed to help organizations extract useful information from their own corporate data, thereby enhancing their competitiveness. Investment consultants, for example, could use the software to determine investment patterns in order to make more accurate predictions on price fluctuations in, say, securities. Meteorologists are another group of potential users—they could use the data-mining software to process accumulated weather data with a view to improving their forecasting accuracy.

Prof Wang anticipates that The FuzzMiner will be ready for market release shortly.
Research for a Knowledge Society

The University is placing emphasis on a number of areas of scholarship that address local opportunities and can assist Hong Kong's transition to a knowledge-based society. Research and development achievements in these areas promise to have substantial regional benefits and impact. They are already internationally recognized areas of strength at HKUST in terms of research and education.

Four of these high impact areas are introduced below. Others such as China business and management; Chinese language sciences; chirrotechnology; energy; history of South China; infrastructure development; Internet technology; microsystems; and nanotechnology will be profiled in future issues of this Newsletter and elsewhere.

Coastal and atmospheric research
Real-time analysis and prediction of environmental problems are more effective than "after the fact" case studies. The timely delivery of scientific data on the cause of such problems empowers government and other stakeholders to implement mitigating measures. With this mission, the University's Center for Coastal and Atmospheric Research (CCAR) focuses on expert systems and solution-minded research relevant to Hong Kong and the Pearl River Estuary.

Established in March 1998, CCAR has tackled a number of large, complex projects from a “top down” and multidisciplinary approach. Based on this experience, the Center has identified a number of initiatives of local benefit. For example, developing a real-time integrated environmental information and prediction system for Hong Kong and the Pearl River Estuary.

E-commerce driven manufacturing and logistics
With its ability to reach anywhere in the world instantaneously at minimal cost, electronic commerce is fundamentally changing how we design, manufacture and distribute. It makes the speedy adoption of e-commerce driven manufacturing and logistics (EDML) essential to Hong Kong's survival as a major commercial and freight transport center in the new economy. To accelerate the technology upgrade of Hong Kong's manufacturing and logistics industries, HKUST has established an EDML research team of experts in e-commerce, transportation logistics, and design and manufacturing.

Drawn from six departments in the School of Engineering and the School of Business and Management, the EDML program team is developing a comprehensive knowledge base on product design and manufacturing capability as well as its integration with logistics and commerce in the Internet-connected environment. The team's research, teaching, and technology transfer work is supported by cutting-edge research facilities as well as input from a number of international collaborators and industrial consortia.

Molecular neuroscience
Continued advancements in neuroscience (the study of the brain) are expected to lead to monumental improvements in global healthcare in terms of the development of more effective diagnostics and therapeutics. Strategically, Hong Kong is also ideally located to tap into the rich history of traditional Chinese medicines (TCM) in order to develop novel neuro-acting drugs.

HKUST has promoted its competitive advantage by recruiting internationally recognized neuroscientists, and by establishing the Molecular Neuroscience Center. The Center's main research focuses on elucidating the molecular basis of neuronal structure and function by combining cutting-edge research facilities with a multidisciplinary team of scientists. The Center also participates in TCM-based neuro-drug discovery.

Recently, HKUST has become a permanent Gordon Research Conference site for molecular and cellular neurobiology. Given the Center's solid foundation, important scientific contributions in the field are envisioned.

Wireless communications
Wireless and mobile communications are one of the most dynamic areas of information technology. There are major growth opportunities in both the provision of wireless services, and the design and manufacture of wireless communications systems and related equipment.

Innovative technologies and research findings by HKUST wireless experts can help Hong Kong make the most of these opportunities.

The HKUST wireless group was established in 1994 and has 17 key members. Their research expertise includes: antenna design and smart antenna systems, communications signal processing, transmission technologies, and wireless and mobile communications.

Since 1996, they have been ranked the top university wireless research group in the world in terms of publications at the IEEE Vehicular Technology Conference, the top international conference on wireless communications systems. The group is also involved in fertile research partnerships with industry giants such as Motorola and counterparts at other local and overseas universities.
HKUST Start-ups Pioneer New Technologies

The HKUST Entrepreneurship Program was introduced in July 1999 as an incubator for high-technology start-up companies established by HKUST students, alumni, faculty, and staff. As of today, 20 such companies have been hatched and many of them are growing impressively, making important contributions towards building Hong Kong into a knowledge-based society.

High-quality, low-cost multimedia streaming

In late October 2000, the HKUST community began to watch live broadcasting on the Internet by accessing TVB.com through personal computers on campus, thanks to the invention of the Intelligent Streaming Gateway (ISG) by James She, who developed this ingenious concept in his MPhil research thesis in electrical and electronic engineering at HKUST. If the three-week trial broadcast runs smoothly, Mr She is planning to expand the service to include other local universities under a project called UTV.

A talented student with an entrepreneurial spirit, James She planned to transform his research into a commercially viable product as soon as he completed his MPhil program in June 2000. He then founded the company SinoCDN with his thesis supervisor, Associate Professor Danny Tsang.

With support from the Small Entrepreneur Research Assistance Program (SERAP) sponsored by the Hong Kong SAR Government's Innovation and Technology Fund and from the HKUST Entrepreneurship Program, SinoCDN focuses on live multimedia broadband broadcasting and networking services. The company's mission is to build a Content Delivery Network (CDN), connecting Chinese communities worldwide, through which high-quality multimedia content can be broadcast over the Internet at very low cost. Using one ISG box, a 256kps leased line can support 200 end-users simultaneously—very high level by today's standards.

Despite its short history, SinoCDN has caught the attention of such big players as Intel, Pacific Century Cyberworks, and Television Broadcasts Ltd (TVB). James She attributes this promising start to the support from the Entrepreneurship Program, which offers facilities at modest rental, accessibility to HKUST resources, professional advice from faculty, financial, and legal advisors, as well as networking opportunities with industry and business.

Life-saving rapid biotests

Not only are multimedia and Internet technologies in hot demand, biomedical engineering is yet another area at the forefront of hi-tech development. Biodetection Ltd is a start-up company under the HKUST Entrepreneurship Program that develops rapid biotests to improve medical diagnosis. Its credo is to “save lives and money with rapid tests”.

Failing to find a commercial partner to produce the tests at the research stage, Prof Reinhard Renneberg of HKUST's Department of Chemistry joined the Entrepreneurship Program to “raise his own baby” and founded Biodetection Ltd with postdoctoral associate Dr Helma Kaptein in September 1999. At its present stage of development, the company is focusing on rapid heart-attack tests. According to Prof Renneberg, current detection systems are too expensive and much too slow (more than two hours!). A rapid test has to be developed in order to save lives.

Biodetection Ltd has been able to collect clinical data for its research by working with the Prince of Wales, United Christian, Queen Mary, and Princess Margaret hospitals. The company's objective is to supply its partnering hospitals with an easy and inexpensive test that can diagnose heart attacks within minutes by Spring 2001. Another line of products for the prevention of heart attacks is already on the drawing board.

Housed in the HKUST Annex, the company receives helpful advice from the HKUST RandD Corporation Ltd and from experts such as Silicon Valley start-up guru John Nesheim. Like SinoCDN, Biodetection Ltd is also supported by the Government's SERAP program, which matches 50% of the capital raised by the company on a loan basis.

Other products under development at Biodetection Ltd include rapid environmental tests that people can perform on the spot to tell, for example, whether seafood is safe or if water is polluted.
R&D at Your Fingertips

Over 100 companies are making use of the University's expertise and research facilities to develop innovative products and technologies. Still others tap HKUST know how and resources for product testing and problem solving.

But how do business or industry clients find out what services and solutions the University can provide? Where should they look for information on engaging HKUST as an R&D partner? The University’s new R&D Portal is a good place to start.

As its name suggests, the R&D Portal provides a dedicated gateway or “one-stop shop” on the Web for people interested in research and development at HKUST.

The portal is a secure, password-protected site with two membership categories: Portal Members and HKUST Staff. Existing and potential R&D clients from government, business, and industry, and other interested parties are warmly invited to register as Portal Members. Membership is free but required for entry beyond the “front door”.

Log-in takes Portal Members to an Info Center. From here they are directed to information on new technologies ready for commercial development; research facilities and expertise available to business and industry clients; procedures for establishing research partnerships; commissioning R&D services; and other relevant topics.

Interactive search functions let Portal Members search for information on current research projects, patented technologies, expertise, and facilities by academic or industrial classification, by first or family name of project manager, or by key word. Various forms required for R&D administration can also be downloaded from the site.

However, the R&D Portal is more than a web site that makes information easier to access. Its ultimate goal is to provide Portal Members with customized content. For this reason, all first-time users are asked to fill in a simple online registration profile. This generates a customized presentation of the database information on projects, patented technologies, research expertise, and facilities to match the viewer’s stated interests. As the portal matures, the profiles can be used to generate an intuitively personalized front page to greet Portal Members whenever they log on. Members can update their profiles to reflect evolving interests or support needs at any time.

Another automated feature allows Portal Members to submit online requests for R&D support and quotations. Requests will be processed and followed through by HKUST Applied Technology Center staff. The Center’s Director, Dr David Young, anticipates that this new level of automation will greatly improve the University’s response-time and efficiency in servicing business and industry’s R&D needs.

The R&D Portal should be fully operational by the end of November. In the meantime, Newsletter readers are invited to enjoy a “soft opening” preview by clicking on http://rdportal.ust.hk.

Meeting growing needs

SinoCDN and Biodetection Ltd are but two examples of how the Entrepreneurship Program takes new technologies out of the University’s labs and establishes companies that create jobs and help build Hong Kong into a knowledge-based society—an initiative which contributes to HKUST’s mission of assisting in the social and economic development of Hong Kong.

With a primary focus on technology, the Entrepreneurship Program offers start-up companies a package of services that include space at cost, central administrative support, communications, access to an Advisory Committee providing guidance on technical and management issues, introductions to venture capitalists, discounts for participation in trade shows and other promotional activities, as well as access to University facilities and resources, seminars, and workshops.

Because of the rapid expansion of the Entrepreneurship Program and the increasing need to provide a more effective interface between the University and the private and public sectors, the University is planning to expand the Annex with the construction of a 10,000 square meter Enterprise Center to house commercial and industrial related activities all under one roof. This will include an expanded incubation facility that will be able to accommodate up to 35 start-up companies.
Microsoft and HKUST Joint Lab
Microsoft Research, China and HKUST established a virtual research laboratory on 28 September. The MSR-HKUST Joint Research Laboratory was declared open following the signing of an agreement by Dr Yaqin ZHANG, Managing Director of Microsoft Research, China and Prof Otto LIN, Vice-President for Research and Development at HKUST. The Laboratory's inauguration marks a further consolidation of collaborative research endeavors between HKUST and Microsoft. It will focus on developing multimedia and information technologies, and facilitate research and academic exchanges between the University and Microsoft Research in Beijing. This is Microsoft Research's first joint laboratory in Hong Kong, and its fourth in China.

Open House
The 2000 Student Outreach Day attracted over 15,000 Form 6 and Form 7 secondary-school students, parents, and teachers to the University campus on 23 September. The day-long program of talks, exhibitions, and guided tours is organized annually to offer guests a closer look at the academic opportunities, facilities, and campus life awaiting students at HKUST. Interest in the seminars introducing academic programs was higher than ever this year, with more than half of the 32 seminars oversubscribed. Tours of the 37 laboratories on show in the Schools of Science and Engineering proved similarly popular. Many guests also enjoyed the exhibition matches of badminton and softball, art exhibitions, and tours of student amenities.

Geron Drug Screening Collaboration
A common goal to discover drug leads for cancer and age-related diseases has led to a research collaboration between HKUST and Silicon Valley biopharmaceutical company, the Geron Corporation. The partnership was formalized on 18 September with the signing of a drug screening project agreement by Dr Thomas OKARMA, President and CEO of the Geron Corporation (right), and Prof Tony EASTHAM, Acting Vice-President for Research and Development at HKUST. It grants the University's Biotechnology Research Institute use of Geron's patented telomerase technology in screening traditional Chinese medicines for new drug leads. Innovation and Technology Commissioner, Mr Francis S W HO, JP, greeted the collaboration as a positive step forward for Hong Kong's biotechnology industry.

New Cultural Chair
The University's first Y K Pao Distinguished Visiting Professor, Immanuel WALLERSTEIN (right), flew in from Yale to present a stimulating Inaugural Lecture on cultural conflict and identity, and participate in discussion forums with leading social scientists from the Chinese Mainland, Hong Kong, Singapore, and Taiwan (20–22 September).

Prof Wallerstein's visit marked the formal inauguration of the Y K Pao Visiting Chair in Cultural Studies in the School of Humanities and Social Science. The Chair is endowed with a fund of US$2 million from Dr Helmut SOMMEN, Chairman of the World-Wide Shipping Agency and a member of the University Court, in memory of his father-in-law, the shipping magnate and philanthropist Y K PAO.

China Hi-Tech Fair 2000
The University showcased recent achievements in innovative research, and technology transfer and commercialization by HKUST faculty and eight start-up companies from the HKUST Entrepreneurship Center at the second China Hi-Tech Fair in Shenzhen (11–17 October), the largest international technology fair held in the Chinese Mainland. This year's fair generated more than US$8.5 billion in technology transfer and investment agreements. Vice Premier Wu Bangguo visited HKUST's booth on 12 October. Other exhibitors included Peking and Tsinghua universities, trade delegations, private enterprises, investors, and research institutes.
Mr Kenneth Hung FANG, JP
方煥先生

Mr Kenneth Fang is Chairman of Fang Brothers Knitting Limited, a non-executive director of the Hong Kong and Shanghai Banking Corporation Ltd, and a leading member of the textile and retail industries in Hong Kong, China, and overseas.

Born in Shanghai, Mr Fang obtained a master’s degree in chemical engineering from the Massachusetts Institute of Technology.

Mr Fang has held offices in key industrial and trade associations as well as public service organizations in Hong Kong. He currently serves as Chairman of the Hong Kong Productivity Council and the Prince Philip Dental Hospital Board of Governors. He is also an honorary chairman of the Hong Kong Textile Council and an honorary president of the Hong Kong Woollen and Synthetic Knitting Manufacturers’ Association. He also serves as a member of the Hong Kong SAR Government’s Textile Advisory Board.

Mr Fang is a court member of the University of Hong Kong and the Hong Kong Polytechnic University. He was made a Justice of the Peace in 1986, an OBE in 1990, and a CBE in 1997. He currently serves as a member of the National Committee of the Chinese People’s Political Consultative Conference.

Dr Larry Chi Kin YUNG
榮智健博士

Dr Larry Yung is Chairman of CITIC Pacific and a director of several leading corporations in Hong Kong and China. Born and educated in Shanghai, Dr Yung graduated at the University of Tianjin with a degree in electrical engineering. Having gone through the Cultural Revolution, he moved to Hong Kong in 1978 to develop the family business. In 1981, he invested in the venture capital business in the United States, which led to the founding of the first CAD company to be listed in the States.

Dr Yung mapped out the strategy to invest in Hong Kong’s transportation system in 1985 and became Vice Chairman and Managing Director of CITIC HK (Holdings) Ltd in 1987. The company invested in the Hong Kong Eastern Harbour Crossing and later in Cathay Pacific Airways. Other strategic acquisitions include the Western Harbour Crossing, Dragonair, and Dah Chong Hong. Not forgetting his roots, Dr Yung has invested in power stations and transportation systems in different provinces of the Chinese Mainland since 1997.

Dr Yung has been instrumental in setting up foundations to benefit students at Jiangnan, Tsinghua, Tianjin, and Stanford universities. He was a member of the Governor’s Business Council from 1994 to 1997, and is an appointed member of the Chinese People’s Political Consultative Conference. He holds an honorary doctorate in business administration from HKUST.

Ms Kai-Yin LO
羅獻妍女士

Ms Kai-Yin Lo is a well-known jewelry designer and entrepreneur, as well as a historian, author, patron, and collector of Chinese art. Born in Hong Kong, she studied European history in Cambridge and London universities where she received her BA and MA respectively. She has also attended the Harvard Business School of Advanced Management.

Ms Lo started her career in the public relations field, initially with Time Inc in New York, and with Mandarin Oriental Hotels in Hong Kong. In the early 1980’s, she parlayed a personal interest in jewelry design into the successful development of her own brand of jewelry, which ushered in a new direction of design in the field and earned her international recognition and numerous awards, including the prestigious Neiman Marcus Design Award, USA, and the Hong Kong Entrepreneur Award, both in 1992. In 1999, Ms Lo founded a new company, Yin Expressions Limited, to engage in jewelry design, marketing, and art consultancy.

Ms Lo is also recognized for her efforts in furthering the understanding of Chinese art and culture through exhibitions, seminars, and writing. She is Commissioner of the Hong Kong Culture and Heritage Commission and a member of the Hong Kong/Japan Business Cooperation Committee of the Hong Kong Trade Development Council.

Prof Kang L. WANG
王康隆教授

Prof Kang L. Wang is a pioneer and distinguished scholar in electrical engineering. He received his BS from Cheng Kung University in Taiwan, and his MS and PhD degrees from the Massachusetts Institute of Technology. During his career, Prof Wang has worked at MIT and General Electric. In 1979 he joined UCLA as Professor of electrical engineering and, from 1993 to 1996, he was Chairman of the Electrical Engineering Department. He was successful in recruiting a large number of world-class scholars to the Department, and was instrumental in furthering the industrial affiliates program to forge closer ties between the faculty and industry. Prof Wang was also the principal architect for the establishment of the UCLA Nanoelectronics Research Facility, and served as its first Director.

Prof Wang has been exceptionally active in university administration, public service, as well as industry and business in the United States, where he holds several directorships. He also serves as a consultant and advisor to industry and government, including the Department of Defense and the Jet Propulsion Laboratory. He is a Guggenheim Fellow and IEEE Fellow, and a member of the American Physical Society and the Materials Research Society. His research interests include MBE/SI USLI technology, microwave and millimeter wave devices/circuits and technology for wireless communications, optoelectronics for Internet infrastructure, and quantum computing and information.
PROFESSOR AND HEAD
DEPARTMENT OF BIOLOGY

H. Benjamin PENG 彭筱明教授

Prof. H. Benjamin Peng is an internationally renowned neurobiologist who has made significant contributions in the field of developmental neuroscience. He is also an authority in the area of synapse development using the neuromuscular junction as a model system.

Prof. Peng obtained his BS in physics from Tsing Hua University, Taiwan and his PhD in biological sciences from Purdue University, USA. After two years’ postdoctoral training at Purdue, he became an Assistant Professor of anatomy at University of Illinois College of Medicine in 1978 and was promoted to Associate Professor in 1984. He joined the University of North Carolina at Chapel Hill in 1985 and has been Professor of cell biology and anatomy there since 1993. He worked at HKUST’s Biology Department for his two-month sabbatical in 1995.

Prof. Peng has published 73 papers in neuroscience, cell biology, and developmental biology, many of which appeared in the most prestigious journals of the field. He co-edited Xenopus laevis: practical uses in cell and molecular biology, considered by researchers in the field as the bible in working with this amphibian species in cell and molecular studies. He is a member of the Society for Neuroscience, American Society for Cell Biology, American Association of Anatomists, American Association for the Advancement of Science, and Society of Chinese Biologists in America.

VISITING PROFESSOR
DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

Vijay K. BHARGAVA

Prof. Vijay K. Bhargava received his BSc, MSc, and PhD degrees from Queen’s University in Canada. He has been Professor of electrical and computer engineering at the University of Victoria in Canada since 1984 and has held regular or visiting appointments at the Indian Institute of Science, University of Waterloo, Concordia University, Ecole Polytechnique de Montreal, the NTT Wireless Research Laboratory, and the Tokyo Institute of Technology.

Prof. Bhargava’s research interests include fixed and mobile wireless communications, spread spectrum communications, and error-correcting codes. His major publications include Digital Communications By Satellite, of which he was principal author, and in 1994 he was co-editor of the IEEE publication Reed-Solomon Codes and Their Applications. In addition, he has co-authored many book chapters, journal papers, conference papers and technical reports for various industries and government agencies.

He is very active in the Institute of Electrical and Electronics Engineering (IEEE), and has served as its Vice President for Regional Activities. Currently he is serving as the President of IEEE Information Theory Society. He is a fellow of the IEEE, the Engineering Institute of Canada, and the Royal Society of Canada.

PROFESSOR
DEPARTMENT OF CHEMICAL ENGINEERING

Ka Ming NG

Prof. Ka Ming Ng received his BS from the University of Minnesota and his PhD from the University of Houston, both in chemical engineering. He joined the University of Massachusetts in 1980 and has served as Professor of Chemical Engineering since 1991. He has also held visiting positions at Massachusetts Institute of Technology, DuPont Central R&D, and the National University of Singapore.

His research is in process system synthesis with applications in manufacturing and environmental conservation. There are three focuses. First, in reaction system synthesis, systematic methods are developed for synthesizing pharmaceuticals, polymers, agricultural chemicals, electronic materials, and various fine chemicals for use in consumer products. Second, in separation system synthesis, systematic techniques are used to recover pure products ranging from organics, electrolytes, proteins, to enantiomers from a multi-component mixture. Third, in solids and semi-solids synthesis, an integrated approach is developed for handling bulk solids, powders, creams, and pastes. Prof. Ng has consulted with DuPont, Mitsubishi, Pharmacia, Rohm and Haas, Unilever, BASF, Mobil, and others.

Prof. Ng serves at the American Institute of Chemical Engineers. He received the General Electric Outstanding Teaching Award in 1992 and the Outstanding Senior Faculty Award at the University of Massachusetts in 1998.

PROFESSOR
DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING

Kei May LAU

Prof. Kei May Lau received her BS and MS degrees in physics from the University of Minnesota, and a PhD in electrical engineering from Rice University, Texas.

From 1980 to 1982, Prof. Lau was a Senior Development Engineer at M/A-COM Gallium Arsenide Products, Inc. In 1982, she joined the faculty of the Electrical and Computer Engineering Department at the University of Massachusetts/Amherst, where she initiated organometallic chemical vapor deposition (MOCVD), and compound semiconductor materials and devices programs. She spent her first sabbatical leave in 1989 at the MIT Lincoln Laboratory and worked with the Electro-optical Devices Group. She developed acoustic sensors at the DuPont Central Research and Development Laboratory in Wilmington, Delaware during her second sabbatical leave in 1995-96. She was a Visiting Professor at HKUST for the fall of 1998.

Prof. Lau is a recipient of the National Science Foundation Faculty Awards for Women Scientists and Engineers. She serves on the IEEE Electron Devices Society Administrative Committee, the Electronic Materials Committee of the Minerals, Metals and Materials Society of the American Institute of Materials Engineers, and is also an editor of the IEEE Transactions on Electron Devices.
ASSOCIATE PROFESSOR OF COMPUTER SCIENCE

Rudolf Hans FLEISCHER
University of Saarbruecken (Computer Science) Research Associate Professor, University of Waterloo
1993 PhD
1999-2000
Research Interests
Efficient data structures and algorithms, online algorithms, computational geometry, experimental algorithmics.

VISITING ASSOCIATE PROFESSOR OF MARKETING

Akshay R RAO
Virginia Polytechnic Institute & State University (Marketing)
1986 PhD
1994-2000
Research Interests
Consumer behavior and information economics implications for pricing strategy and product management.

ASSISTANT PROFESSOR OF CHEMISTRY

Zhizhong GUO
University of Minnesota-Twin Cities (Biological Chemistry)
1998 PhD
1998-2000
Research Interests
Bio-organic chemistry, chemical biology, enzymes in combinatorial chemistry, molecular basis of Alzheimer’s disease.

ASSISTANT PROFESSOR OF CHEMISTRY

Bing XU
University of Pennsylvania (Chemistry)
1996 PhD
1998-2000
Research Interests
Using surface/polymer chemistry and nanofabrication to explore the new frontiers of biomaterials-biomedical, bioelectronic, bioanalytical.

ASSISTANT PROFESSOR OF MATHEMATICS

Shiqing LING
University of Hong Kong (Statistics)
1997 PhD
1997-2000
Research Interests
Time series analysis, econometrics, large sample theory, adaptive estimation, financial time series models.

ASSISTANT PROFESSOR OF CIVIL ENGINEERING

Chii SHANG
Purdue University (Environmental Engineering)
1999 PhD
1999-2000
Research Interests
Physico/chemical processes, environmental assessment/instrumentation, disinfection processes, heavy metal removal.

ASSISTANT PROFESSOR OF COMPUTER SCIENCE

Brahim Bensaou
University Paris VI (Computer Science)
1993 PhD
1997-2000
Research Interests
Quality of service in both wired and wireless communication networks, traffic and congestion control in Internet, mobile ad-hoc networks.

ASSISTANT PROFESSOR OF COMPUTER SCIENCE

G N丁
University of Turku, Finland (Computer Science)
1997 PhD
1997-2000
Research Interests
Cryptography, information and computer security, coding theory, electronic commerce.
ASSISTANT PROFESSOR OF ACCOUNTING

Chih-Ying CHEN
陳智瀛博士

1997 PhD

1997-2000 Assistant Professor, Taiwan University (Accounting)
Accounting information and security analysis, capital market research.

1997 PhD University of California, Berkeley (Accounting)
Research Interests

ASSISTANT PROFESSOR OF ACCOUNTING

Jong Hag CHOI
崔鐘鶴博士

2000 PhD

2000 Research Associate, Stanford Graduate School of Business
Organization and economic sociology, network analysis, business groups, strategic management, organizational changes, dynamics of market positions.

Research Interests

 ASSISTANT PROFESSOR OF FINANCE

Yeung Lewis CHAN
陳潤博士

2000 PhD Harvard University (Economics)
Research Interests Optimal portfolio allocation, heterogeneity in financial markets, term structure models, information and learning.

ASSISTANT PROFESSOR OF MANAGEMENT OF ORGANIZATIONS

Tai-Young KIM
金泰嘔博士

2000 PhD Stanford University (Sociology)
Research Interests Organizational and economic sociology, network analysis, business groups, strategic management, organizational changes, dynamics of market positions.

Research Interests

ASSISTANT PROFESSOR OF ECONOMICS

Jaehyon NAHM
南宰絃博士

2000 PhD

2000 Research Interests

Harvard University (Industrial Organization, Micro Theory)
Telecommunications market; how compatibility between different systems affects demand for telecommunications service.

ASSISTANT PROFESSOR OF ECONOMICS

Wen ZHOU
周文博士

2000 PhD

2000 Research Interests

Duke University, USA (Economics)
Assistant Professor, Peking University
Industrial organization, applied microeconomics.

ASSISTANT PROFESSOR OF SOCIAL SCIENCE

Agnes Shuk-mei KU
谷淑美博士

1995 PhD

1993-2000 Assistant Professor, Hong Kong Polytechnic University
Cultural sociology; public sphere, civil society and democratic struggle; identity politics; gender issues; Hong Kong culture.

Research Interests

ASSISTANT PROFESSOR OF SOCIAL SCIENCE

Ngok MA
馬嶽博士

1998 PhD

1999-2000 Research Interests

University of California, Los Angeles (Political Science)
Lecturer, City University of Hong Kong
Politics and elections in HK, political economy, economic transformation in Eastern Europe and China.