

SCHOOL OF **Engineering**
STATUS REPORT 95-96

FOREWORD



▶ Professor Ping K. Ko, Dean of Engineering

It has been 18 months since I became Dean of the School of Engineering in May 1995. A lot has happened within this period in our school. In this report you will find detailed account of them. In essence, we have been making the transition from a fast moving start-up phase to a consolidation phase, and at the same time developing a strategic plan to better our future.

In both faculty and students, we have surpassed the 90% point of our steady-state size this year. With 185 allocated faculty, 2160 undergraduates, and over 500 postgraduates, we are the largest school and 37% of the university. In 1995, we graduated 329 undergraduates and 77 postgraduates. I am happy to learn from a survey conducted in late 1995 that the local job market for them was good. I am also keenly aware that companies from overseas have been actively pursuing our Masters and Doctorates, especially in the computer science and electronics disciplines, through direct recruiting activities in Hong Kong and/or faculty contacts. I expect this trend of global search for engineering talents to intensify in the future, and our graduates, with their state-of-the-art training and bilingual ability, should be able to compete favorably with their counterparts from anywhere in the world.

The younger members of our school, Chemical Engineering and Industrial Engineering & Engineering Management, graduated their first cohort of undergraduate students in 1995. In the past year, we have been working closely with the Hong Kong Institution of Engineers on the accreditation process for our programs. Admission of Hong Kong as a member of the Washington Accord means that our programs, once accredited, will have wide international recognition. At present, six of our seven UG programs have received either full or provisional accreditation from HKIE, in time for their graduates. For our Computer Science program - and in fact all Computer Science programs in Hong Kong - the accreditation criteria have yet to be defined by HKIE.

Two departments - Computer Science and Civil & Structural Engineering - have changed their Heads in the past year. Fortunately, both founding heads are still with us, though in other capacities. Therefore, we can continue to rely on their wisdom and advice should circumstances require. I want to take this opportunity to thank them for the numerous and enormous



contributions they have made to our school and university. They can also find comfort in the excellent successors they have helped recruit - their "brainchildren" are in good hands indeed.

We have been doing well in funding acquisition for research and development. In the RGC competitive bidding exercise in 1995, we continued to lead by significant margins, in terms of the number of successful proposals, success rate, and total funding, among engineering schools in the local institutions. As more faculty came onboard and many of our research facilities became operational, we have also been working toward strengthening our ties with local industries. Establishment of the Cyberspace centre, and new projects on garment technology, pattern recognition, microelectronics, electronic packaging, all supported by the Industry Department, are fruits of our effort.

On the teaching/learning front, we are embarking on new initiatives to provide a better learning environment for our students. The summer semester, which aims at providing scheduling flexibility for students who need it, is one of them. About half of our students participated in the first summer school held in an 8-week period in July/August this year.

Other initiatives include broadening the exchange student program with overseas universities for capable students, and a new advising

system that merges advising with professional development counseling and training of communication skills. The new advising scheme, in particular, illustrates the direction we believe engineering education is heading. The Internet and other electronic media, as information sources, will become increasingly important supplements (in some cases, replacement as well) to conventional classroom lectures. What they can't provide (and replace) is the person-to-person interaction. Engineering education has to respond by introducing more elements of the apprenticeship system; and this is a positive change we should all embrace.

Ping Keung Ko
*Professor and Dean
School of Engineering*

December 1996

ADMINISTRATION AND ORGANISATION

The administration of HKUST follows a model which provides clear lines of responsibility and authority. The President is the University's chief executive and academic officer. Reporting to him are three Vice-Presidents. They bear responsibilities for Academic Affairs, Administration and Business, and Research and Development.

There are four Schools in the University. The Deans of these four Schools report to the Vice-President for Academic Affairs.

In a manner similar to that of the University, the Dean of a School is the School's chief executive and academic officer. Reporting to him are the Department Heads and Directors of Central Facilities and Research Institutes managed by that School. The two Associate Deans share the responsibilities of the Dean in the management and operations of the School.

President

Professor Chia-Wei Woo

Vice-President for Academic Affairs

Professor Shain-Dow Kung

Dean of School of Engineering

Professor Ping-Keung Ko

Associate Deans of School of Engineering

Dr. Neil Mickleborough

Dr. Helen Shen

Head of Department of Chemical Engineering

Professor Po-Lock Yue

Head of Department of Civil and Structural Engineering

Professor Wilson Tang

Head of Department of Computer Science

Professor Roland Chin

Head of Department of Electrical and Electronic Engineering (Acting)

Professor Phillip Chan

Head of Department of Industrial Engineering and Engineering Management

Professor Mitchell M. Tseng

Head of Department of Mechanical Engineering

Professor Ping Cheng



▶ From left to right: Prof. Mitchell Tseng/DH, Industrial; Prof. Ping Cheng/DH, Mechanical; Prof. Phillip Chan/DH, Electrical & Electronics; Prof. Roland Chin/DH, Computer Science; Dr. Helen Shen/Associate Dean; Prof. Wilson Tang/DH, Civil & Structural; Prof. Po-Lock Yue/DH, Chemical; Prof. Ping K. Ko/Dean; Dr. Neil Mickleborough/Associate Dean



▶ Dr. Neil Mickleborough, Associate Dean



▶ Dr. Helen Shen, Associate Dean

UNDERGRADUATE STUDIES



► *Engineering Festival '95 – Mechanical Engineering Demo*

EDUCATIONAL PHILOSOPHY

The undergraduate programmes offered by the University involve students attending full-time for three academic years. The University curriculum is founded on a credit-based system, and all undergraduate degrees are honours degrees. The undergraduate curricula in the School of Engineering are broad-based with special attention given to laboratory skills, computer applications, and design techniques. All engineering undergraduate students are required to take specialist courses in various engineering disciplines, both in and outside their departments. Together these reflect the fundamental facts that the mission of engineering is to produce and synthesise, and that engineering practice must be compatible with economic realities and the social environment.

In keeping with the philosophy of providing specialist training with a generalist outlook, engineering undergraduate students take at least 12 credits (usually 4 courses) in Humanities and Social Science, and additional elective courses in both the School of Science and the School of Business and Management.

The School also offers industrial training to provide students with a series of relevant, well-planned, and inter-related engineering experiences in an industrial atmosphere. The training aims to give students a broad and structured understanding of engineering practices, and help them satisfy the training requirements of the Hong Kong Institution of Engineers (HKIE).

The Engineering Summer School was offered to Secondary 7 students in summer 1996, which allowed them to get a head start in their programme of choice. Students were able to accumulate credits and apply them towards their Engineering degree requirements if admitted to the School. The Summer School was established with the aim of giving students more time to cope with the demands of their academic programme as well as allowing very able students to use the flexibility to take extra courses and a much more aggressive schedule.



▶ The Popsicle Stick Bridge Design Competition of the 1995 Engineering Summer Camp for Form-6 students

UNDERGRADUATE EXCHANGE PROGRAMME

The School of Engineering has established undergraduate exchange programmes with several overseas institutions, such as University of Pennsylvania, University of Michigan and University of Washington in St. Louis and is in active negotiation with a number of other institutions. These exchanges are intended to provide opportunities for students from the participating institutions to study abroad and then return to their home institution to obtain their degree. The international exposure enhances the educational experience of students and provides them with an advantage in their future career development.

DEGREE PROGRAMMES

Degree	Title of Course	Abbreviated Title	Course Code
BEng	Chemical Engineering	CENG	E320
BEng	Civil and Structural Engineering	CIVL	E330
BEng	Computer Science	COMP	E340
BEng	Electronic Engineering	ELEC	E350
BEng	Industrial Engineering & Engineering Management*	IEEM	E361
BEng	Mechanical Engineering	MECH	E370
BEng	Computer Engineering	CPEG	E380

* This programme is previously known as the Department of Industrial Engineering.

Undergraduate Enrolment

Dept.	1996-97 Intake	1995-96 Intake (1st year Students)	1994-95 Intake (2nd Year Students)	Total Current Enrolment
Chemical Engineering	55	62	55	172
Civil & Structural Engineering	119	124	97	340
Computer Science	142	135	126	403
Electrical & Electronic Engineering	155	170	168	493
Industrial Engineering & Engineering Management	70	67	52	189
Mechanical Engineering	89	91	81	261
Computer Engineering	114	92	98	304
Total	744	741	677	2162

DEGREE REQUIREMENTS

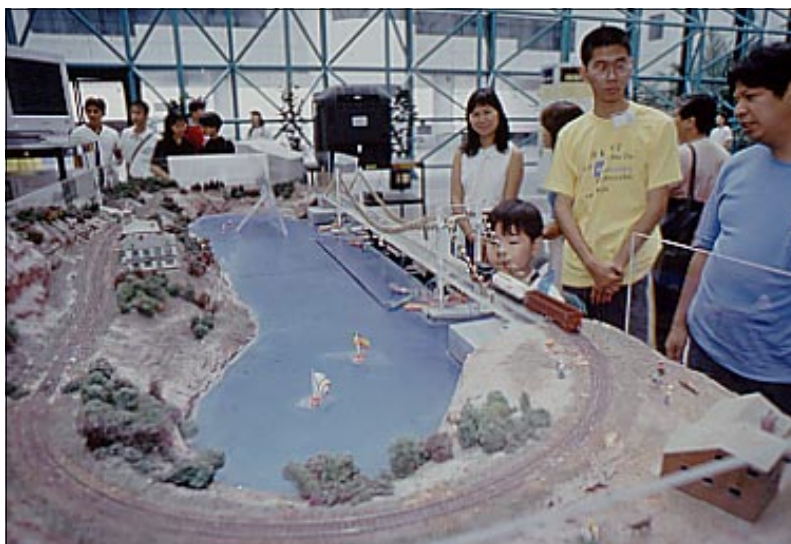
For graduation purposes students require a total of 100-105 course credits, as specified for each programme. A credit is approximately equivalent to the work required for one lecture hour per week for one semester. For complete programme requirements, please see the University Academic Calendar and the University's undergraduate prospectus.

The School has 518 students graduating from all her undergraduate programmes at the end of the academic year 95/96. These graduates come from the Departments of Chemical Engineering, Civil and Structural Engineering, Computer Science, Electrical and Electronic Engineering, Industrial Engineering & Engineering Management and Mechanical Engineering.

Undergraduate Programme Course Credit Requirements for 96/97

Programme	Engineering		Science	Business & Management	Humanities & Social Science	Language	Elective		Total
	Within Dept.	Outside Dept.					Free	Engg	
CENG	57	6	20	6	12	3			104
CIVL	61	6	8	7	12	3		8	105
COMP	54	7	12	6	12	3	6		100
ELEC	66	5	10	6	12	3			102
IEEM	50	18	16	6	12	3			105
MECH	67	10	6	6	12	3			104
CPEG	71	0	10	6	12	3			102
Minimum Credits Required			6	6	12				100

Students are required to take a total of at least thirty-six credits outside the student's major department.



► University Open Day

ADMISSION REQUIREMENTS

To qualify for admission to the University, applicants must:

- ▶ normally be at least 17 years of age by the first day of the academic year to which they are seeking admission;
- ▶ meet the general entrance requirements of the University and the requirements of the particular programme or programmes for which they are applying; and
- ▶ apply on the prescribed form before the application deadline.

Entry to an undergraduate programme of study requires prospective students to satisfy both the general University and specific departmental entrance requirements. Applicants may be requested to attend personal interviews and/or take additional tests to be administered by the University. Interviews are designed for the purpose of providing further assessment of the applicant's motivation, aptitude and overall suitability for the chosen field of study.

General Admission Requirements

The general University requirements for entry in the 1997-98 academic year include ALL of the following:

- ▶ Hong Kong Certificate of Education Examination (HKCEE)
passes in at least seven subjects at the first and if necessary second attempt, of which
 - i. at least five must be passed at a single sitting; and
 - ii. three must be Mathematics, English Language (Syllabus A or B), and either Chinese or an alternative language
- ▶ Hong Kong Advanced Level Examination (HKALE)
 - i. passes at the same sitting in
 - a. either one Advance Level (AL) subject plus two Advanced Supplementary (AS) subjects, or two AL subjects; and
 - b. either AS Chinese Language and Culture(1)(2), or AS Liberal Studies; and
 - ii. pass in AS Use of English (UE)(3)

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- (1) Alternatively, a pass in AL Chinese Literature is acceptable in lieu of AS Chinese Language and Culture, in which case the student is required to pass in addition either (i) two AL subjects; or (ii) one AL subject plus one AS subject; or (iii) three AS subjects.
 - (2) For applicants who use an alternative language, rather than Chinese, to satisfy the language requirements in the HKCEE, an AS subject may be used as a substitute for the Chinese Language and Culture requirement.
 - (3) All students admitted with a UE grade below C will be required to attend and pass a non-credit bearing English language enhancement course during the first year of attendance.
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Entrance Requirement Equivalents

Alternatively the general entrance requirements may be satisfied by obtaining one of the following qualifications:

- ▶ i. General Certificate of Secondary Education/General Certificate of Education at Ordinary Level -
passes in at least seven subjects at the first and if necessary secondary attempt, including Mathematics, English Language and a language other than English, with five of the subjects passed at a single sitting; and
- ▶ ii. General Certificate of Education at the Advanced Level/Advanced Supplementary Level -
passes at the same sitting in 1 AL plus 3 AS subjects; or 2 AL subjects plus 1 AS subject; or at least 3 AL subjects.
- ▶ at least one year's successful full-time study or equivalent in a bachelor's degree programme at a university or tertiary institution recognised by this University;
- ▶ a professional diploma, higher diploma or higher certificate from a polytechnic or recognised tertiary college in Hong Kong;
- ▶ an International Baccalaureate.

Notwithstanding the above, the University may recognise other qualifications, or successful study at another recognised institution. In assessing these qualifications, the University will ensure that such applicants have an educational background equivalent to that required of JUPAS candidates. Proficiency in English is also a consideration.

Mature Applicants

Applicants who do not satisfy the general or departmental entrance requirements of the University but are aged 25 or over by the first day of the academic year in which admission is sought may be granted exemption from the entrance requirements of the University provided they can demonstrate aptitude and suitability for admission to a particular programme of study.

Departmental Entrance Requirements for Undergraduate Programme

Programme	Departmental Entrance Requirements
BEng in Chemical Engineering	3 AL subjects; or 2 AL subjects plus 1 AS subject <i>(Subjects must be chosen from Applied Mathematics, Biology, Chemistry, Engineering Science, Mathematics and Statistics, Physics, and Pure Mathematics)</i>
BEng in Civil and Structural Engineering	AL Pure Mathematics and AL Physics/Engineering Science, plus 1AL/2AS subjects.
BEng in Computer Engineering	AL Pure Mathematics plus 1AL/2AS subjects. One of these subjects must be AL/AS Physics or AL Engineering Science.
BEng in Computer Science	AL Pure Mathematics plus 1AL/2AS subjects.
BEng in Electronic Engineering	AL Pure Mathematics plus 1AL/2AS subjects. One of these subjects must be AL/AS Physics or AL Engineering Science.
BEng in Industrial Engineering and Engineering Management	2 AL subjects; or 1 AL subject plus 2 AS subjects. <i>(Subjects must be chosen from Applied Mathematics, Biology, Chemistry, Computer Applications, Design and Technology, Engineering Science, Mathematics and Statistics, Physics, and Pure Mathematics.)</i>
BEng in Mechanical Engineering	2 AL subjects; or 1 AL subject plus 2 AS subjects <i>(must include Pure Mathematics, and Physics/Engineering Science)</i>

In addition to the general requirements, applicants for 1997-98 entry must also satisfy entrance requirements specific to their desired programmes of study. Unless otherwise specified, AS level subjects referred to below exclude Use of English, Chinese Language and Culture, and Liberal Studies(1).

Application for Admission

Applicants who are seeking admission based on the results of their Hong Kong Advanced Level Examination results should apply via the "Joint University Programmes Admission System" (JUPAS). This system enables applicants to apply on the strength of their HKALE results for admission to the undergraduate programmes in UGC institutions. Application details may be obtained from the JUPAS Guide published by the JUPAS Office every year.

Applicants who are applying for admission on the basis of qualifications other than HKALE results, including non-local applicants, should apply to the University for direct admission. Applications for admission in September should reach the University by 31 December of the previous year.

All departments within the School of Engineering offer MSc, MPhil, and PhD degrees. Postgraduate degrees are available on a part-time or full-time basis. Taught programmes leading to MSc degrees may be the most suitable for students interested in part-time study. Both MPhil and PhD are research degrees, and students in some disciplines are required to participate in research on a full-time basis.

POSTGRADUATE STUDIES



Postgraduate Enrolment 1996 - 1997 (Full-time)

Dept.	MSc	MPhil	PhD	Total
Chemical Engineering	0	14	7	21
Civil & Structural Engineering	1	13	24	38
Computer Science	8	48	20	76
Electrical & Electronic Engineering	1	79	46	126
Industrial Engineering & Engineering Management	1	15	24	40
Mechanical Engineering	5	17	27	49
Total	16	186	148	350

Postgraduate Enrolment 1996 - 1997 (Part-time)

Dept.	MSc	MPhil	PhD	Total
Chemical Engineering	7	1	0	8
Civil & Structural Engineering	50	1	6	57
Computer Science	21	8	10	39
Electrical & Electronic Engineering	23	4	8	35
Industrial Engineering & Engineering Management	56	4	1	61
Mechanical Engineering	22	3	5	30
Total	179	21	30	230

DISCIPLINARY PROGRAMMES

MSc Programmes

These are coursework degrees for which students must fulfil a minimum requirement of 30 credits. Students may also be required to undertake a project in some departments. Projects require the submission of a written report, as specified by the department, and carry a maximum of nine credits. The reports will be read by two faculty members, one of whom is the supervisor. Letter grades instead of “Pass” or “Fail” grades are used for grading project from Fall Semester, 1996/97 onwards.

MPhil Programmes

In addition to coursework requirements, if any (see Course Credit Requirement table), MPhil students will undertake a programme of thesis research under the direction of a supervisor appointed by the department.

Each MPhil student is, on the commencement of study, assigned an interim supervisor. This supervisor works with the student to map out a tentative programme of study and research, and to identify a research supervisor. The research supervisor, when appointed, replaces the interim advisor.

MPhil research is conducted under the general supervision of a thesis committee of at least three faculty members, one of whom is the designated thesis supervisor and committee chairman.

When the thesis is ready for examination, to the satisfaction of both the student and the supervisor, the department head appoints an examination committee consisting of three faculty members. One is the supervisor and another is appointed as

chairman. The committee examines the thesis and conducts an oral thesis examination. Theses are graded Pass or Fail.

PhD Programmes

PhD programmes focus on original research by the student, but most also require coursework (see Course Credit Requirement table). Doctoral students proceed from admission to the programme, to candidacy for the degree, and then to defence of the thesis. Each has a thesis supervisor who oversees the student’s research. Candidacy is obtained by the successful completion of qualifying examinations specified by the department.

PhD research is conducted under the general supervision of a thesis committee of at least three faculty members, one of whom is the designated thesis supervisor.

The five member thesis examination committee is appointed by the Senate Committee on Postgraduate Studies on the recommendation of the department. The committee is chaired by an individual from outside the school, who is appointed by the Committee on Postgraduate Studies upon recommendation by the dean. The Chair person presides over the examination, but is not one of the five members of the examination committee, which is made up of the thesis supervisor, two academic staff members from the department, one examiner external to the University who has expertise in the field being examined, and one academic staff member from outside the department. Thesis will be graded “Pass” or “Fail”.

For complete programme requirements, please see the University Academic Calendar and departmental postgraduate studies brochures.

Degrees Offered and Their Course Credit Requirements

Discipline	Degree		
	MSc	MPhil	PhD
Chemical Engineering	30	15	15
Civil & Structural Engineering	30	15	30
Computer Science	30	17	17
Electrical & Electronic Engineering	30	15	15
Industrial Engineering & Engineering Management	30	15	15
Mechanical Engineering	30	12	24

INTERDISCIPLINARY PROGRAMMES

Master of Science (MSc) in Biotechnology

Biotechnology is the application of techniques and processes that utilise biological systems for efficient and useful production of materials to serve human needs in agriculture, medicine, industry and daily life. Although biotechnology had its beginnings in man's earliest cultivation of crop plants, the production of wines and cheeses and the domestication of animals, modern developments in the field have been greatly stimulated by recent advances in biochemistry and molecular biology. Biotechnology is endowed with enormous potential for the future, and Hong Kong is well suited for its deployment.

This MSc programme, designed for the training of research and technical personnel for the biotechnology industry in Hong Kong and its surrounding regions, admits both full-time and part-time students. It is administered by the Committee on MSc Programme in Biotechnology which is jointly appointed by the Departments of Biochemistry, Biology, Chemistry, Chemical Engineering, and Civil and Structural Engineering.

Master of Science (MSc) in Environmental Science and Engineering

Hong Kong society has made the improvement of its environment a high priority issue to ensure sound and stable future development. The Hong Kong Government is investing considerable resources for the provision of an adequate infrastructure to coordinate environmental control activities. The Government has established mechanisms and agencies to support initiatives for the promotion of research, education and community programmes in environmental protection. In this connection, the University is making significant contributions to these initiatives by engaging in innovative and relevant research and by launching interdisciplinary postgraduate programmes in environmental studies. Joint MSc programmes in Environmental Science and Environmental Engineering are now offered at HKUST. The Departments of Biochemistry, Biology and Chemistry from the School of Science and the Departments of Chemical Engineering, Civil and Structural Engineering and Mechanical Engineering from the School of Engineering are the most involved departments participating in the programmes.

Master of Science (MSc) in Materials Science and Engineering

This multidisciplinary programme involves the Departments of Chemical Engineering, Electrical and Electronic Engineering, Mechanical Engineering, Chemistry and Physics. Materials science and engineering is crucial to the success of many industries in Hong Kong and the surrounding region. The programme aims to provide students with intelligent insight into today's material problems from many different yet coherent points of view. It emphasises the basic elements of materials science and engineering synthesis and processing, physics and chemistry of solid, thermodynamics and kinetics, and modern instrumental characterisation. The programme is designed for the training of research and technical personnel for local and regional manufacturing industries.

ADMISSION REQUIREMENTS

Applicants seeking admission to a master's degree programme should have obtained a first degree from this University or a recognised institution, or obtained an approved equivalent qualification; and satisfied the school and department concerned as to their academic fitness as well as their English ability to pursue the postgraduate programme.

To be eligible for admission to a PhD degree programme, applicants should normally have obtained a master's degree from this University or an approved institution, or presented evidence of satisfactory work at the postgraduate level on a full-time basis for at least one year, or on a part-time basis for at least two years; and satisfied the school and department concerned as to their chosen subject of research, as well as their academic fitness and English ability to undertake the research.

Selected applicants may be invited for interview. Successful applicants will receive an offer of admission from the school or department concerned, and may be required to satisfy specified conditions. Applicants receiving an offer will be expected to accept or decline by a specified date.

Application for Admission

Application forms for admission to postgraduate programmes are available directly from:

Admissions, Registration and Records Office
The Hong Kong University of Science and Technology
Clear Water Bay
Kowloon
Hong Kong

The closing date for the return of the application forms will be 1 February for admission in September of the same year, but late applications may be considered.

Items to be submitted with the completed application form include a one-page statement on study plans and career goals; two letters of recommendation mailed directly to the Director of Admissions, Registration and Records; and officially certified academic transcripts of undergraduate studies (and postgraduate studies, if any). If official transcripts are in a language other than English or Chinese, a certified translation into English must be provided.



QUALITY ASSURANCE SYSTEM



SELF VALIDATION PROCEDURES

Curriculum planning and review is an on-going process in the University. The University Senate is the supreme academic authority at HKUST and establishes policy either directly or through its committees. Formulation of academic policies and oversight of their implementation are the responsibility of the Office of Academic Programme Administration. Procedures necessary to the academic administration of the institution are established and executed by the responsible unit(s) concerned, including schools, departments, and the Admission, Registration and Records Office.

Both courses and programmes proposed by departments must go through a two-tier process. The proposals will first be considered by the Engineering Undergraduate (EUSC)/ Postgraduate Studies Committees (EPSC) of the School, under the authority delegated by the Engineering School Board, which is responsible for ensuring that the proposals are consistent with University and School policies. After approval by EUSC/EPSC, under the authority delegated by the School Board, the proposals will go forward to the Committee on Undergraduate Studies (CUS) or the Committee on Postgraduate Studies (CPS).

In principle, the proposal for new degree programmes and major changes to existing programmes are forwarded to the Senate on the recommendation of CUS or CPS. The Senate delegates the authority to CUS and CPS to approve new courses as well as changes to courses and degree programmes, and all approvals and refusals are then reported to the Senate.

CRITERIA FOR THE ACCREDITATION OF ENGINEERING DEGREE PROGRAMMES

Apart from the above mechanism in reviewing the courses and programmes at departmental, school and university levels, the Hong Kong Institution of Engineers (HKIE) undertakes professional accreditation to evaluate the standard and quality of our engineering degree programmes. In so doing, the HKIE takes into account the factors which relate to the programmes, and the universities, and which influence the quality of the educational experience. These factors include the curriculum, the syllabus, the calibre of the academic staff, the entry standards, staffing

levels, teaching methods, facilities, funding and method of assessment.

The following describes broad criteria which are used by HKIE regarding appropriate degree programmes for the profession. In setting them out, HKIE considers it important, both in the context of educational and professional objectives, for universities to encourage an environment which can accommodate innovative educational developments and to allow for the expression of the university's individual strengths, qualities and ideals.

STANDARDS

Those who graduate with honours from an engineering degree course accredited by HKIE, are deemed to have satisfied the educational component for admission to Corporate Membership of HKIE.

In undertaking accreditation, HKIE also takes note that such programmes should meet internationally recognised standards for the engineering profession.

ACCREDITATION

Following HKIE accreditation visit in November 1995 and March 1996, the following decisions were made for the engineering programmes:

▶ *Electrical & Electronic Engineering and Mechanical Engineering*

Full accreditation for 3 years for graduating classes of 1996, 1997 and 1998

▶ *Chemical Engineering and Industrial Engineering & Engineering Management*

Provisional accreditation until first class of graduates in 1996. Full accreditation for a period of 3 years to be considered following a visit after the first graduating class.

▶ *Computer Engineering*

Provisional accreditation until first class of graduates in 1997. Full accreditation to be considered following a visit towards the end of the provisional accreditation period.

▶ *Computer Science*

Deferred until accreditation criteria for Computer Science are developed by HKIE

▶ *Civil & Structural Engineering*

Full accreditation for 5 years for graduating classes up to and including the year 2000.

ENGINEERING ADVISORY COMMITTEE

Regular review of curricula at departmental, school and university levels and the HKIE Accreditation exercise are the effective means of assuring the programme standard. In addition, the School of Engineering relies heavily on the advice of distinguished advisors from academia, industry and government bodies to ensure that its programmes are current, relevant and most importantly commensurate to the standard of quality of other internationally renowned engineering schools. The School of Engineering has enlisted the assistance of local and overseas advisors to form a committee and advise on strategic planning, research, curricular development and academic standards, faculty recruitment and evaluation, as well as collaborative activities with industry in teaching and research. Membership of the School's advisory Committee is given in Appendix 1.



CONTINUING AND PROFESSIONAL EDUCATION PROGRAMMES

EDUCATIONAL PHILOSOPHY

In order to support the University's mission to contribute to the economic and social development of Hong Kong and her region, the School of Engineering has focused its Continuing and Professional Education Programmes to the delivery of advanced subjects in Engineering and Management that are relevant to the various Engineering disciplines within the School. These programmes are self-supporting and a moderate fee is charged for each programme. In general, programmes are designed for practicing engineering professionals at postgraduate levels and conducted in either a shortcourse or a workshop format. Programme materials are usually condensed to within one to three days of continuous lecture delivery. Industrial flavoured laboratory demonstrations and hands-on exercises are incorporated in these programmes frequently to enhance the learning experience.

PROGRAMMES OFFERED

Since March of 1995, the School of Engineering has offered a total of 21 programmes with 18 of our own Engineering faculty, 14 distinguished overseas speakers and over 500 mostly local engineering professionals from industry, government departments and other tertiary institutions participated in them. 14 shortcourses and workshops were delivered in the 1995-1996 academic year, with 2 contract training and 12 public offerings. The total number of programme offerings is expected to double this year with increased involvement of professionals from other Asia Pacific countries. The following is a comprehensive list of courses offered so far and courses planned to be offered in the 1996-997 academic year.



▶ *Industrial participants in the lab demonstration session of the Asian Pacific shortcourse on Aerosols*

Shortcourse/Workshop Title	Speakers	Dates	Sponsor Department
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ACADEMIC YEAR 1994-1995

Basic Electronics Training Course for KCRC Signal Staffs	Dr. Mark Yau <i>HKUST</i>	4 March - 6 May 1995	Electrical and Electronic Engineering
Enhancing Manufacturing Productivity: Applying Group Technology for CIM Implementation	Prof. Inyong Ham <i>Distinguished Professor Dept. of Industrial and Management Systems Engineering Pennsylvania State University</i>	8-14 June 1995	Industrial Engineering and Engineering Management
Fuzzy Logic: Industrial Applications and Introduction to Theory	Dr. John Yen <i>Dept. of Computer Science Texas A & M University</i>	20-24 June 1995	Industrial Engineering and Engineering Management

ACADEMIC YEAR 1995-1996

Designing User Friendly Systems: Human Aspects in Computing	Prof. Gavriel Salvendy <i>NEC Professor of Industrial Engineering Purdue University</i>	15-19 July 1995	Industrial Engineering and Engineering Management
Visibility for Design and Manufacturing	Prof. Tony C. Woo <i>Fluke Chair Professor of Engineering University of Washington</i>	1-15 August 1995	Industrial Engineering and Engineering Management
Profession Enhancement Series for KCRC Signal & Communication Staffs - Data Communication & Fiber Optics	Dr. Danny Tsang & Prof. Hoi-Sing Kwok <i>HKUST</i>	19 August - 18 November 1995	Electrical and Electronic Engineering
Asian Pacific Shortcourse on Aerosols: Atmospheric Properties and Measurement	Prof. John Seinfeld, <i>California Institute of Technology</i> Prof. David Pui, <i>University of Minnesota</i> Prof. Wladyslaw W. Szymanski, <i>University of Vienna</i> Mr. Gilmore Sem, <i>TSI Incorporated</i>	23-25 August 1995	Chemical Engineering
Design of Analog Integrated Circuits Shortcourse	Prof. Charles Sodini <i>Professor, Dept. Of Electrical Engineering and Computer Science MIT</i>	2-4 November 1995	Electrical and Electronic Engineering
Time Competition through Business Process Design Shortcourse	Dr. Hong Chen <i>University of British Columbia</i>	16, 18, 20-21 December 1995	Industrial Engineering and Engineering Management
Lighting and Optics For Visual Inspection Workshop	Dr. Reddiar Anbalagan <i>President of Innovision</i>	19 December 1995	Computer Science
Developing Business Applications on Internet	Dr. Waiman Cheung, <i>CUHK</i> Dr. James Gray III Dr. Dik Lee, <i>HKUST</i> , Mr. Richard Leung, <i>HK Airport Authority</i>	27 April and 4 May 1996	Computer Science
Profession Enhancement Series for KCRC Signal & Communication Staffs - Data Transmission and Radio Systems	Dr. Wai-Ming To, Dr. Danny Tsang, Dr. Roger Cheng, Dr. Mark Yau & Prof. Hoi-Sing Kwok, <i>HKUST</i>	11 May - 21 September 1996	Electrical and Electronic Engineering
Engineering Perspectives of Aerobic Wastewater Treatment Shortcourse	Prof. Howard Huang, Dr Guanghao Chen <i>HKUST</i>	31 May -1 June 1996	Civil and Structural Engineering
Quality Improvement Using SPC and Taguchi Method Shortcourse	Dr. Kwok Leung Tsui <i>HKUST</i>	7-8 June 1996	Industrial Engineering and Engineering Management

Shortcourse/Workshop Title	Speakers	Dates	Sponsor Department
ACADEMIC YEAR 1995-1996 (CONTINUED)			
Ground Earthquake Response Analysis Shortcourse	Dr. X. S. Li & Prof. C. K. Shen, <i>HKUST</i>	21-22 June 1996	Civil and Structural Engineering
Business Process Re-engineering: Design and Implement Effective Business Processes Shortcourse	Prof. Mitchell Tseng & Dr. Chuan-Jun Su <i>HKUST</i>	21-22 June 1996	Industrial Engineering and Engineering Management
Software Reliability Shortcourse	Prof. Way Kuo <i>Professor and Head Dept. of Industrial Eng. Texas A & M University</i>	28-29 June 1996	Industrial Engineering and Engineering Management

ACADEMIC YEAR 1996-1997

Structural Analysis and Design of Tall Buildings	Dr. J. S. Kuang & Dr. C. M. Chan, <i>HKUST</i> Mr. K. S. Kwan, Housing Dept. HK Government	4-6 July 1996	Civil and Structural Engineering
One-day IC Design & Fabrication Technology review Course for Motorola Staffs	Dr. Philip Chan <i>HKUST</i>	31 July 1996	Electrical and Electronic Engineering
Developing Business Applications on Internet Workshop	Dr. Waiman Cheung, <i>CUHK</i> Dr. Dik Lee, <i>HKUST</i> , Mr. Richard Leung, <i>HK Airport Authority</i>	21-22 August 1996	Computer Science
Process Safety Management Shortcourse	Dr. Gordon Mckay, <i>HKUST</i>	23 & 30 August 1996	Chemical Engineering
One-day IC Design & Fabrication Technology review Course for Motorola Staffs	Dr. Philip Chan <i>HKUST</i>	11 October 1996	Electrical and Electronic Engineering
Ergonomics and Usability Engineering in Product Design Shortcourse	Prof. Martin Helander <i>Professor and Head Division of Industrial Engineering Linkoping Institute of Technology, Sweden</i>	14-15 November 1996	Industrial Engineering and Engineering Management
Global Supply Chain Shortcourse	Prof. Hau Lee <i>Thomas Ford Chair Professor Dept. of Industrial Engineering & Engineering Management Stanford University</i>	13-14 December 1996	Industrial Engineering and Engineering Management
One-day IC Design & Fabrication Technology review Course for Motorola Staffs	Dr. Philip Chan <i>HKUST</i>	15 January 1997	Electrical and Electronic Engineering
Taguchi Method & Design of Experiments Shortcourse	Dr. Kwok Leung Tsui <i>HKUST</i>	7-8 March 1997	Industrial Engineering and Engineering Management
Process Safety Management Shortcourse	Dr. Gordon Mckay, <i>HKUST</i>	7 & 14 March 1997	Chemical Engineering
Design & Implement Effective Business Processes Shortcourse	Prof. Mitchell Tseng & Dr. C. J. Su <i>HKUST</i>	21-22 March 1997	Industrial Engineering and Engineering Management
One-day IC Design & Fabrication Technology review Course for Motorola Staffs	Dr. Philip Chan <i>HKUST</i>	11 April 1997	Electrical and Electronic Engineering
Fundamentals of IC Technology	Prof. Ping Ko & Prof. Simon Wong <i>HKUST</i>	17-18 April 1997	Electrical and Electronic Engineering

STUDENT ACTIVITIES

INTRODUCTION

Since the establishment of the Engineering Student Union (ESU) in 1994, it has been actively involved in organizing students' activities such as the ESU Orientation camp and the Engineering Festival '96.

In September 1995, the ESU initiated the "beach project" to build a BBQ site on a small sandy beach by the campus water front. After one year of planning and through the support and advice of different units of the University such as the School of Engineering, the Estates Management Office, the Public Affairs Office and the fund raising efforts of the University Development Office, the beach project has now been completed. The scope of the project included the laying of foundations, the building of a barbecue site, the setting up of water and electricity supplies, and the building of a pedestrian walkway around the site.

Many civil engineering students have participated in the "beach project" as part of the group project in their Industrial Training Programme.



▶ The completion look of the beach project

▶ HKUST computer contest team members excelled in the ACM International Collegiate Programming Contest 1996, coming in 11th



STUDENT ACHIEVEMENT

The awards/prizes received by the Engineering Undergraduate and Postgraduate Students for the year 95/96 are as follows.

► *Outstanding Service Awards:*

Mr. Francis Tat Chi Lo (CENG Year 3) has been selected as the recipient of this award which is given to those with a strong record in the provision of service to fellow students, their school or the community, who have proven leadership and organisational abilities, a good academic standing, and who have actively participated in extra-curricular activities. The Awards are open for application by all full-time undergraduate students of the eight tertiary institutions in Hong Kong. The awards are administered by the Hong Kong Student Service Association and are provided from a charitable donation known as the Innovations Fund.

► *Prize winner for Sharp Idea:*

Mr. Mike Wai Ki Lee (ELEC Year 2) is one of the prize winners for his idea of a key organizer. He has won a scholarship and a five-day trip to Japan.

► *UST Computer Science students competed with the world's best:*

The computing programming team of HKUST was placed 11th in the Association for Computing Machinery (ACM) International Collegiate Programming Contest held in the United States this year. This ranking puts the HKUST team among the top 1 per cent of the world's student computer programmers. The HKUST team beat traditional heavyweights in computer programming such as Caltech and the University of Toronto and were placed well ahead of their Asian rivals.

► *Dean's List Awards:*

At the end of each semester, the University honours undergraduate students with excellent academic accomplishments by placing them on the Dean's List. Only those who have achieved a Semester Grade Average of at least 10.0, which is equivalent to an average grade of mid A-, will be included.



► *From left to right:*

1. OKURA & Company (HK) Ltd., Mr. Steven Lee;
2. SKK (HK) Co. Ltd., Mr. Joseph Chan - Marketing Executive;
3. Dean of Engineering, Prof. Ping K. Ko;
4. HKIE Chairman 1995/96, Mr. Edmund Leung;
5. HKIE Young Member Committee Chairman 1995/96, Mr. Michael Ma;
6. Gammon Construction Ltd., Mr. Chris Chau - Assistant Project Manager;
7. Associate Dean of Engineering, Dr. Neil Mickleborough.

In the Spring semester of 1995/96, approx. 5% of the engineering students received the Dean's List Awards. Among a total of 230 UG students who were identified for the awards in all schools, around 40% are engineering students.

► *Patent for HKUST:*

Dr. Jack Lau, Assistant Professor in the Department of Electrical & Electronic Engineering has been awarded a patent by the U.S. Patent Office for his PhD thesis project at HKUST in developing a magnetic sensor device. The sensor's big advantage is that it is made out of a material that is compatible with silicon-based circuits.

► *Scholarships/Prizes:*

For the 1995/96 academic year, the number of scholarships available to the University was 182. Approximately 40% were allocated to engineering students.

GRADUATES' CAREER DEVELOPMENT

First degree Graduates 1995

In November 1995, 329 undergraduates received their Engineering degrees from the departments of Civil and Structural Engineering, Computer Science, Electrical and Electronic Engineering and Mechanical Engineering. According to the graduate employment survey 1995, 328 out of the 329 Engineering graduates responded to the survey, 287 (87.5%) were in full-time employment, 1 (0.3%) was self-employed, 1 (0.3%) was unemployed, 1 (0.3%) was under-employed, and 38 (11.6%) were in further studies.

Some two thirds of the Engineering graduates were employed in the Commerce and Business Sector. There was also an increase in the number employed in the Government Sector.

Among the 287 engineering graduate respondents in full time employment, 186 (64.8%) entered the Commerce & Business sector, 9 (3.1%) in the government Sector, 9 (3.1%) in Community & Social Services, 14 (4.9%) in the education sector, and 51 (17.8%) in Manufacturing & Industries. In 1994 (2.7%) joined the Construction Sector whilst the figure this year increased to some 18 (6.3%).

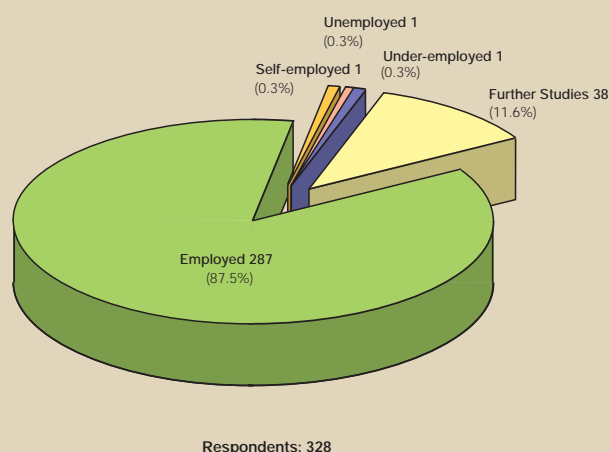
The majority of Engineering graduates took up technical jobs such as Engineering (48.8%) and Systems Analysis & Computer Programming (38.3%). 84% of Engineering graduates felt that their studies were relevant or quite relevant to their job as the majority of Engineering graduates pursued their careers in the Engineering field.

Higher Degree Graduates 1995

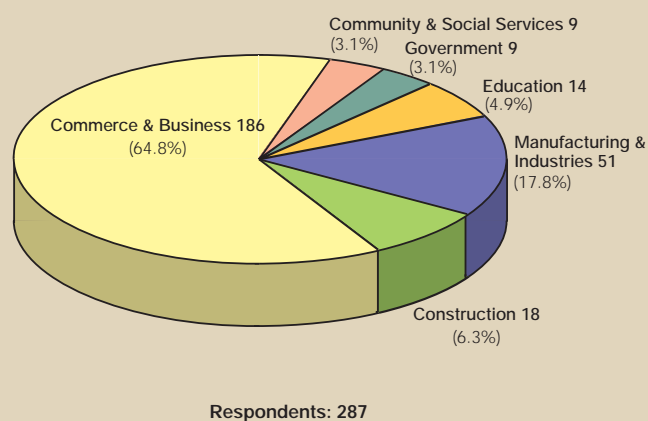
A total of 77 postgraduates from the School of Engineering graduated in 1995. According to the employment survey of full time engineering higher degree students graduating in 1995, 51.3% of our graduates were employed in Commerce and Business, 20.5% in Manufacturing and Industries and another 20.5% in Education. 66.7% of our graduates took up employment in Engineering and 20.5% in Systems Analysis and Computer Programming. The distribution pattern was somewhat similar to last year. 83.8% of graduates found their studies relevant or quite relevant to their job.

In the survey of 43 higher degree graduates, the response to the question regarding their major objective in pursuing postgraduate studies, 21 (48.8%) indicated they were driven by their academic/professional interest, 16 (37.2%) of graduates intend to enhance their qualifications for better employment opportunities, 4 (9.3%) wish to broaden exposure & life experience and 2 (4.7%) are preparing to change to another career field.

Employment Status of 1995 First Degree Engineering Graduates



Distribution of Full-time Employed 1995 First Degree Engineering Graduates by Employment Sector

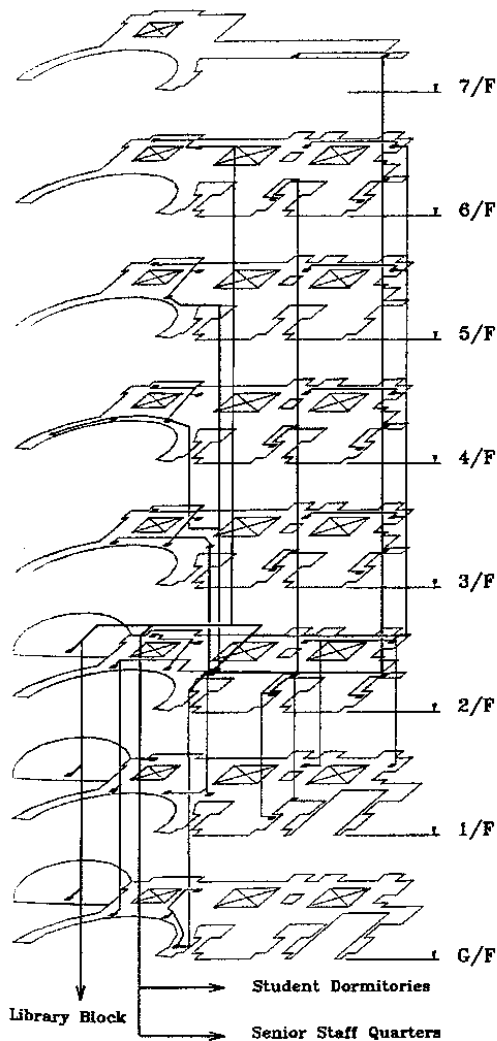


CENTRE OF COMPUTING SERVICES AND TELECOMMUNICATIONS (CCST)

Director: Dr. William Ivey

The Centre of Computing Services and Telecommunications develops and manages the computing and networking infrastructure of the University. It provides computing support to undergraduate and postgraduate teaching, and research applications in all schools. The Centre also serves the University's administrative needs by providing an integrated information system to support the day-to-day routines as well as to satisfy the need for information in management decision making. CCST also manages the University's PABX telephone system.

FACILITIES



► The high speed Fibre Distributed Data Interface (FDDI) network supports the computing needs of the University's campus

The HKUST computing environment is highly distributed, and modeled after the client-server architecture. The cornerstone is an advanced, high-speed FDDI (Fibre Distributed Data Interface) network backbone, which operates at 100 million bits per second, with distributed wiring junctions from which various local area networks emanate. The network covers not only all the campus buildings but also reaches out to staff quarters and student dormitories. The Centre operates powerful server computers to provide campus-wide network services such as network printing, e-mail and electronic notice board. One important characteristic of the University's computing environment is its Chinese-English bilingual capability. Increasingly, more network services will have this feature.

To support computation intensive research, CCST provides solutions in different forms. High performance computing resources include a workstation cluster, an 8-processor SGI/Onyx symmetric multi-processor machine and an 140-node Intel Paragon massively parallel machine, providing a powerful environment for scientific computing. All micro-computers and scientific workstations are connected to the campus network, providing desktop computing power as well as windows to a vast array of information and computing resources, such as the Library system and various scientific and business packages, on the University's own network or that of other institutions in Hong Kong, and through the Internet, on networks of educational and research institutions worldwide. In addition, the Centre also manages a number of "computer barns" in various locations in the academic buildings, providing PC, Macintosh and Unix

workstation facilities for teaching and student use. Each academic department also has one or more computing facility rooms.

UNIVERSITY LIBRARY

Director: Mrs. Min-min Chang

The Library is an integral component of the academic programs, supporting the University's teaching and research in science, engineering, business and management, the humanities and social sciences. As of 1996, five years after the University's opening, the Library's book, periodical, and microform collections total approximately 400,000 volumes, and many audio-visual materials, both educational and recreational, are available for use in specially equipped facilities.

In addition, the Library offers a learning environment rich in electronic information and services. Its focus on electronic resources may be seen in its web site (<http://library.ust.hk>) as well as in the prominence of computer terminals and the extensive collection of databases, many networked and many full text/full image. In a sense the Library is always open in that numerous library resources may be used by accessing the databases on the local area network, the online Library catalog, and especially, information of various types via the web server. There users can search the Library's catalog of holdings in both English and Chinese and the catalogs of other tertiary institutions in Hong Kong and overseas. Many of the Library's instructional materials and policy statements along with numerous links to local and external resources, are available on the web site, which may be used at any time from every part of the campus.

An experienced staff assists users in a variety of ways, from the selection, acquisition, and cataloging of materials to making use of the collection, online searches, and interlibrary loans. There are also a fully-equipped classroom and computer laboratory for group instruction. The University Library has a strong service orientation in order to effectively meet the information needs of its academic community.

LANGUAGE CENTRE

Director: Dr. Gregory James

The Language Centre has a pan-University role in the provision of language courses, both as academic disciplines and as a support service. English is the medium of instruction in the University, and a priority of the Language Centre is to assist students in all schools to acquire the necessary language skills for them to gain the maximum benefit from their subject courses. In addition, the importance of Putonghua is reflected in the number and variety of courses in this language offered to all students.

The Language Centre has one 18-booth and three 24-booth computerized language laboratories (for oral/aural work as well as text processing, editing and computerized assessment).

For students who need further help with their writing, the English Writing Centre (a service offered by the Language Centre) runs workshops and gives individual consultations. The Language Centre also operates a Self-Access Centre, a purpose-built facility that contains audio, video, satellite TV, computer and multimedia equipment, along with a variety of language-learning materials. The Self-Access Centre is open on weekdays and Saturday mornings. Its aim is to help staffs and students to improve their skills in English, Putonghua and other languages through independent learning.

► *Language Centre facilities are readily available to students and staffs*



MATERIALS CHARACTERISATION AND PREPARATION FACILITY (MCPF)

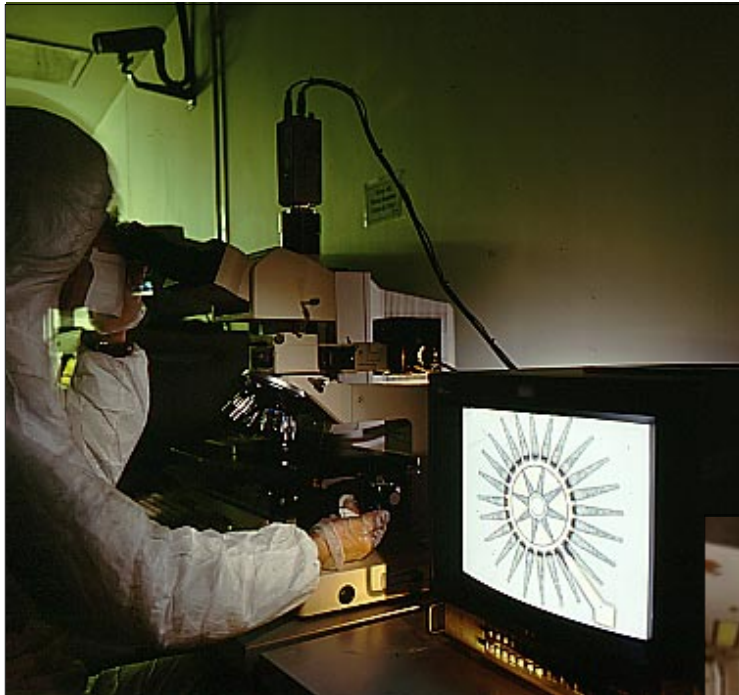
Director: Prof. Ming L. Yu



▶ *High-tech equipment in the Materials Characterization & Preparation Facility is open to faculty and students to do research*

The Materials Characterisation and Preparation Facility (MCPF) is a central facility for the synthesis, study and testing of new materials and materials needed for in-house or collaborative research projects. The Facility constitutes an important resource which houses state-of-the-art instrumentation, organizes workshops and training, and is a focal point for interdisciplinary research. The facility serves academics in all the science and engineering departments and is also available to external clients from other tertiary institutions, government bodies, and private industry. The MCPF occupies about 4000 square metres of purpose-built laboratories and offers a wide range of sophisticated multi-disciplinary equipment needed for in-house and collaborative materials research projects, and for performing materials analysis. Laboratories dedicated to particular facilities and processes are accessible only to authorized clients of the MCPF. Tasks requested by occasional users are served by the Facility's own trained staff.

The scope of the facilities in the MCPF is sufficiently broad to meet many of the demands of the still-growing community of staff and postgraduate students. For example, a wide range of instrumentation is available for various types of thermal, electrical and spectroscopic characterisation, and for the preparation of materials by sputtering and evaporation. Equipment for microanalysis includes a field emission scanning electron microscope, a dedicated high-resolution transmission electron microscope, a time-of-flight and imaging SIMS system, and a multitechnique surface analysis system (XPS, Auger, SIMS, etc.). These are supported by more standard types of electron-beam analytical instrumentation. The Facility makes such facilities available to other tertiary institutions and local industries either by offering analytical and failure analysis services at prescribed cost or, where appropriate, through collaborative research projects.



▶ A student is inspecting his device through a microscope

▶ Oxide Etcher



MICROELECTRONICS FABRICATION FACILITY (MFF)

Director: Prof. Philip Chan

The Microelectronics Fabrication Facility (MFF) provides functional microelectronics fabrication laboratories for teaching and research, particularly in new discrete semiconductor devices, novel microsensors and microactuators, advanced microelectronics process technology and application specific integrated circuits (ASICs).

The MFF phase I laboratory provides an appropriate clean room environment of about 247 square metres with Class 1000 clean rooms (containing fewer than 1000 particles per cubic foot of air larger than a half micrometer) and five basic fabrication modules which provide photolithography, thermal diffusion/thin-film disposition, dry/wet etching and metallisation. The laboratory has also developed 3 micron MOS and bipolar base line processes to provide microelectronics fabrication at the discrete device and small scale integrated circuits (SSI) level, with the possibility to upgrade to LSI and VLSI level in its phase II development.

In 1996, the technical capabilities of MFF is further upgraded with the completion of its phase II laboratory, which occupies an area of 10,000 square feet with Class 100 clean rooms constructed. State-of-the-art microelectronics processing equipment is installed there such as the E-beam Direct Write System which facilitates the sub-half-micron photolithography and enables more advanced research work. In addition to the existing five modules in the phase I laboratory, phase II will provide the sixth module of mask-making and a processing line for liquids-crystal-display prototyping. While the phase I laboratory mainly serves the academic departments of the University, phase II extends its service further to the private sector through various technical collaborations.

COMPUTER-AIDED-DESIGN AND MANUFACTURING FACILITY (CAD/CAM FACILITY)

Director: Dr. Matthew Yuen

The Computer-Aided-Design and Manufacturing Facility (CAD/CAM Facility) is a central facility to support research and teaching related areas.

It focuses on multi-disciplinary and application-oriented research programmes that will create impact on the design and manufacturing industries in Hong Kong and the neighbouring region. The Facility will collaborate and interact with local industries and international bodies.

The Facility maintains a range of state-of-the-art equipment to promote research in the area of design and manufacturing. These include measurement equipment such as Co-ordinate Measuring Machine (CMM) and three-dimensional laser scanning system. The Facility has a number of Computer Numerical Control (CNC) machines and state-of-the-art computer-aided-design systems for providing a platform for CAD/CAM integration. The manufacturing facility is also enhanced by having a rapid prototyping machine. Robots are used to integrate the manufacturing and assembly operation. The Facility has a strong capability in Computer-Aided-Engineering with a full range of analysis and simulation software.



▶ PC based controller for CNC machining centre

ADVANCED ENGINEERING MATERIALS FACILITY (AEMF)

Director: Dr. Chi Ming Chan

The Advanced Engineering Materials Facility (AEMF) was established in early-1994. Its mission is to provide state-of-the-art facilities and direction for HKUST as well as Hong Kong Industries to develop advanced engineering materials technology and application by means of research on manufacturing, microstructural design, new materials development and testing methodology.

Research programmes, though to be largely initiated by faculty, emphasize applications suitable for industry. Currently, there are a number of projects funded by the Research Grants Council and the University Research Infrastructure Grants being carried out at the Facility. These include fracture and fatigue of ceramic fibre/particulate reinforced sintered steels, in-situ liquid crystal polymer (LCP) composites, optimisation of composite repair patch, microstructural design of new polymer blends, hydrogen embrittlement, composite interfaces, piezo-electronics materials, electronics packaging and assembly, and applications of composite to infrastructures.

The Facility will also engage in training of graduate students and researchers in advanced materials technology, and international exchanges. Another function of the Facility is to organize seminars, workshops and conferences to disseminate knowledge of recent development and transfer the latest materials technology to the industries.

CHINA LIGHT AND POWER WIND/WAVE TUNNEL FACILITY (WWTF)

Directors: Prof. Paul Chang and Dr. S. C. Kot

Aiming at enhancing the environmental, and wind engineering research capability in Hong Kong to meet the needs of tertiary institutions and industry, the University decided in late 1994 to build a central environmental, and wind engineering research facility, the China Light and Power Wind/Wave Tunnel Facility (WWTF). The WWTF will be used by the academic community of local tertiary institutions to conduct basic and applied research projects, to provide services to the industry and professionals, and to facilitate collaboration with international institutions.

The China Light and Power Wind/Wave Tunnel Facility can help pioneer a new understanding of wind action on structures. Its applications include the dispersion of pollutants, wind energy, wind/wave loading and other phenomena affected by the turbulent 'boundary layer' of wind near the earth's surface. The research thrusts cover four areas :

- i. wind engineering,
- ii. environmental studies,

- iii. industrial aerodynamics, and
- iv. wind/wave interaction.

Funding for its apparatus and instrumentation is \$18 million. It occupies a floor space of 1,328 square meters. The WWTF has a closed-circuit wind tunnel. The size of the wind tunnel is 62-metre long and 17-metre wide. It has both high-speed and low-speed testing sections in parallel. The latter includes a 40-metre long wave water tank which can be converted to a 'dry' testing section by covering the tank. This 'state-of-the-art' boundary layer wind tunnel provides a versatile testing feasibility. The high-speed section has a maximum speed of about 100 km/hr (27 m/sec) and allows a wide range of velocity scales and Reynolds numbers. It can be used for studying the aeroelastic behaviour and pressures on buildings and other structures. The low-speed testing section is particularly well suited to problems involving Froude number scaling which generally need large scales and relatively low wind speeds, such as studies of long span bridges, the dispersion of pollutants, studies involving the influence of terrain, and the interaction of wind and waves with offshore structures and ships.

GEOTECHNICAL CENTRIFUGE FACILITY (GCF)

Director: Prof. C. K. Shen

The geotechnical centrifuge is a nominal 4.3 meter radius, 400 G-Ton payload machine with 2-dimensional dynamic shaking capability to simulate earthquake motions. It is the first of its kind in the world. Funding for its apparatus and instrumentation is \$14 million, and it occupies a floor space of 213 square meters. The objectives of the Geotechnical Centrifuge Facility are :

- i. to provide a focal point in the Asia-Pacific region for the development and undertaking of research into the area of geotechnical material characterisation and modelling;
- ii. to provide geotechnical centrifuge modelling facilities to enhance collaborative research and teaching activities in the geotechnical academic community in Hong Kong;

- iii. to facilitate interaction between the profession and the academics on the advancement of design, construction technology and engineering development of geotechnical engineering projects;
- iv. to conduct research and development projects for industry, and to foster the dissemination of advances and developments in centrifuge modelling technology from the Universities to industry through workshops, short courses, seminars and technical publications;
- v. to provide a central facility for the training of postgraduate students and researchers in the area of geotechnical centrifuge modelling;
- vi. to facilitate international collaboration and interaction among the academics in Hong Kong in the field of geotechnical centrifuge modelling and geotechnical material characterisation.

The research functions of our University not only provide for the intellectual development of faculty and students, but also stimulate the transfer of the latest advanced technology to meet the economic, industrial, commercial, and environmental needs of Hong Kong. The faculty provide the leadership to position HKUST's research at the forefront of intellectual development and to insure the movement of new knowledge into teaching programmes. As participants in research activities, students build a foundation for fruitful professional careers in industry, commerce, education, or public service.

RESEARCH

No university, especially a technological university like HKUST, can be self-contained in research. Elsewhere in the world are recognised experts, fine laboratories, and good organisations that can contribute greatly to the programmes at HKUST. One of the goals of research programme development is to co-operate worldwide with other universities, research institutions, and industrial laboratories to the benefit of all. Thus, duplication of costly facilities and programmes may be avoided. These partnerships in research extend the capability of HKUST far beyond local resources. The benefits of these partnerships are especially significant during a period when faculty and the student body are expanding rapidly and new laboratory facilities are being constructed.

To contribute more effectively to the economic vitality of Hong Kong and the surrounding region, the University works with industrial and commercial organisations to set up new and expanded enterprises. Furthermore, the University's personnel and facilities are available to support the community's on-going technical needs in testing, computation, evaluation, non-credit and credit training, as well as industrial R&D.

Research in the School of Engineering is funded from a variety of sources, both government and private. At present, there are already 293 research projects in the School; Appendix 2 gives the titles and the names of the investigators of the 134 newly funded projects initiated in 95/96 and offer a glimpse of the research activities that go on in the School.

FUNDING SOURCES

A major source of funding for research is the recurrent budget of the University. In Hong Kong, departmental budgets contain a

research component (between 30% and 40% of the budget) that is intended, by the University Grants Committee (UGC) which funds tertiary institutions in Hong Kong, to support such aspects of research as conference travel, consumables, and general expenses.

RESEARCH GRANTS COUNCIL EARMARKED RESEARCH GRANTS

The Research Grants Council (RGC) allocates grants on a competitive basis for academic research projects undertaken by academic staff of the seven tertiary institutions funded by the UGC. HKUST is one of these seven institutions. Applications are submitted by individuals or groups of academic staff. The research can be of a basic or applied nature. Grant funds provide support mainly for research staff and may support a modest amount of equipment, consumables, and travel expenses.

RGC DIRECT ALLOCATION GRANT

The Research Grants Council (RGC) provides a block grant to each of the seven UGC-funded tertiary institutions for allocation to research projects. In 1995/96 the total funds available to this University amounted to \$8 million. Awards are made on a competitive basis, are normally for one year, and normally do not exceed \$100,000 per award. Grant funds provide support mainly for research staff and may support a modest amount of equipment, consumables, and travel expenses.

RGC CENTRAL ALLOCATION

The Research Grants Council (RGC) provides, as its yearly budget permits, grants in support of inter-institutional research projects. Grant funds provide mainly support for facilities or equipment costs that normally cannot be supported from the recurrent budgets of individual institutions. The involvement of several institutions in the proposal is strongly encouraged.

UGC-FUNDED RESEARCH INFRASTRUCTURE GRANT

As a UGC-funded institution, HKUST uses about 2% of the overall recurrent budget to provide grants to build research infrastructure at the University. Research infrastructure is mainly interpreted as the building of research programme activities, procedures and mechanisms needed for the development of HKUST into a research university. Interdisciplinary and/or multidisciplinary proposals are preferred to augment the normal funding pattern of disciplinary research. In 1995/96 the total funds available to the University among the four Schools amounted to \$21.6 million. Awards are made on a competitive basis and are normally for a period of one to three years. Grant funds provide support mainly for research staff and may support a modest amount of equipment, consumables, and travel expenses. A unique aspect of the Research Infrastructure Grant programme is that projects are required over their life-time to attract external non-UGC funding of an amount at least equal to that of the Research Infrastructure Grant awarded.

PRIVATE AND OTHER GOVERNMENTAL FUNDING SOURCES

In addition to the sources of research funding discussed above, there are a number of other private and governmental funding sources, some of which are listed below.

UK/HK Joint Research Scheme

Provides support mainly for travel costs for collaborative research with another institution in the United Kingdom.

Foundations

The Croucher Foundation
Chiang Industrial Charity Foundation Ltd.

Various branches of the Hong Kong government from time to time issue requests for proposals. There are also many private businesses and corporations in Hong Kong which provide opportunities for research or consulting contracts. A sample of some of these which have or have had contracts with faculty at HKUST are:

Private Companies

Computer Products Inc.
Hutchison Telecom
Mass Transit Railway Corporation
DEC Corporation
Hat Fash Ltd.
Intrusion-Prepakt (Far East) Limited
Respiroics (HK) Ltd.
Sterling Products Ltd.

Hong Kong Government

Civil Aviation Department
Environmental Conservation Fund
Geotechnical Engineering Office
Health Services Research Committee
Industry Department
Kwun Tong District Board
Shatin District Board

Finally, there are a number of research institutes and centres within HKUST that fund research projects. These are described below.

PROJECTS AWARDED IN 1995/96

	GOVERNMENT AWARDS		NON-GOVERNMENT AWARDS		SUMMARY OF AWARDS	
	No. of Projects	Total Awards	No. of Projects	Total Awards	No. of Projects	Total Awards
ChE	8	3,107,728	5	1,820,568	13	4,928,296
CSE	10	2,433,389	3	426,000	13	2,859,389
CS	18	4,486,324	14	7,132,100	32	11,618,424
EEE	25	8,420,322	5	3,194,000	30	11,614,322
IEEM	13	3,213,458	5	5,692,260	18	8,905,718
ME	21	7,073,391	7	5,581,900	28	12,655,291
TOTAL	95	\$28,734,612	39	\$23,846,828	134	\$52,581,440

RESEARCH INSTITUTES AND CENTRES

Some research activities fit well into the traditional disciplinary organisation, and are administered by academic Departments and Schools. This is especially true of smaller, basic research programmes that primarily involve faculty and thesis students. For research programmes that are large and require the participation of a combination of faculty and students from different disciplines, the activities are separately administered in research institutes and centres. Special laboratory facilities are, in some instances, also separately and centrally maintained. Faculty and students are encouraged to pursue disciplinary as well as multidisciplinary or interdisciplinary research.

ADVANCED MANUFACTURING INSTITUTE (AMI)

Director: Prof. Joe H. Mize

The Advanced Manufacturing Institute (AMI) was established in 1994 with an initial allocation of \$10 million. In order to remain competitive under the rapid transformation of the manufacturing sector, Hong Kong industry needs to up-grade its technical capability, move manufacturing/design capacity to the high value-added level, and to leverage the existing business network of Hong Kong. To meet this challenge, the Advanced Manufacturing Institute aims to provide opportunities for young engineers to acquire systems design expertise through cooperation with world-class manufacturing system designers and research institutes, and aims at promoting industry-university cooperation in the area of advanced manufacturing technology and systems.

Areas of interest include Manufacturing Management, Manufacturing Process Technology, Manufacturing Control, and Manufacturing System Design. The main scope will consist of providing a focal point for the research and development of advanced manufacturing systems, developing and expanding the activities of material processing, control technology and manufacturing logistics, promoting interchange and transfer of manufacturing technology to industry, providing a stimulating environment for training of students and researchers and facilitating international exchanges for investigators in the field of advanced manufacturing.

BIOTECHNOLOGY RESEARCH INSTITUTE (BRI)

Director: Dr. Nancy Ip

The mission of the Biotechnology Research Institute (BRI) is to assist Hong Kong in its economic development, and in so doing contribute to the economic well-being of the Asia-Pacific region through research, development and training of specialists in biotechnology. The Biotechnological industry worldwide is in a period of rapid growth. Besides scientific advances that are bringing a constant stream of new processes and products, the business environment of the industry is also undergoing dramatic changes in the form of increasing globalisation, as new entrants, both national governments and corporations, seek participation. The founding of BRI through a \$130 million grant from the Royal Hong Kong Jockey Club helps Hong Kong strive to become one of the important centres of biotechnology in the world.

Biotechnology covers a wide range of fast-growing areas of economic importance. The four research areas that have been targeted for development by BRI are:

1. Neuron-specific proteins
2. Genetic engineering and protein design
3. Plant biotechnology
4. Drug delivery and development

The activities of BRI include the recruitment of biotechnology related faculty, the purchase of equipment, planning and construction of facilities, and the support of research projects in the targeted areas.

CENTRE FOR DISPLAY RESEARCH (CDR)

Director: Prof. Hoi-Shing Kwok

The Centre for Display Research (CDR) was established by the Hong Kong Government Industry Department at HKUST in August 1994. The purpose of CDR is to provide basic research support for the local Liquid Crystal Display (LCD) industry. Initial funding

was 14.6 million dollars for three years. Most of the funding will be used to establish an LCD laboratory. This LCD laboratory, when combined with the Microelectronics Fabrication Centre at HKUST, will be capable of producing 4 inch panels of active-matrix LCD using thin-film transistors. CDR will concentrate on several areas of display research: thin-film-transistor materials and devices, circuit design using new video-coding technology, new display schemes, colour-filter design and fabrication, optical-system design, microfabrication technology, liquid-crystal material development, and chip-on-glass packaging technology. Faculty from the departments of Electrical & Electronic Engineering, Physics and Chemistry are involved in CDR.

CYBERSPACE CENTRE

Director: Prof. Samuel Chanson

The Cyberspace Centre aims to help the local software industry join and make effective use of the Internet to improve their competitiveness in the world market. Opened in September 1996 with a HK\$3.63 million grant from the Hong Kong Government Industry Department, the Cyberspace Centre assists the local software industry by offering Internet-related seminars, technical training, guidebooks, tool evaluation, and technical support. The Centre also develops technology and expertise to stay abreast of Internet-related developments and serves as a point of contact for industry to obtain information on the latest developments in Internet technologies.

The Centre's research and development focuses on technology related to searching and disseminating information on the Internet conveniently and efficiently, English-Chinese web page translation, and security issues in using the Internet. For the software industry to get maximal benefits from the Internet, it is essential to have efficient search, indexing, and translation techniques as well as user friendly interfaces (including Chinese interfaces). Furthermore, users must be protected from intrusion from the network, and be able to conduct commercial transactions through the net reliably and securely. The Cyberspace Centre is dedicated to providing services and developing technologies which place Hong Kong's software industry on the fore-front of Internet research and development.

HONGKONG TELECOM INSTITUTE OF INFORMATION TECHNOLOGY (HKTIIT)

Director: Prof. Ming-Lei Liou

This Institute was founded with a grant of \$100 million from Hong Kong Telecommunication Limited. The concept of the Institute is based on the recognition that in future there will be no economic development, no industry or commerce, no service or manufacturing capability of any significance without the full utilisation of telecommunication and information technology. All schools at the University are involved in the research activities of this Institute. At present, the Institute is sponsoring four major research programmes, namely Lightwave Technology, Network Technology, Wireless Communication, and Video/Multimedia Technology. In order to facilitate greater interactions between the researchers of the Institute and Hong Kong industry, the Institute also sponsors Industrial Forum on Information Technology annually.

Undergraduate scholarships and postgraduate research studentships are offered through the Institute, and certain members of the academic faculty are designated as Institute Fellows.

INSTITUTE FOR ENVIRONMENT AND SUSTAINABLE DEVELOPMENT (IESD)

Director: Prof. Gary Heinke

The formation of the Institute for Environment and Sustainable Development (IESD) provides for effective collaboration among several departments in the University which are directly involved with environmental studies to assist government and industry in resolving many urgent environmental challenges facing Hong Kong and its surrounding region.

At present, the Institute's focal point is on coordinating technical and administrative aspects of all major environmental research activities. Currently, 20 research projects in the environmental field, worth about \$15 million, are in progress.

In the initial years, priority will be given to those areas which are urgent to the solution of Hong Kong's and its region's environmental problems. Another important emphasis is to contribute to the enormous challenges of solving the environmental problems of developing countries.

Individual projects will be carried out through research or development contracts, or through consulting contracts with the Institute, which will have the responsibility for performance and schedule of all work. Currently the Institute has \$15 million funding.

INSTITUTE FOR INFRASTRUCTURE DEVELOPMENT (IID)

Director: Mr. George Beetle

The Institute for Infrastructure Development has been established to help advance the University's objective of contributing to the social and economic development of Hong Kong. Infrastructure development is a familiar aspect of modern life which fosters human settlement, societal interaction and economic progress. It embraces the entire conceptualisation, creation, use, operation and support of large-scale structures and systems involving roads, harbours, drainage, slopes, airports, bridges, terminals, water resources, energy supply, telecommunications, sanitation, railroads and the like.

The Institute plays a facilitative role, matching the talents of faculty and research staff to the search for acceptable solutions to problems outside the University. It seeks to address infrastructure issues which lie unattended and where new efforts can add value. By linking outside needs to the research interests of the faculty, the Institute helps in the creation of a local technology base for Hong Kong. It also strengthens the University's internal research capacities through the focus on new applications to satisfy societal needs.

The Institute aims not only to support the effective design and delivery of new facilities with new applications of knowledge, but also to strengthen their use, operation, maintenance and support; and to assist with clarifications of need, justifications of specific forms of response, and valid commitments of societal resources.

Recent activities include supporting academic research in new methods of sensing and analysis to assess the health of major structures; organizing, in collaboration with Tsinghua University of Beijing and under the aegis of the Three Gorges Corporation, the China Ministry of Finance and the World Bank, advanced training programmes for project managers working in China; supporting research to help lower costs by improved routing and scheduling of container boxes that pass through the port of Hong Kong, analyzing train operations to help the India Railways Board to expand system capacity for daily commuter services into Bombay, and directing feasibility studies on new private investments in public transport for several Indian cities,.

INSTITUTE FOR MICRO SYSTEMS (IMS)

Director: Prof. Ping K. Ko

The Institute for Micro Systems (IMS) includes five Centres:

- Centre for Micro Electro Mechanical Systems
- Centre for Circuit and System
- Centre for Nano Device and Technology
- Centre for Advanced Display Technology
- Centre for Microelectronics Material and Technology

The University's facilities for electronics fabrication, the Microelectronics Fabrication Centre, is central to the activity of the Institute.

The goals of IMS are to foster research in crucial areas of microelectronics and to transfer the developed technologies to the local electronic industry to raise its competitive edges and to spawn new business. Research areas will have high scientific as well as commercial potentials. Currently the Institute has obtained \$12 million funding. To utilize the limited available resources effectively and efficiently, IMS will pick particular areas or topics which the Institute is able to afford.

SINO SOFTWARE RESEARCH INSTITUTE (SSRI)

Director: Dr. Ting-chuen Pong

The Sino Software Research Institute (SSRI), established in July 1992 with a \$20 million grant from the Sino Land Co., Ltd. has the dual aim of supporting software research that can lead to practical applications, and providing assistance in transforming those applications into useful products.

The Institute sees its primary role as that of a catalyst, helping software research projects reach the critical phase in which ideas may be translated into prototypes that can be evaluated using large-scale trials.

The Institute also encourages development efforts in areas that are relevant to the economic and social development of Hong Kong. One such project is the "Hong Kong SuperNet", which made full Internet access available to the public, an important step to maintaining Hong Kong's status as a regional communications centre.

Beyond its interest in software research and development, the SSRI also provides technical and consultative help to local businesses as they seek to implement the latest software technologies. As part of this effort, the Institute sponsors workshops, seminars and lectures on software topics related to the needs of businesses and public institutions. One such example was the UNIX Security Workshop, which offered practical advice, specific solutions, and hands-on experience in safeguarding UNIX operating systems in a networked environment.

DEPARTMENT OF CHEMICAL ENGINEERING



► Professor Po-Lock Yue, Head

The Department of Chemical Engineering has achieved an important milestone in its development. For the first time there will be chemical engineers graduated from Hong Kong. Many of these young chemical engineers will enter Hong Kong's workforce with a sufficiently broad and deep knowledge base to make a significant contribution to the technological and economic development of Hong Kong. A "Careers Evening" and an "Industry Day" were organised to prepare students for job applications and introduce them to potential employers. The Department, with the help of the Careers Centre of the Students Affairs Office, is continuing in its efforts to find suitable employment for these graduates.

Currently there are 163 undergraduates and 26 postgraduates enrolled. The faculty size stands at 12, with several visiting professors/scholars contributing to the teaching and research programmes. Whilst there had not been major changes in the undergraduate curriculum, some of the levels 3 and 5 courses were taught for the first time. Without a doubt the Senior Design Project was the climax of the 3-year undergraduate program. For a whole semester students work individually and in small groups the design of a chemical process under the guidance and supervision of faculty members. Three separate processes were selected for this year's projects. Students took full advantage of ASPEN Plus, a process simulation tool used widely in academia and industry. The project ended with students presenting their designs to fellow students and faculty. We are delighted to have a contribution from the Hong Kong and China Gas (HKCG) Company Limited to award the best designs. HKCG engineers were involved in the judgment of the winners.

Science teachers in secondary schools were invited to our "Teachers Day" run on two separate occasions. For most of the teachers it was the first time for them to find out first-hand what chemical engineering is and the course we offer at HKUST. The Department will participate in the Engineering Summer Camp in July when some two hundred top Form 6 students selected from secondary schools will spend five days at the University to find out more about Engineering. The recruitment of high quality students continues to be a matter of top priority for the department.

As part of our recruitment strategy we will be offering an "Introduction to Chemical Engineering" summer course, primarily to Form 7 students. The course is intended to provide prospective

students some first insights of the Chemical Engineering discipline. Other summer courses will be offered in the future.

Another important milestone attained this year was the accreditation by the Hong Kong Institution of Engineers (HKIE). The HKIE accreditation team gave a clear endorsement of our BEng degree program, awarding us with a provisional accreditation. Full accreditation will be sought when we have had our first batch of graduates. We need to help more Hong Kong companies to establish Scheme A training program so that our graduates may obtain full HKIE membership earlier.

Faculty continued to win external research support. The total research funds awarded to the department now stands at 25 million HK dollars. It is particularly pleasing that we are beginning to receive direct funding from industry. Industrial support will be increasingly important as government funding becomes more competitive. The department is actively seeking to expand its interaction with industry.

In April the University had a two-day visit from a UGC Teaching and Learning Quality Process Review Panel. Chemical Engineering was one of the twelve units reviewed by the Panel. The review report is on the University as a whole, rather than individual departments. The review has catalysed some of our plans for quality assurance in teaching and learning.

Key research advances have been achieved in several areas. Through a research programme on environmental management of Hong Kong industries, innovative technologies have been developed and evaluated for application in solving some of Hong Kong's difficult environmental problems. These include problems in the bleaching, dyeing and printing industry, the electroplating industry and others. The target is now set to attempt near zero discharge which should lead to considerable waste reduction in Hong Kong. Our recent success in converting municipal solid waste into biodegradable polymers has hit the local news headline. Another innovative project has led to the successful synthesis of natural fibre reinforced composite materials which may be used as wood substitutes. These materials are developed from low cost natural fibres and should be very cost effective. An industrially supported project has been launched to develop computer integrated control for injection moulding which is a fundamental operation in the plastics industry. The project is aimed at better control of quality of products and less waste generation.

FACULTY

Professor and Head of Department

Po-Lock YUE

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Tel: (852) 2358 7122



Detoxification of hazardous waste and wastewater by advanced oxidation, catalytic wet air oxidation and biological oxidation; waste minimisation and resources recovery; applied catalysis, photocatalysis and novel reactor engineering; applications of artificial intelligence in chemical engineering.

Reader

Chi-Ming CHAN

BEng Minnesota;

MS, PhD Calif Inst of Tech

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Tel: (852) 2358 7125



Polymer blends and alloys; conductive composite polymers; cross-linking of polymers; polymer processing; adhesion phenomena, surface and interface science; surface analysis techniques; application of surface and interface analysis techniques in rheological measurements.

Reinhard RENNEBERG

MSc Moscow and Donetsk;

PhD Centr Inst of Molecular Biology

(Berlin, Germany)

(Concurrently appointed as Reader of Chemistry)

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Tel: (852) 2358 7387



Biosensors and bioelectronics; analytical and biochemistry; immuno-chemistry; environmental and clinical chemistry; enzymology; immobilisation of biomolecules and cells.

Visiting Reader

Gordon MCKAY

BTech, PhD, DSc Bradford

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Tel: (852) 2358 7133



Effluent treatment by absorption; mass transfer modelling of adsorption systems; utilisation of chitin and chitosan from prawn/crab shells; production of activated carbons; fluidisation and transportation of large particles; design of two phase relief systems.

Assistant Professor/ Lecturer

Chak-Keung CHAN

BS Texas (Austin);

PhD Calif Inst of Tech

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Tel: (852) 2358 7124



Aerosol physics and chemistry; emission control and fate predictions of particulate pollutants; microcontamination control in ultraclean facilities; powder synthesis via novel aerosol reaction engineering; air pollution control and instrumentation.

Furong GAO

BEng East China Inst of Petroleum;

MEng, PhD McGill

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Process measurements, dynamics, and control in polymer processing; real-time computer modelling; computer aided design, engineering, and manufacturing (CAD/CAE/CAM); applications of neural network and fuzzy control to process engineering systems.

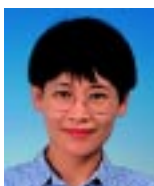
Ping GAO

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PhD Cambridge

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Diffusion in polymers and processing of ultra-high molecular weight polyethylene (UHMWPE); low temperature processing for precision extrusion of high impact strength UHMWPE materials, applications of oscillatory flow in baffled tubes to reaction and liquid/liquid mixing.

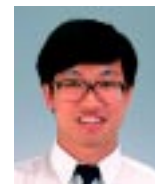
Xijun HU

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PhD Queensland

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Air pollution control and wastewater treatment through adsorption and catalysis; multicomponent adsorption equilibrium and kinetics in porous media; gas-solid reaction; modelling and computer simulation; characterisation of microporous solids.

Yongli MI

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Structure-permeability relationships of polymer membranes; synthesis of new fluorine-containing polyimides with enhanced permeability and selectivity for the separation of gas mixtures; solubility and transport of plasticising gases in glassy polymers.

Terrence Fu YEE

BSc Oregon State;

PhD Carnegie Mellon

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Chemical process design, simulation and optimization via computer-aided methods; efficient heat integration of chemical process; scheduling and planning of chemical manufacturing processes; process design and simulation for the pulp and paper industry.

King-Lun YEUNG

BS De La Salle;

MS, PhD Notre Dame

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Synthesis of advanced inorganic membrane materials for separation, reaction and pollution control applications.

Jian YU

BEng Zhejiang Inst of Tech;

MSc Zhejiang;

PhD British Columbia

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Biodegradation and biotransformation of environmental pollutants; enzymatic catalysis and kinetics; immobilisation of cells and enzymes; fermentation/ separation system; downstream processing of bioproducts; production of biodegradable plastics.

Visiting Scholar

Guo-Hua CHEN

BEng Dalian U of Tech;

MEng, PhD McGill

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Tel: (852) 2358 7138



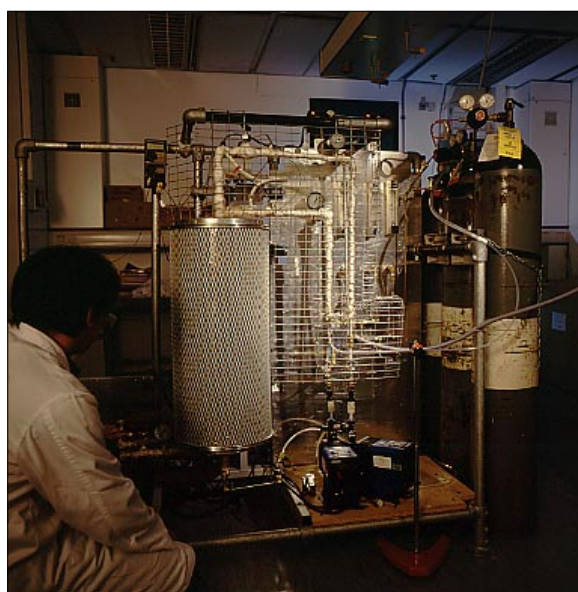
Environmental management, membrane separation, heat and mass transfer, drying.

RESEARCH AREAS

Chemical engineering has become a highly diversified engineering and science discipline which encompasses research interests ranging from aerosol to zeolite and from conventional petrochemical processing to multi-disciplinary areas such as materials engineering, biotechnology and environmental engineering. In addition to the fundamentals of transport, thermodynamics, kinetics and reaction engineering, research interests of HKUST focus on four areas, as described below.

Advanced Materials

Over the last three decades, many of the “high-technology” industries have evolved from mechanical-based manufacturing to chemical-based manufacturing. Examples may be seen in home entertainment, data storage and manipulation, telecommunication, high performance polymers, advanced ceramics and composites. Chemical engineers have actively participated in researches that have made these advances possible. At HKUST, research efforts are being focused on novel polymers and polymer composites. The fundamental processes such as rheology, non-Newtonian flow, heat and mass transport, and reactor design



▶ TI02 (Titanium Dioxide) Synthesis Reactor

associated with the production and processing of these materials are being studied in depth. Research programmes are supported by state-of-the-art equipment at the Materials Characterisation and Preparation Centre. In addition, multidisciplinary research and collaboration are possible through the Institute of Micro Systems, the Advanced Manufacturing Institute, Advanced Materials Research Institute and Centre for Advanced Engineering Materials.

Bioprocess Engineering

Biotechnology has emerged as a new opportunity for chemical engineers. Genetic and environmental manipulation of cells for protein production and for enhanced biocatalytic activities are possible by recombinant DNA techniques and metabolic engineering. Designing and maintaining the associated bioprocesses relies on the understanding of (i) the kinetics of cell growth and enzymatic catalysis, (ii) the transport and thermodynamic properties of the system, (iii) cell culture equipment and down-stream separation, (iv) current good manufacturing practices (GMP). Chemical engineers contribute

to a large number of traditional and new biotechnology industries from brewing, pharmaceutical and waste treatment to protein production by animal and insect cells and the associated purification. At HKUST, novel biosensors and environmental biotechnology are active research endeavors. Research activities are supported by the Biotechnology Research Institute at HKUST.

Environmental Engineering

Hong Kong is a densely populated urban city where encounter of air, water, municipal and industrial pollution is a fact of life for its residents. Naturally, research programmes at HKUST aim to develop appropriate technologies for improving the environmental quality in Hong Kong. However, research efforts will not merely be restricted to tackling local problems but will involve fundamental studies of generic phenomena and innovative methods which provide the basis for new solutions to the many and varied environmental problems world-wide. The Department participates in collaborative programmes with other departments in the University and the Institute for Environmental Studies. Examples of projects include air pollutant formation and abatement, source apportionment of air pollutants, gas to particulate conversions, deodorisation of indoor air, catalytic and advanced oxidation, conventional and advanced methods for the treatment of wastewater, hazardous waste and micro-contamination, waste minimisation, and cleaner technologies.

Process System Engineering

Validated and robust models underpin the success of scale-up, design and optimisation of all kinds of processes in the process and allied industries. The design, operation and control of these processes may be facilitated by advanced computational tools and computer technology. In conjunction with the other three areas of research, projects are developed to model complex problems such as air pollutant dispersion, scale-up of bioprocesses, and surface phenomena and effects. More fundamental studies involve the development of process design tools, optimization strategies and model solution techniques. Other projects will focus on the application of dynamic simulation, advanced control, parallel processing, knowledge-based systems, neural network and other artificial intelligence techniques to problems in non-traditional processes, particularly those that are relevant to industries in Hong Kong and Asia.

LABORATORIES

- Advanced Materials Research Laboratories
- Air Pollution Control Research Laboratory
- Analytical Laboratory
- Biochemical Engineering Research Laboratories
- Environmental Engineering Research Laboratories
- Food-Engineering Laboratory
- Pilot Plant Research Laboratory
- Polymer Characterization Laboratory
- Polymer Processing Laboratory
- Process Engineering Applications Laboratories
- Waste and Wastewater Treatment Research Laboratory

DEPARTMENT OF CIVIL AND STRUCTURAL ENGINEERING



▶ Professor Wilson Tang, Head

In June 1995, we watched with excitement the first batch of graduates receive their degree from our undergraduate programme, thirty-six in total. What gives us the greatest pleasure is the fact that they are working in relevant fields where they can apply to the fullest what they have learned at HKUST. In the same year, we also admitted an unprecedentedly large intake of 128 undergraduate students to the Department. Now, we have a total undergraduate enrolment of 294 students, among whom 73 are expected to graduate by June 1996. The fact that the Department itself has eventually produced its own graduates also has significant implications on its postgraduate programmes. In Fall 1995, the Department took in 31 new part-time MSc students, of whom 18 are graduates from our own undergraduate programme. This figure, which is also half of the 36 graduates that we produced in that year, is by no means a coincidence. The high enrolment percentage from our own fresh graduates indicatively reflects the appreciation for and the attachment to the Department on the part of its own graduates. Though less drastic than the progress made in the MSc programme, the research student enrolment is also on the rise. Our research programmes now have a total of 45 full-time equivalent, which is a 50% growth in comparison with the figures in 1994-95. There is no doubt that the Department has already built up a strong foundation in both its teaching and research programmes, and is more ready than ever to reach out to the profession.

In Spring 1996, there were three new ventures in the Department's history. First there came the debut of the Department's World Wide Web in April 96. The WWW, as the World Wide Web is usually known, has allowed the Department to meet with friends from all over the world through the electronic network. On 18 May, the Department had its first Open Day. Over a hundred visitors from a wide range of consultancy firms, contractors, and government agencies, were recorded flocking to the campus to see the state-of-the-art facilities of the Department on the Day. On 31 May 1996, the Department launched its first Continuing and Professional Development course, which is one among a series of courses that will continue into July of the same year. With a series of short courses in line, the Department is committed to serve the needs of the profession in technology transfer and development. In the coming years, it can be expected that the Department of Civil and Structural Engineering at HKUST will continue to excel in fulfilling its mission of educating the young and contributing to the economic development of Hong Kong.

FACULTY

Professor and Head of Department

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Systems, Risk, Reliability

Professor

Paul T. Y. CHANG

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Structural Analysis, Computer-Aided- Design

Gary. W. HEINKE

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PhD McMaster
(Principal Research Scientist of
Research Centre, and Director of
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Water/wastewater treatment, cleaner production, air pollution, marine pollution

Howard J. C. HUANG

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Water/Wastewater Treatment

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Foundation Engineering, Ground Improvement, Soil Behaviour

Yeou-koung TUNG

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Probabilistic Approaches to Water Resource Problems

Associate Professor / Senior Lecturer

Neil C. MICKLEBOROUGH

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MEng Carleton;
PhD Tasmania
(Associate Dean of Engineering)
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Reinforced/Prestressed Concrete Structures, Structural Dynamics

Visiting Associate Professor / Senior Lecturer

Ali JAAFARI

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Construction Systems Design Management & Risk Assessment

Akira MITA

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Control and Health-monitoring of Structures

Assistant Professor/Lecturer

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Tall Building Design, Structural Optimization

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Wind, Vibration Control, Structural Dynamics

Guanghao CHEN

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Biotreatment, Water Quality

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Environmental Hydraulics

Mohamed S. GHIDAQUI

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Water Resources Modelling

L. S. KATFYGIOTIS

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Tel: (852) 2358 8750*



Structural Dynamics & Identification

Jun-Shang KUANG

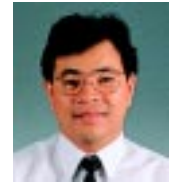
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Tall Buildings, Reinforced Concrete Bridges

Kin-Man LEE

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Tel: (852) 2358 7158*



Land Reclamation, Soft Ground Engineering

Xiang-Song LI

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Soil Dynamics, Geotechnical Instrumentation

Zongjin LI

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Materials, Nondestructive Test

Hong-Kam LO

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Transportation Management, Information Systems

Irene Man-Chi LO

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MSc, PhD Texas (Austin)
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Soil Remediation, Landfill Design, Waste Treatment

Duncan A. MCINNIS

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PhD Toronto
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Tel: (852) 2358 6922*



Water Supply Hydraulics, GIS for Environment and Infrastructure

Charles W. W. NG

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PhD Bristol
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Centrifuge & Numerical Modelling, Laboratory & Field Testing

Douglas B. RIGBY

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Soil Structure Interaction

Lianfa SONG

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Physical & Chemical Processes, Membrane Separation Processes

Hai YANG

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Modelling & Optimization of Transportation Systems

Visiting Assistant Professor / Lecturer

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Tel: (852) 2358 7175*



Hydrodynamics, Sediment & Pollutant Transport

Visiting Scholar

Qingshi J. YANG

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Tel: (852) 2358 8753*



Soil Modelling, Marine Geotechnics, Computational Geomechanics

Part-time Lecturers

Y. C. MOK

BSc(Eng), MSc(Eng) Hong Kong



C. SIU

OBE; BSc(Eng) Hong Kong



RESEARCH AREAS

The research focus of the Civil and Structural Engineering Department lies in two broad areas: infrastructural development and planning, and environmental and water resources studies. There are many subgroups under each of these two areas. A brief description of each area is given below. It is likely that research focus will change as necessary to explore new areas of interest associated with the emergence of new technology.

INFRASTRUCTURE DEVELOPMENT AND PLANNING

The bulk of the infrastructure development schemes are within the realm of the civil engineering disciplines, including the traditional specialty fields of structural engineering, construction management and technology, geotechnical engineering, harbour and coastal engineering, and the interdisciplinary, broad based approach of transportation systems engineering, regional development and planning, etc. The infrastructure facilities now being developed under the Port and Airport Development Scheme (PADS) in Hong Kong are having a very strong and positive impact on research and technology development of our postgraduate programme. Major research areas identified include: building-system design and analysis, geotechnical engineering and soil-structure interaction, construction materials, transportation system modelling and operation, integrated risk and reliability assessment, and infrastructure system development, on which the Department is working closely with the Institute for Infrastructure Development.

▶ Measuring particle size by Coulter Multisizer



▶ Hollow cylinder testing apparatus

ENVIRONMENTAL AND WATER RESOURCE STUDIES

The 1990s are generally recognised as the decade of environmental awareness. HKUST is committed to devoting its resources and expertise in fundamental research and in the development of advanced technology in order to improve the quality of life and to free it of environmental hazards. The areas of research where civil and structural engineering will play a leading role shall include contaminated sediment transport; physical, chemical, and biological water and waste treatment processes; mathematical models for environmental quality management; mixing and transport phenomena of pollutants in natural and artificial systems; and water resources management and engineering. The Department is in close cooperation with the Institute for Environmental Studies in this area of research.

LABORATORIES

- Computational Laboratory
- Construction/Concrete/Materials Laboratory
- Environmental Engineering Laboratory
- Fluid Mechanics/Hydraulics Laboratory
- Geotechnical Engineering Laboratory
- Structures/Solid Mechanics Laboratory
- Surveying Laboratory

DEPARTMENT OF COMPUTER SCIENCE



▶ Professor Roland Chin, Head

The Department of Computer Science continues to expand its effort to improve its curriculum and facilities, and to strive for excellence in both teaching and research. At present, the department has grown to a size consisting of 420 undergraduate students, 110 postgraduate students, 30 researchers, 19 supporting staff and 40 faculty members.

All the four modern computer teaching labs have been completed and are serving students within the department and outside the department. The four state-of-the-art labs for research in computer engineering, artificial intelligence, database systems, and multi-media graphics are fully operational and heavily utilized by students and researchers.

The Department is committed to continuous improvement in the classroom and in the curriculum. For example, student feedback was used to revise our entry level courses to closely suit students from our secondary schools. A team of faculty is in place to work on the improvement of the first year and second year course sequences and the final year projects. In addition, a number of forums focusing on teaching techniques and learning methodologies are being held as part of the continuous effort for teaching enhancement.

An exciting news this year was the Department's continued success in the ACM International Collegiate Programming Contest, which is a clear indication of our devotion to good training and the students' devotion to self-disciplined hard work. Our team of four talented CS students – Wong Wing Kin, Ip Ting Pong, Chesney Wong, and Ngan Sai Fong - coached by Dr. Stiber was placed 11th out of over 1000 such teams worldwide, beating many teams from top universities in US, Canada, and Asia.

Continuing grant support in research is helping the Department to achieve academic excellence and to maintain competitiveness and relevance. Our faculty and students are involved in more than 80 funded research projects ranging from applied research such as the development of an information system which integrates maps, roads, buildings, water pipes, gas lines, and other similar information of Hong Kong for effective resource management and city planning, to fundamental research such as the study of optimal approaches to allocate computational intensive tasks onto a large number of connected computer processors for fast parallel execution.

Recently, the ITDC has supported over 12 million dollars for three projects which involve many faculty and students in the Department. One project is developing machine vision systems for automated visual inspection of manufacturing products such as electronic components and machined parts. A second project is developing approaches to use the worldwide communication technology, especially the Internet, to help Hong Kong industries to make effective use of this media to stay competitive. The third project is to design optical measurement systems to automate the clothe fitting and modeling process for the garment industry. In this year's RGC grant applications, 20 out of 32 proposals submitted by the Department were funded for a total of \$8 million. This success rate is among the best in Hong Kong.

As we look forward to the next few years, we anticipate the need to improve advising and delivery of problem-solving skills to students. There will be more emphasis on communication and project teamwork in both our undergraduate programme and postgraduate training. In terms of research, the Department continues to advance its intellectual base and focus its effort in projects which are relevant to our students and our educational programmes.

FACULTY

Professor & Head of Department

Roland T. CHIN

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Image processing; machine vision; digital signal processing; pattern recognition and related applications.

Professor

Samuel T. CHANSON

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(Associate Head of Department)

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Computer communications (particularly protocols); high speed networks; multimedia conferencing systems; distributed operating systems.

Frederick H. LOCHOVSKY

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Information systems design; database design; data and knowledge base integration; organizational support systems; human-computer interaction.

Vincent Y.S. SHEN

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Software engineering; distributed and real-time systems.

Derick WOOD

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Document processing; symbolic manipulation of language-theory objects; algorithms; data structures; computational biology; formal language theory; computational geometry.

Adjunct Professor

Herbert EDELSBRUNNER

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Data structures and algorithms, computational geometry, discrete geometry, combinatorial topology, combinatorics, solid modeling, scientific computing, geometric visualization.

Visiting Professor

Su-Shing CHEN

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Information infrastructures, digital libraries, hypermedia, human-computer interaction, object-oriented systems.

Reader

Jun GU

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VLSI engineering, computer networking, computer architecture, parallel and distributed processing, operations research and combinatorial optimization.

Dik L. LEE

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Document retrieval and management; discovery, management and integration of information resources on wide-area networks; deductive database systems; object-oriented database systems.

Ting-Chuen PONG

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Computer vision and image processing; robotics; artificial intelligence; pattern recognition.

Associate Professor / Senior Lecturer

Amelia C.W. FONG LOCHOVSKY

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Artificial intelligence; image processing and pattern recognition; Chinese information processing.

Helen C. SHEN

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Flexible manufacturing systems; data fusion; machine vision; colour image analysis.

Assistant Professor /Lecturer

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Parallel and distributed processing; high performance computer architectures and their assessment; performance evaluation.

Sunil ARYA

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Computational geometry; design and analysis of data structures and algorithms.

George BACIU

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Computer graphics; scientific visualisation; analytical and computational dynamics of physical systems; entropy optimisation; symbolic computation.

Lewis Hau-Ming CHAU

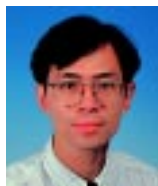
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Logic programming; formal specification; visual programming.

Siu-Wing CHENG

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Computational geometry; design and analysis of algorithms; data structures.

Shing-Chi CHEUNG

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Distributed computing systems, object-oriented design and programming, software testing and verification, multimedia and real-time systems, and mobile computing.

Manhoi CHOY

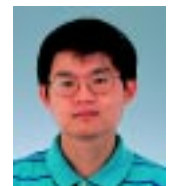
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Principles and practice of parallel and distributed systems; distributed shared memory systems; geographical information systems; high performance distributed computing; distributed algorithms.

Kok-Wee GAN

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Natural language processing; Chinese computing; computer aided instructions.

Mordecai J. GOLIN

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The theory, design and application of algorithms; computational geometry; combinatorics; mathematical tools for the analysis of algorithms.

James W. GRAY, III

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Computer security; cryptographic protocols; formal methods in software engineering; connectionist models in computing.

Mounir HAMD

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Design and analysis of parallel and distributed computing systems; high-speed networking and communications; software development for computationally intensive applications; parallel algorithms.

Andrew B. HORNER

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Computer music; genetic algorithms and artificial life; financial prediction.

Kamalakar KARLPALEM

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Distributed database systems; database design; semantic data modelling and knowledge representation; applications of database technology; cooperative problem solving.

Alex KEAN

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Knowledge representation and reasoning.

Chung-Mong LEE

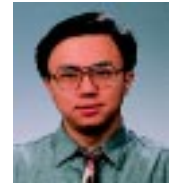
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Computer vision; image processing; video coding; neural networks; expert systems; robotics; artificial intelligence.

Bo LI

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ATM, MPOA, All optical networks, mobile communications and performance evaluation.

Zhaoping LI

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Neural computation; signal processing in biological and artificial sensory systems: vision, olfaction, and audition; neural networks; pattern recognition; visual psychophysics.

Fangzhen LIN

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MS Beijing;
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Artificial intelligence; knowledge representation and reasoning; planning and reasoning about action; logic programming; robotics.

Jelena V. MISIC

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Parallel computer architectures and algorithms; computer networks and protocols.

Jogesh K. MUPPALA

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Performance evaluation; client-server computing; stochastic Petri nets; high speed networks.

Tin-Fook NGAI

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Parallel processing (architectures, OS supports, compilers and languages), computer architectures, compilers, distributed computing, realtime and multimedia systems.

Dimitris PAPADIAS

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PhD, National Technical U. of Athens
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Data and knowledge base systems; spatial databases; geographic information systems; query languages; constraint satisfaction algorithms; qualitative reasoning; argumentation systems; WWW applications.

Chung-Dak SHUM

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Parallel multimedia disk storage; multi-processor database systems; main memory database architecture; parallel query optimisation; performance modelling and analysis.

Dekai WU

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PhD California (Berkeley)
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Statistical, neural, and probabilistic natural language processing; machine translation; dialog systems.

Beat WUTHRICH

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Knowledge base systems; knowledge discovery in databases; uncertainty management; machine learning.

Dit-Yan YEUNG

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Neural computation; statistical learning theory; handwriting recognition; document processing.

Nevin Lianwen ZHANG

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Tel: (852) 2358-7015*



Artificial intelligence; knowledge representation; data structures and algorithms; reasoning under uncertainty; Bayesian networks; decision networks; planning and control under uncertainty; Dempster-Shafer theory; data fusion.

Adjunct Assistant Professor**Babak HAMIDZADEH**

*BS, MS, PhD Minnesota
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Real-time operating systems; real-time databases; parallelising compilers; parallel database systems; knowledge discovery in databases; high-performance computer architectures; performance analysis; artificial intelligence.



► Teaching the robot to write Chinese character

RESEARCH AREAS

Foundations of Computer Science

Foundations of Computer Science can be divided into two areas, namely, Theory of Computation, and Design and Analysis of Algorithms. Work in Theory of Computation seeks to uncover and explain the structures underlying computational processes, as well as to model the difficulties encountered in an attempt to understand them. The goals of research in Design and Analysis of Algorithms are to identify central problems in a variety of applications and develop efficient approaches to solving them, as well as to propose effective and general algorithmic design paradigms and analytical techniques.

Some topics currently under investigation are:

Combinatorial Optimisation has as its goal the design of efficient algorithms to maximise or minimise an objective function under some constraints for a combinatorial structure. Many practical optimisation problems fall into this category; for example, routing for VLSI design and finding an optimal resource allocation schedule.

Computational Geometry deals with the computational aspects of geometrical problems. Typical problems are: finding the convex hull of finitely many points, decomposing geometric domains into simple pieces (such as simplices), and planning a path for a geometric object that avoids obstacles. Due to the widespread use of geometry in application areas such as computer graphics, geometric modelling, and mesh generation, there is a great demand for efficient solutions for these problems.

Data Structures is concerned with the design of efficient data representations for specific applications. For example, the design of an efficient data structure for external string matching or for multiple alignment.

Formal Grammars and Machines deals with the specification and properties of languages and translations. Application areas such as document processing, telephone switching, and reactive systems are driving current research. For example, the validity of a World Wide Web page is determined by the HTML grammar.

Graph Algorithms have widespread application in modelling systems where the relations between pairs of objects play an important role, as well as in solving problems arising in these systems. Typical problems include finding the shortest route from one site to another in a network and determining a feasible schedule for processes with deadlines.

Performance Analysis Techniques for algorithms and data structures include probabilistic and competitive analysis. Probabilistic analysis uses the input probability distribution to show that an algorithm, or data structure, works well with high probability on a randomly chosen input. Competitive analysis of an on-line algorithm demonstrates that it performs within some constant factor of an optimal algorithm for the same task.

Randomised Algorithms use the element of chance to either improve or simplify algorithms. A randomized algorithm makes random choices in the course of its execution, so that the algorithm works well on every input with high probability. A well-known example is the randomized algorithm to find the median of a set of integers that runs in linear expected time.

Artificial Intelligence

Artificial intelligence (AI) research studies how computers can be made to exhibit intelligent behaviour in performing certain tasks which, until now, would have been better done by humans. These tasks include deductive and inductive reasoning, planning, speech recognition, vision, language understanding, common-sense reasoning, learning, and motion control. Related fundamental issues in AI involve knowledge representation, problem-solving paradigms and strategies, computer languages for AI and their implementations, software development environments, and parallel architectures for AI applications.

Specific areas under investigation include the following:

Computer Vision deals with the automatic interpretation and understanding of two-dimensional images of three-dimensional

scenes. Current research focuses on object recognition and the determination of three-dimensional structures from images, particularly those based on stereo and visual motion.

Work in Expert Systems is aimed at discovering strategies involved in expert problem-solving and in building development tools for expert systems.

Image Processing involves computer processing and analysis of digitised images, with the goal of discovering patterns and identifying semantic entities of interest. Current research focuses on the design and analysis of image processing and pattern recognition algorithms as well as on their applications.

Knowledge Representation and Reasoning is about how to represent knowledge in a form that is suitable for automated reasoning on computer. Current research focuses on reasoning under uncertainty using Bayesian networks, representing and reasoning about actions in dynamic domains, and representing and reasoning about strategic information in planning.

Logic Programming concerns the use of logic as a programming language and explores computational models based on controlled deduction. Current research interests rest in incorporating functional and object-oriented programming paradigms into the framework and developing tools for specifying distributed systems.

Machine Learning aims to develop computational models of learning, a crucial feature in simulating natural intelligence. Current research focuses on learning in various statistical models.

Natural Language Processing concerns computational techniques for understanding and manipulating human language. Current research focuses on statistical, neural network, and machine learning techniques to improve the accuracy and coverage of interpretation, translation, and cognitive language models, and their applications to Chinese information processing.

Neurocomputing is based on massively parallel networks of simple computing elements, inspired by biological nervous systems. One research focus is the theory and applications of the self-modifying capabilities of artificial neural networks. Another focus is modelling biological neural networks as complex systems that exhibit sophisticated emergent behaviour. Many neural networks

are akin to statistical pattern recognition algorithms and exhibit properties useful for machine learning.

Robotics research concentrates on the modelling of automated flexible manufacturing systems, autonomous vehicle navigation, sensory data fusion and integration.

Several possible applications that are valuable to Hong Kong are automatic translation between Chinese and English, computer-assisted manufacturing, autonomous vehicle navigation, medical image analysis for diagnostic purposes, speech and character recognition, electronic libraries, expert systems, and intelligent tutoring systems.



► Demonstrating light source projection using a 'space ball'

Computer Engineering

Computer engineering is concerned with the design, analysis and implementation of computer systems. Design techniques take into consideration both the requirements imposed upon the system and the technology available for implementation, while analysis techniques are useful in verifying if the system meets its requirements.

Computer engineering can be broadly divided into the following sub-areas:

Computer Architecture and Organisation deals with the design, analysis and implementation aspects of processors, memory

systems, input/output and their interconnection. Topics related to high-performance architectures include pipelining and vector processing, and shared versus distributed memory systems.

Fault-Tolerant Computing is mainly concerned with mechanisms to deal with faults and failures that arise in computer systems. Topics of interest include fault detection and correction, designing circuits for testability, error detecting and correcting codes, redundancy, evaluating reliability, availability and safety characteristics of systems.

Operating Systems deals with issues related to process and task scheduling and management, interprocess communication, synchronisation, concurrency control, mapping, load balancing, memory management, file systems, and security.

Parallel and Distributed Computing deals with the use and management of multiple processors to achieve speedup and increased computational power. Specific topics of interest include SIMD and MIMD processing, parallel synchronous and asynchronous algorithms, parallel compilers, multiple and distributed processing, performance monitoring and programming aid tools.

Real-Time Systems is a growing application area of computer systems, characterised by stringent timeliness requirements. Topics of interest include concurrency, synchronisation, fault-tolerance, task scheduling, and techniques to ensure that deadlines are met.

Other topics that involve expertise from both computer and electrical engineering include:

Computer Communication and Networking which deals with the communication requirements among computers. Topics of interest include communication protocols, protocol specification, testing and verification, flow control, deadlock and congestion issues, network architectures, high speed networks and local area networks.

VLSI Design which deals with design and implementation of circuits using device technologies like NMOS and CMOS. Topics of interest include chip layout, design tools and circuit simulation tools.

The Computer Engineering programme is designed to prepare students for research in the areas described above, as well as to provide solutions to Hong Kong's needs in the design and analysis of computer systems, communications networks, and systems software.

Data and Knowledge Management

Research in Data and Knowledge Management draws upon techniques from both the database and knowledge base areas and focuses primarily on the effective integration and application of technologies from these two areas. It is driven by the need of existing and emerging data- and knowledge-intensive applications in both centralized and distributed environments.

Our research focuses fall into three main areas:

- "intelligent" information access which applies knowledge-based techniques to information retrieval problems as well as integrates database and information retrieval querying paradigms;
- DB/KB integration which applies AI and statistical techniques to improve the data modelling and data analysis capabilities of database systems;
- distributed DBMS which extends and applies database and knowledge base technology to distributed scenarios for both traditional database applications and newer applications such as multimedia support.

Current topics under investigation are described below.

Conceptual Modelling and Design deals with the design of the conceptual database structure (schema) of a database system. Current research issues being explored include object modelling, schema evolution, operational semantics, and integrity constraints.

DBMS Internals include the topics of transaction management and recovery, query processing and optimization, caching and buffer management, and physical representation techniques in database systems. Specific areas of research include clustering techniques for object-oriented models, database support for advanced applications such as cooperative information systems

and engineering environments, multi-processor database systems, and performance modelling and analysis.

Distributed, Federated, and Heterogeneous Databases is concerned with the coordination of separate data and knowledge bases. Some of the issues being explored are novel architectures for the integration of data and knowledge bases, integration of heterogeneous transaction management systems, federated approaches to schema integration, distributed database design, and the use of the object-oriented model in the integration of disparate information systems.

Information Retrieval studies the analysis, storage and retrieval of loosely structured data such as textual documents and World Wide Web pages consisting of both text and multimedia data. Research issues being pursued include architectures for widely distributed information systems, information visualization, image indexing, Chinese document retrieval, indexing and search techniques for text, and discovery, management and integration of information resources on the Internet.

Knowledge-based Management Systems draws concepts and techniques from AI in order to develop more advanced systems to manage data and knowledge. Some of the research issues include object-oriented database technologies, expert database systems, active database systems, abduction (explanation generation), knowledge discovery or data mining, and knowledge representation.

Organisational Activity Support focuses on the architectures and technologies for supporting distributed, cooperative organisational activities. Research issues being addressed include knowledge representation, evolution and migration, integration of procedural and problem-solving activities, active database system supported cooperation and coordination, and user support for capturing and using organisational knowledge.

User Level Facilities are concerned with the interaction of end-users, application programmers and system administrators with database systems. Some of the current research interests include cooperative user interfaces, multi-media user interfaces, browsers, query and programming language interfaces, application development environments, database design tools, and resource and performance monitoring facilities.

Software Technology

Software Technology covers a range of application areas related to software design, development, deployment, and use. The goal is to provide the software tools and methods to address important application problems.

Specific sub-areas under investigation include the following:

Chinese Information Processing involves all aspects of dealing with Chinese texts, such as representation, storage, index structure, retrieval, and input/output methods. Further applications such as speech generation, Chinese text proofreading, natural language interface, etc., are also addressed. Part of the work involves the construction of language resources such as dictionaries, tagged corpora, and valuable statistics extracted from large corpora.

Computer and Communication Security is important in computer science theory and of vital concern in computing practice. Our research projects include mathematical analysis of cryptographic protocols and cryptanalysis of encryption algorithms, as well practical investigations of applications such credit card transactions over the Internet.

Computer Graphics and Digital Sound Synthesis are rapidly evolving areas due to the rapid expansion of the world-wide information infrastructure. With applications starting from scientific visualization and simulation to photorealistic rendering and multimedia, computer music and digital image synthesis are contributing to almost every activity in a technologically advanced, information-based society. We have established the Graphics And Music Experimentation (GAME) Lab which is a modern facility for carrying out fundamental, theoretical and applied research in all aspects of visualization, rendering, three-dimensional modelling, animation, physically-based simulation, computer music, sound analysis and synthesis and visual psychophysics.

Formal Specifications of software can be expressed using functional logic grammars. We are interested in developing a functional logic language for the specification of complex software systems.

Graphical User Interface Design assesses the merits of different interface development tools provided by modern computers so

that a designer can make intelligent choices in building the most appropriate graphical user interface for the application.

Multimedia Applications development involves the programming of multimedia objects which encapsulate text, graphic, image, audio, or video data. Due to the lack of software support tools, development of these applications is complex and difficult. We are developing an environment that provides a class lattice of multi-media objects, runtime support of open systems on the Internet, and communicating protocols for transmitting multimedia objects using the transport services provided by the networks.

Static and Dynamic Analyses are popular approaches to explore the behavior of distributed software systems. We are developing automated techniques and the associated tool support to analyse a system by means of its architecture.

Laboratories

The Department of Computer Science enjoys excellent computing facilities. As of the beginning of the fall semester, 1996, there are approximately 270 state-of-the-art workstations, 60 personal computers, 1 mobile robot and two ATM switches in various departmental laboratories and offices. A group of SUN SPARCstation 20/612 and SPARCstation 10/51 servers and a SUN SPARCserver 1000 provide file and CPU services to the Department. A state-of-the-art pool of CPU servers is being planned to boost the computing capacity in the Department. An Annex terminal server with a modem spool of 15 lines provides dial-up service for the faculty members and the postgraduate students. Another terminal server with 24 lines will be installed for the undergraduate students before the end of the year. In addition, the Department has access to a 140-node Intel Paragon parallel computer which is still the largest supercomputer in Hong Kong, and indeed in Asia outside of Japan.

All computing equipment are connected to ethernet switches for high performance network access within the department's laboratories, which are in turn connected to the Internet through the University's 100 Mbit/sec FDDI backbone.

All students in Computer Science can access SUN SPARCstation 10's and SPARCstation IPX Colour workstations, SGI XS24Z full

24-bit colour graphics workstations, and 80486-based colour PCs (soon to be upgraded to 200 MHz Pentiums) in the four departmental general teaching laboratories. They can also access SUN SPARCstation Classic, Pentium colour PCs and Apple Macintosh computers in the Computer Barns and Macintosh Laboratory operated by the University's Computing Centre. There is normally no waiting for computer access.

Each faculty member is provided with one workstation in his or her office. At this time, most faculty are equipped with SUN workstations. Postgraduate students can access a variety of workstations, such as SUN SPARCstation 5/70, SPARCstation 10/50, SPARCstation IPX, SPARCstation 4/80, SGI Indigo2 Extreme, SGI Indy R4600PC, Pentiums and Pentium Pro's, NeXTstations and Apple Macintosh Quadra in research laboratories.

The Department's Graphics And Music Experimentation (GAME) Room is equipped with 7 SGI Indigo2 Extreme workstations, 4 NeXTstations, a SPARCstation 10/30 with 24-bit colour graphics board, an Apple Macintosh Quadra, and various video and audio equipment, including: an ImageCorder for 35mm slide production; Diskus, Betacam, S-VHS machines for high-quality video recording and editing; a digital camera for capturing high resolution static image; and synthesizers, amplifiers, loudspeakers and a mixing board.

The AI/Robotics/Image Processing Laboratory houses 13 SPARCstations served by a 20/612 CPU server, 1 DEC Alpha, 1 SGI XS24Z, 1 mobile robot, and various sensory and computer vision equipment such as: image acquisition boards include a Targa-2000 24-bit real time frame grabber, high resolution CCD camera, 600dpi scanner, digitizer and optical drive. There are several other PCs (Pentiums and 80486s) in the laboratory for final year projects.

The Computer Engineering Laboratory contains 2 Fore System ASX-200 ATM switches, 12 SPARCstations (mainly SPARC-20s), 2 Pentiums, 2 PCs and other multi-media facilities. A 100Base ethernet hub is integrated with the Pcs to build a high speed LAN. 2 SPARCstation 20/612 and 2 SPARCstation 5/70 are equipped with ATM interface card and multimedia option. The Fore System LAX-20 allows multi-protocol LAN switching that support Ethernet, token ring, FDDI and ATM.

The Database System Laboratory has 9 SPARCstations. Most machines are equipped with multi-media option. There is another PC and optical drive in the laboratory for final year projects.

The Department is committed to keeping its computing facilities up-to-date.

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING



▶ Prof. Philip Chan, Acting Head

In recent years electrical and electronic engineering has permeated into every facet of our lives. In particular, telecommunication and microelectronics have fueled the information technology explosion. Modern electrical and electronic engineering has evolved into many exciting disciplines such as photonics, computer networks, wireless communications, telecommunications, multimedia technology, microelectronics, VLSI, micromachines, display technology, computer engineering, robotics, automatic control and biomedical instrumentation. These disciplines provide challenging research opportunities for the faculty and exciting employment opportunities for the students. Although EEE is planned to be a large department, we realize we need to focus and invest in a limited number of key research areas to be successful. We have planned and recruited top quality faculty in five main research areas: information technology, microelectronics, computer engineering, robotics and control, biomedical instrumentation.

The Department of Electrical and Electronic Engineering at HKUST aims to provide a rigorous and yet relevant education to our students. At the undergraduate level, we aim to educate students to become effective engineer at a fast-moving technologically orientated world. The top undergraduates shall be well prepared to cope with the demanding postgraduate studies in HKUST or abroad. In last five years, our graduates were sought by the leading industrial companies in Hong Kong and abroad. We have also witnessed our graduates compete and excel in postgraduate studies in Hong Kong and abroad. The Department maintains modern equipment and laboratories to facilitate the research and teaching activities of faculty and students. At present, the Department operates more than twenty laboratories. The Department has approximately 713 undergraduate students, 135 postgraduate students and 45 active research grants with a total value of over \$45 million.

During the 1995-1996 academic year, the Electrical and Electronic Engineering (EEE) Department graduated the third class of students. EEE received full accreditation from the Hong Kong Institution of Engineers (HKIE). This is the first such accreditation in the University. The Computer Engineering programme received provisional accreditation from HKIE. In faculty recruitment, we have reached the critical mass to develop strong research programmes in most areas except perhaps computer engineering. Computer engineering will be one of the key area

for faculty recruiting in the years to come. The quantity and the quality of faculty applications have dropped significantly perhaps due to improvement of the job opportunities in North America. However, we are proud to report that the new faculty we recruited recently are as strong as it has ever been. With the reduced rate of expansion and even the possibility of budget cuts, the challenge of next few years will be quite different. We plan to take advantage of the 'flexible appointments' to hire post-docs and visiting faculty to support our active research and teaching programmes. In the past year, we have focused on restructuring our undergraduate programme to reduce the student workload while maintaining the quality. We have also been riding on the wave of UGC's Teaching and Learning Quality Process. We are proud to report that EEE has the best course evaluation result in the School of Engineering. On the research front, 19 out of 32 RGC proposals submitted from the Department were funded for a total of \$11.5 million. We still have the best success rate among EEE departments in Hong Kong. We also witness the inauguration of the Centre for Display Research sponsored by the Industry Department of the Hong Kong Government. We congratulate Dr. Chi Ying Tsui who received the best paper award in the IEEE Transactions on VLSI Systems for his paper titled "Power Estimation Methods for Sequential Logic Circuits." The first US patent titled "Dual-Emitter Lateral Magnetometer" was granted to Jack Lau, Ping K. Ko, Cuong Nguyen and Philip C. H. Chan. This is also the first US patent granted to the faculty in the School of Engineering. This year our faculty has filed five more US patents.

FACULTY

Professor and Acting Head of Department

Philip C.H. CHAN

BS California (Davis);

MS, PhD Illinois (Urbana-Champaign)

Email: eepchan@ee.ust.hk

Tel: (852) 2358 7041



Electronic design automation, VLSI devices, circuits and systems, CAD/CAE/CAM technologies; microelectronics.

Professor

Xiren CAO

BS Chinese U of

Sci and Tech (Beijing);

MS, PhD Harvard

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Tel: (852) 2358 7048



Discrete event system theory and applications, computer and communication systems, B-ISDN and ATM, system engineering, queueing theory and optimisation.

Peter W.P. CHEUNG

BS Oregon State;

MS Puget Sound;

PhD Washington

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Analog integrated circuits design, microelectronics, microsensors, biosensors, medical electronics and medical instrumentation, microprocessor-based instruments design, optoelectronics.

Ping K. KO

BS Hong Kong;

MS, PhD California (Berkeley)

(Dean of Engineering)

Email: pingko@usthk.ust.hk

Tel: (852) 2358 6952



Semiconductor devices, silicon-on-insulator technology, microelectronics and microsensors.

Hoi-Sing KWOK

BS Northwestern;

MS, PhD Harvard

Email: eekwok@ee.ust.hk

Tel: (852) 2358 7056



Thin film technology, fabrication of thin film opto-electronic devices with applications to optical signal processing and display technology, liquid crystal displays.

Ming-Lei LIU

BS National Taiwan;

MS Drexel;

PhD Stanford

(Director of Hongkong Telecom Institute of Information Technology)

Email: eeliou@ee.ust.hk

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Low bit-rate video, image compression techniques, advanced television, packet video, VLSI architecture, and implementation of signal processing systems for visual applications.

S. Simon WONG

BSEE, BSME Minnesota;

MS, PhD California (Berkeley)

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Design and fabrication of high performance integrated systems. Special interest in bridging design and technology issues of high performance device structures, advanced interconnection technology and multi-chip modules.

Adjunct Professor**Ruey-Wen LIU**

BS, MS, PhD, Illinois

(Urbana-Champaign)



Network and system theory; artificial neural networks; algebraic theory of control system design; computer-aided design; signal and image processing; modelling of socio-economic systems; fault analysis; high-speed data transmission; blind signal processing; and multi-channel system identification.

Visiting Professor**Silvanus Siu-Wai LAU**

BS, MS, PhD California (Berkeley)

Email: eesslau@ee.ust.hk

Tel: (852) 2358 8525



Electronic materials science; advanced semiconductor, heterostructure materials and devices.

Kenneth C. SMITH

BS, MS, PhD Toronto

Email: eesmith@ee.ust.hk

Tel: (852) 2358 7062



Linear and digital circuit design, instrumentation, data transmission, input/output systems, special-purpose processors, reliable systems, testable systems, multiple-processor systems, multiple-valued logic, man-machine systems, computer-assisted instruction, flexible manufacturing, machine-vision, semi-custom VLSI, electronic music, medical instrumentation, neural networks and fuzzy logic.

Adjunct Reader**Justin C. CHUANG**

BS National Taiwan;

MS, PhD Michigan State



Wireless communication and networking.

Associate Professor / Senior Lecturer**Chin-Tau LEA**

BS, MS National Taiwan;

PhD Washington

Email: eelea@ee.ust.hk

Tel: (852) 2358 7090



Broadband and wireless network architectures; high-speed electronic and photonic switching; network protocols.

Khaled BEN LETAIEF

BS, MS, PhD Purdue

Email: eekhaled@ee.ust.hk

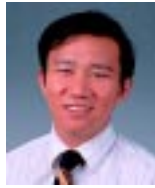
Tel: (852) 2358 7064



Communications systems, optical fibre transmission networks, information theory and coding, spread spectrum and wireless personal communications.

Zexiang LI

*BS Carnegie-Mellon;
MS, PhD California (Berkeley)
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Tel: (852) 2358 7051*



Robotics and control, holonomic and nonholonomic motion planning, mechanism design, robust and Hoo control, adaptive control, CAD/CAM for control systems.

Tai-Chin LO

*BS National Taiwan;
MS, PhD Illinois (Urbana-Champaign)
Email: eetclo@ee.ust.hk
Tel: (852) 2358 7212*



Integrated circuit technology, electronic materials, microwave bipolar transistors and integrated circuits, semiconductor device modelling for circuit simulation.

Joseph SCHMITT

*BS Case Western Reserve;
MS, PhD Stanford
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Tel: (852) 2358 8515*



Biomedical sensors and instrumentation; analog circuit design; optical spectroscopy, imaging, and interferometry; theory of light propagation in random media; design of technology for developing countries.

Johnny K.O. SIN

*BS, MS, PhD Toronto
Email: eesin@ee.ust.hk
Tel: (852) 2358 7052*



Power integrated circuits and devices, semiconductor devices and fabrication technology, modelling and characterisation of semiconductor devices.

Assistant Professor/Lecturer**Oscar C.L. AU**

*BS Toronto;
MA, PhD Princeton
Email: eeau@ee.ust.hk
Tel: (852) 2358 7053*



Image processing, digital signal processing, coding theory, communications, detection and estimation.

Mansun J. CHAN

*BS California (San Diego);
MS, PhD California (Berkeley)
Email: mchan@ee.ust.hk
Tel: (852) 2358 8519*



Nanometric device physics; SOI technology for high-speed circuits; device modelling (BSIM3); automated device characterisation systems.

Roger CHENG

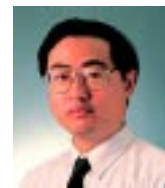
*BS Drexel;
MA, PhD Princeton
Email: eecheng@ee.ust.hk
Tel: (852) 2358 7072*



Mobile communications; multi-user communications; information theory; coding theory.

Kwan-Fai CHEUNG

*BS, MS, PhD Washington
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Tel: (852) 2358 7050*



Digital signal processing algorithms, artificial neural networks and applications, fuzzy set theory and applications, digital image processing, optical information processing.

Ho-Chi HUANG

*BS, MS National Taiwan;
PhD Washington
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Tel: (852) 2358 7046*



Semiconductor devices, optical probing for VLSI testing, opto-electronics, integrated guided-wave optics, optically based instruments.

Zaheed KARIM

*BS, MS, PhD Southern California
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Tel: (852) 2358 7070*



Optical computing and signal processing, spatial light modulators, optical interconnects, electrooptic devices, integrated optics, computer generated holograms, micro-electronics packaging.

Wing-Hung KI

*BS California (San Diego);
MS California Inst of Tech;
PhD California (Los Angeles)
Email: eeki@ee.ust.hk
Tel: (852) 2358 8516*



Design and modelling of switching mode power converters; design and modelling of dimmable electronic ballast; and analog integrated circuit design for power converter controllers.

Tsz-Mei KO

*BEE, MEE Cooper Union;
PhD California Inst of Tech
Email: eetszmei@ee.ust.hk
Tel: (852) 2358 7054*



Communication system, information processing, coding theory, VLSI design and computer networks.

Jack K.C. LAU

*BS, MS California (Berkeley);
PhD Hong Kong U of Sci and Tech
Email: eejlau@ee.ust.hk
Tel: (852) 2358 7043*



Analogue and digital IC design; microprocessor design; VLSI circuit design and simulation.

Curtis C.S. LING

*BS California Inst of Tech;
MS, PhD Michigan
Email: eeling@ee.ust.hk
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Millimeter-wave integrated circuits and antennas; integrated phased arrays and broadband communications systems; micromachining applied to integrated high-speed systems.

Howard C. LUONG

*BS, MS, PhD California (Berkeley)
Email: eeluong@ee.ust.hk
Tel: (852) 2358 8514*



Ultra-high-speed and ultra-low-power analog and digital integrated circuits: high-performance analog-to-digital converters; VLSI digital signal processing and computer systems.

Philip MOK

*BS, MS, PhD Toronto
Email: eemok@ee.ust.hk
Tel: (852) 2358 8517*



Analogue integrated circuits for telecommunications; power integrated circuits; VLSI device, technology and circuit design.

Ross David MURCH

*BS, PhD Canterbury (Christchurch)
Email: eermurch@ee.ust.hk
Tel: (852) 2358 7044*



Electromagnetics, inverse scattering, imaging, and image/signal processing.

Cuong T. NGUYEN

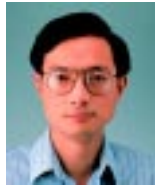
*BS California (Berkeley);
MS, PhD Stanford
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Tel: (852) 2358 7066*



High-performance bipolar and MOS devices, characterisation and modelling of chemo-mechanical polishing for VLSI and microsensors.

Truong-Thao NGUYEN

*BS Ecole Polytech (France);
MS Princeton;
PhD Columbia
Email: eethao@ee.ust.hk
Tel: (852) 2358 7063*



Discrete-time signal processing, quantisation, high resolution analogue-to-digital conversion, source coding, image compression, signal reconstruction, wavelets.

Vincent M.C. POON

*BSc, MPhil, PhD CUHK
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Tel: (852) 2358 7047*



Microelectronic device physics and technology, VLSI design and fabrication, optoelectronics, opto-computing and integrated optics, advanced semiconductor materials.

Li QIU

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Tel: (852) 2358 7067*



Automatic control, signal processing and manufacturing.

Bertram Emil SHI

*BS, MS Stanford;
PhD California (Berkeley)
Email: eebert@ee.ust.hk
Tel: (852) 2358 7079*



Neural networks, computer vision and signal, and image processing.

Danny H.K. TSANG

*BS Winnipeg;
BEng, MS Technical U of Nova Scotia;
PhD Pennsylvania
Email: eetsang@ee.ust.hk
Tel: (852) 2358 7045*



B-ISDN/ATM networks, multi-rate circuit-switched networks, computer networks, performance analysis, modelling of variable-bit-rate video.

Chi-Ying TSUI

*BS HKU;
MS, PhD Southern California
Email: eetsui@ee.ust.hk
Tel:(852) 2358 7071*



VLSI design and CAD algorithms for energy efficient high performance microprocessors, power analysis and optimisation for CMOS circuits, hardware/software co-design for low power embedded systems.

Li-Xin WANG

*BS, MS Northwestern Polytech U (Xian)
PhD Southern California
Email: eewang@ee.ust.hk
Tel: (852) 2358 7068*



Intelligent robotic systems and control, fuzzy logic and fuzzy control, neural computing and parallel processing.

Man WONG

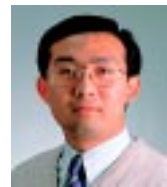
*BS, MS Massachusetts Inst of Tech;
PhD Stanford
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Tel: (852) 2358 7057*



Advanced device fabrication technology, thin film transistors and general device physics.

Mark S.F. YAU

*BSc Hong Kong;
MS Boston;
PhD Illinois (Urbana-Champaign)
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Digital signal processing, estimation and detection theory; information theory; stochastic process and control theory; application of the above to inverse problems including sensor-array processing and image processing.

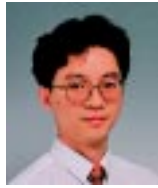
Bing ZENG

*BS, MS U of Electronic Sci and Tech of
China;*

PhD Tampere U of Tech (Finland)

Email: eezeng@ee.ust.hk

Tel: (852) 2358 7058



Digital signal and image processing, linear and nonlinear digital filter design, statistical and structural approaches to signal processing, neural networks, image/video coding and transmission.

RESEARCH AREAS

Microelectronics

Microelectronics is an increasingly important research area for Hong Kong. Microelectronics at the EEE Department emphasises the fabrication of real devices for applications, in addition to research in pushing the frontiers of microelectronic technology. The central facility is the Microelectronics Fabrication Centre (MFC) which is a complete facility presently capable of handling 4-inch wafers. Research in microelectronics and semiconductor devices concentrates on the following topics:

- advanced semiconductor materials preparation and characterisation
- microwave and high frequency semiconductor devices
- power semiconductor devices, ICs and integrated systems
- advanced integrated circuits fabrication technology
- integrated sensor and transducer technology

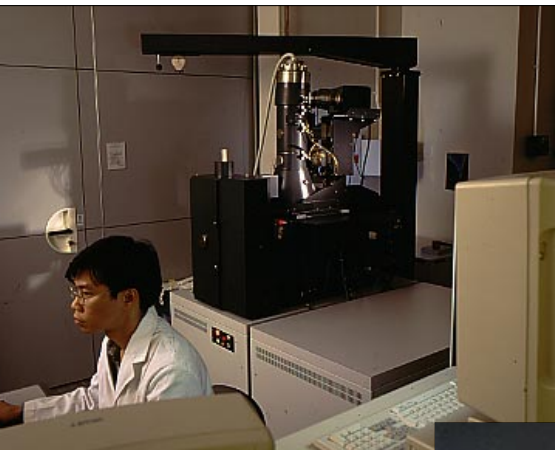
Results from this research programme should spawn novel electronic devices and stimulate the creation of products that are not restricted only to the electronics industry. For example, integrated sensor and transducer technology could have an impact in consumer electronics, medical electronics, automotive control, industrial control, and automated manufacturing.

Integrated Circuits Design, Microprocessors and Instrumentation

Research in this area covers basic digital and analogue IC design and applications. Particular emphasis has been placed on analogue IC design which is important for Hong Kong's future electronic technology and product development. Other research emphases include application of modern electronics and signal

processing, application specific integrated circuits (ASIC) for medical electronics, speech processing, and telecommunications. Another important area is the application of microprocessors in modern electronics and instrumentation. The emphasis here is on microprocessor- and microcontroller-based instrumentation design and development.

► EBML300 Electron beamwriter lithography system



► Experimental set-up for near infrared spectroscopy of biological tissue



Photonics

Photonics is the “wave” of the future. Opto-electronics is rapidly replacing and supplementing electronics in many applications, ranging from communications to signal processing. At the EEE Department, we place emphasis on photonic applications to optical signal processing (and computing), communications and advanced display technology. Some of the topics include:

- application of electronic microfabrication techniques to electro-optical device design and fabrication
- optoelectronic integrated circuits (OEIC) based on silicon technology
- optical signal processing and computing based on smart spatial light modulators
- new optical and electro-optical materials
- display technology

Signal, Image and Video Processing

Information technology, which involves both the processing and transfer of information, has significant importance in our daily life. The high standard of living conditions and the conveniences that we are enjoying are results from the recent advances in such technology.

The EEE Department at HKUST currently conducts major research projects in this key technological area. The research activities of this research group are concentrated in the following major areas:

- image coding and compressing
- image processing and enhancement
- video conversion, composition, and compression
- real-time video signal processing
- very low bit-rate video for various applications
- HDTV and super HDTV
- virtual reality
- medical imaging

Information Theory, Communications and Networks

Research in information theory involves the fundamental theories for both information processing and information transfer. Emphasised research areas include:

- information theory for space communications
- lossless and lossy data compression
- coding and error control mechanisms
- data encryption and system security
- multi-use information theory

Communications and networks deal with the mechanisms and systems for the transfer of information. Research in communications and networks includes both “wired” and “wireless” communications. For wired communications, research areas include:

- B-ISDN, ATM and other high speed networks
- spread spectrum systems
- optical communication systems

Wireless communications is becoming extremely important for Hong Kong and China. At HKUST, we have begun a major effort in wireless communications research in the following areas:

- channel propagation measurement and prediction
- cellular channel allocation, frequency reuse, and spread spectrum
- radio link techniques, technology and implementation
- system architecture, control and networking
- universal wireless personal communication network

Robotics, Control and CAD/CAM

Research in robotics covers the various fundamental issues in robot manipulation including design, analysis and control of multi-robot manipulation systems; robot sensing; gross/fine motion and task planning; intelligent control of robots; applications of robotic technologies to manufacturing and industrial automation.

Research in control covers theory and applications of robust control; computer control systems; optimal control; nonlinear control and applications of nonlinear control techniques to robotics and manufacturing; discrete event system theory and applications to computer communication systems; adaptive control; fuzzy logic systems and intelligent control.

Research in CAD/CAM covers various issues related to intelligent manufacturing systems including design and development of sensor-based advanced controllers for machine tools; computer-

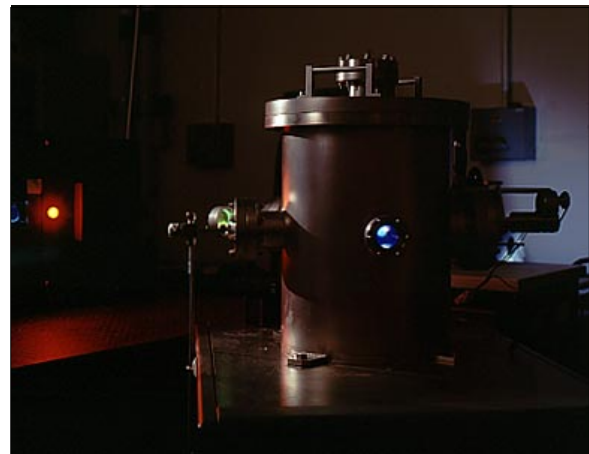
aided setups and on-line quality inspection systems; CAD/CAM integration; and man-machine interface.

Computer Engineering

Generally speaking, Computer Engineering focuses on two interacting aspects of computers, namely their application and their creation. Intellectually, it is a discipline which bridges the gap between Computer Science and Engineering of all kinds. But, in practice, while it can be viewed as conveying an applied part of Computer Science, it is driven by applications, and powered by the implementation technologies which Electrical Engineering nurtures and supports. Correspondingly, research in Computer Engineering emphasized at HKUST includes:

- Computer Architecture including hardware/software balance and tradeoff.
- System Evaluation and Integration, including hardware/software co-design and software engineering.
- Computer and Communication Networking, including parallel and distributed computing, distributed software and special-purpose processors.
- Computer-Aided-Design Tool Development, including design automation for VLSI-implemented systems and circuits.
- Signal processing such as for Image/Speech Compression/ Reconstruction Recognition/ Synthesis.
- Neural-Network Techniques and applications, such as in active sensing.
- Fuzzy Logic and its applications, such as in robotic control.
- Computer Vision Systems with application to instrumentation and control.
- Data-Domain Conversion, such as between analog and binary or multiple-valued digital signals.
- Man-Machine Systems, including user interfaces and multimedia presentation and instruction.
- VLSI Design, targetting mobile computing, multimedia, and high-speed network applications.

Note that for the majority of the research areas listed, the implication is of the computer as either a tool or a task. Thus, for some applications, a novel use of existing processors may be the objective; for others, the exploration of a new computer structure and its VLSI implementation may be the goal; and for yet others, a combination of both may be the key to the novelty which research implies.



▶ *Pulse laser deposition system*

LABORATORIES

Computer Network & System Integration Laboratory
Basic Electronics Core Laboratory
Senior Project Laboratory
Modular Teaching Laboratory
PC CAD Laboratory
Digital Electronics & Microprocessor Laboratory
Analog Electronics Laboratory
Device Characterisation and Test Laboratory
Sensor and Instrumentation Laboratory
VLSI Design and Test Laboratory
Electro-optics Laboratory
Optical Device Characterization Laboratory
Photonic Materials Laboratory
Photonic Materials Preparation Laboratory
Holography Laboratory
Broadband Network Laboratory
Digital Signal Processing and Communications Laboratory
Video Technology Laboratory
Wireless Communication Laboratory
Machine Intelligence Laboratory
Robot Manipulation Laboratory
Robotic Teaching Laboratory
Automatic Control Laboratory
Bio-Medical Research Laboratory
E-Beam Lithography Laboratory
Laser Direct Write Laboratory
Chemo-Mechanical Polishing & Cleaning Laboratory

DEPARTMENT OF INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT



▶ Professor Mitchell Tseng, Head

We completed our third year of operations with a number of remarkable milestones:

- ▶ We graduated our first class of students with bachelor degrees in engineering. Thirty-one students completed their studies in this department.
- ▶ We changed our name to Industrial Engineering and Engineering Management (IEEM). This change has been well received by students, their parents, and industry. It reflects our commitment to meeting the needs of today's industry, and training professionals who can manage technology-based businesses, manage engineering functions, manage technology, and implement new applications.
- ▶ Our faculty has been widely sought after for consultation and we have received a number of major industrial projects. Providing our students with opportunities to work on real-life projects that are relevant to the Hong Kong industry, these projects enhance the value of the knowledge our students are gaining.
- ▶ We have developed several new courses and initiated a number of short courses for industry. One of the most notable is a course jointly offered with Stanford University on global collaboration in supply chain management and product development. This innovative course has received very enthusiastic reception from both shores of the Pacific Ocean.
- ▶ Our laboratory is finishing up with several major donations and collaborations involving industry including a \$3 million grant from Digital Equipment Corporation, a \$2 million software package from SAP International and many others.

Industrial Engineering and Engineering Management in Hong Kong is in a very unique and challenging position at this moment. Looking toward the future, three distinctive dimensions expands the horizon in front of us.

1. The Geographical Dimension. Much has been said about the demise of Hong Kong manufacturing industry. From its peak of 880,000 workers, employment in the manufacturing industry has declined to today's 386,000. This sharp reduction of employment has led to the conflicting conclusion that the

manufacturing Industry is in its demise, despite the ingenuity, dynamism, and entrepreneurial skills of Hong Kong industrialists. In fact, the Hong Kong Manufacturing Industry is alive and growing, for if we move the political boundaries of Hong Kong 50 miles to the north, there are 3 million more manufacturing employees, most of them were there just a few years ago. A large part of this work force is managed through the headquarters of manufacturing enterprises in Hong Kong. There is also a growing production capability network on a global basis through Hong Kong based investment and strategic linkage. This network's impact on Hong Kong Industry can best be demonstrated through a continued growth of value added per person at a rate of 14%/year over the last decade. Thus, we believe that to train our Industrial Engineers for the future, we must transcend geographical boundaries and focus on the global supply chains on the whole.

2. The Service Dimension. The Hong Kong Service Industry has been growing at a record pace. Industrial Engineering knowledge and skill can certainly be applicable to these important industrial sectors. The design of our teaching and research programs have adapted to this changing trend. We have systematically explored and identified technical opportunities in the service industry sector, specifically through 2 years of planning, organization, and development. We have built partnerships in major service industry sectors, in particular, with the shipping and air cargo transportation industry. Through these collaborations, an infrastructure research grant was received and we are well positioned to enter into this vital sector of Hong Kong Industry.

Furthermore, the service content of the product business, which includes warranty services, support services, education services, consulting services, and many others, has been steadily increasing. For us to discuss integrated manufacturing enterprises, we should also pay attention to enhancing our understanding of service dimensions in the product business.

3. The Management Dimension. Industrial Engineering is well recognized as a multi-disciplinary field and should not be limited to the technical field. A good Industrial Engineer should have a solid technical base and also possess management knowledge and skills in order to complete system integration and management operations. With the change of our



▶ *Virtual simulation of rapid assembly system*

department name to Industrial Engineering and Engineering Management, we have begun offering courses and research projects in Business Process Engineering, Transportation Management, Global Supply Chain Management, and other key engineering management subjects. Our graduates, with their balanced training between technology and management, will be rewarded, not only in job opportunities, but also in having the career satisfaction of a comprehensive grasp of technological and management issues.

These three expanding dimensions open many opportunities and challenges and there is no better place than Hong Kong to further take advantage of new opportunities with these expanding horizons. Our faculty and students are very energized to move forward towards the new century with an admirable sense of mission.

FACULTY

Professor and Head of Department

Mitchell M. TSENG

*BSc National Tsing Hua;
MSc, PhD Purdue
Email: tseng@usthk.ust.hk
Tel: (852) 2358 7092*



Manufacturing systems design; business process engineering; service systems engineering; and virtual teaming.

Professor

Joe H. MIZE

*BSIE Texas Tech;
MSIE, PhD Purdue
(Associate Vice-President for Research and Development)
Email: jmize@usthk.ust.hk
Tel: (852) 2358 6164*



Systems integration, especially manufacturing enterprises; comprehensive modelling and simulation environments; analysis and design of management control systems; manufacturing systems design; integrated decision support systems.

Adjunct Professor

Hau LEE

*BS HKU;
MSc London Sch of Econ
MS, PhD Pennsylvania*



Global logistics and supply chain management; product/process design and supply chain performance; inventory planning and control; manufacturing strategies and operations management.

David YAO

*BS Fudan Shanghai;
MS Jiao Tung (Shanghai);
MAsc, PhD Toronto*



Applied probability; queuing networks; first and second order stochastic properties of stochastic systems; modelling of manufacturing and service systems; and the combinatorial structures of discrete event dynamic systems.

Visiting Professor

Inyong HAM

*BEng Seoul National;
MSc Nebraska;
PhD Wisconsin*



Group Technology applications for CIM implementation through effective data-base and efficient data retrieval system; development of new concepts of I-CIM (intelligent computer integrated manufacturing).

Katta G. Murty

*PhD, UC Berkeley
Email: murty@usthk.ust.hk*



Linear, integer, combinatorial, and nonlinear programming, and their application; optimization algorithms; computational complexity.

Reader

Kwok-Leung TSUI

*BSc, MPhil CUHK;
PhD, Wisconsin
Email: ktsui@usthk.ust.hk
Tel: (852) 2358 7110*



Robust design and Taguchi methods; design of experiments; design and modelling of CMM data; statistical process control; design and analysis of computer experiments.

Associate Professor/Senior Lecturer

Hong CHEN

*BS Xian Jiaotong;
MS, PhD Stanford*



Analysis, design and control of stochastic systems, such as manufacturing systems, communication networks, service processing networks, and economic systems.

Visiting Associate Professor/Senior Lecturer

Neville K.S. LEE

BS California (Los Angeles);

PhD MIT

Email: nlee@usthk.ust.hk

Tel: (852) 2358 7104



Low cost ultra-precision manufacturing technology; manufacturing system design; management of technological change in manufacturing; corporate strategies for managing research, development and engineering.

Assistant Professor/Lecturer

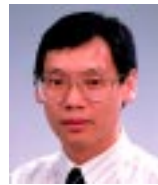
Raymond K.M. CHEUNG

BS, MA York (Toronto)

MA, PhD Princeton

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Stochastic programming models for dynamic management; optimization on routing and transportation scheduling; real time decision making in an uncertain environment; and logistics systems.

Vincent G. DUFFY

BS Poly U (Brooklyn);

MS, PhD Purdue

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Tel: (852) 2358 7116



Integration of people, organization and technology for manufacturing. Projects that contribute to the development of theory and applications for improving the performance associated with the use of advanced manufacturing technologies in the workplace.

Ravindra S. GOONETILLEKE

BSc Moratuwa (Sri Lanka);

MSAE Georgia Inst of Tech

MS, PhD State U of

New York (Buffalo)

Email: ravindra@usthk.ust.hk

Tel: (852) 2358 7109



Human performance modelling in computer systems; learning, training and computer-aiding; design of user-friendly computer systems; mental workload assessment; mental model development; product development.

Ajay JONEJA

BTech Indian Inst of Tech;

MSc, PhD Purdue

Email: joneja@usthk.ust.hk

Tel: (852) 2358 7119



Manufacturing process; computer-aided manufacturing; computer-aided design; computer-aided process planning; computational geometry and geometric reasoning.

Richard J. LINN

MSc Virginia Tech;

BTech, PhD Pennsylvania State

Email: linn@usthk.ust.hk

Tel: (852) 2358 7096



Electronic manufacturing; concurrent engineering; assembly process planning; CAD/CAM; system rationalization; material management.

Jiyin LIU

BEng, MSc Northeastern U of Tech;

PhD Nottingham

Email: jyliu@usthk.ust.hk

Tel: (852) 2358 7113



Scheduling; production planning and control; flexible manufacturing systems; heuristic methods.

Liming LIU

BEng, MEng Huazhong U of Sci & Tech

(Wuhan);

PhD Toronto

Email: liulim@usthk.ust.hk

Tel: (852) 2358 7099



Inventory models; queuing systems; production planning and control systems; reliability and quality; application of operations research in telecommunication network analysis; manufacturing and service systems.

Heloisa H.O.M. SHIH

*BSc, MSc Sao Paulo;
PhD Yokohama National
Email: iehhshih@usthk.ust.hk
Tel: (852) 2358 7117*



Production and project management systems; applications of artificial intelligence; fuzzy inference; OR and Petri net modelling to industrial engineering problems; human-computer interface design.

Richard H.Y. SO

*BS, PhD Southampton
Email: rhyso@usthk.ust.hk
Tel: (852) 2358 7105*



Visual perception and operator performance in static and vibrating environments; user interactions; information presentation and motion sickness with virtual reality systems; human performance modelling and applications to industrial designs.

Chuan-Jun SU

*BSc National Tsing Hua;
MSc Tarleton State;
PhD Texas A&M
Email: cjsu@usthk.ust.hk
Tel: (852) 2358 7881*



Geometric modelling; computer aided design and manufacturing; computer aided process planning; multimedia applications; virtual reality; and systems modelling.

Zhuang-Bo TANG

*BS Tsing Hua;
MS Manchester Inst of Sci & Tech;
PhD Connecticut
Email: zbtang@usthk.ust.hk
Tel: (852) 2358 7106*



Optimization theory and applications; statistical decision analysis; resource allocation under uncertainty; production planning and control; and network management.

Yat-Wah WAN

*BSc Hong Kong;
MSc TexasA&M;
PhD California (Berkeley)
Email: ieywan@usthk.ust.hk
Tel: (852) 2358 7097*



Applied stochastic process; queuing theory; simulation, and stochastic modelling; and scheduling

Benjamin P.C. YEN

*BS National Chiao Tung
MS, MPhil, PhD Columbia
Email: pcyen@usthk.ust.hk
Tel: (852) 2358 7107*



Manufacturing Information Systems; object-oriented modelling and design; interactive design support systems; scheduling theory and systems; machine learning and intelligent systems; system modelling and performance evaluation.

Visiting Assistant Professor/Lecturer**Lorinda CHENG HU**

*BA Rutgers;
MSc Maryland;
PhD Southern California*



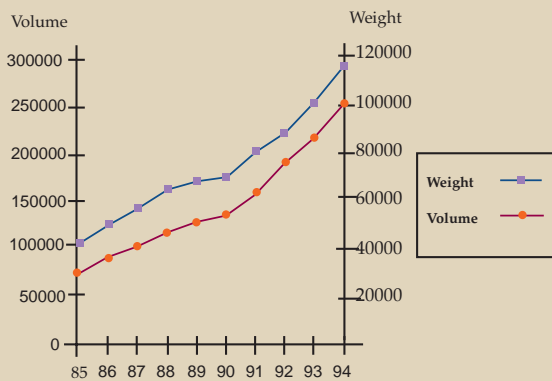
Systems modelling and analysis; optimization and control theory; computer communications network; mathematical modelling of ecological, agricultural and medical systems.

RESEARCH AREAS

Research and Collaboration with Shipping Industry in Hong Kong

Freight transportation has been, and is increasingly an important part of Hong Kong's economy. In 1995, companies in transportation and related areas account for 20% of Hong Kong's GDP providing 350,000 employment opportunities; to cope with the future growth, Hong Kong, the busiest terminal port in the world, needs a 7.6% annual increase in her container handling capacity for the next fifteen years.

Performance of Shipping



There is fierce competition from ports in this region, especially from ports in southern China. Space limitation, sea-side and land-side congestion in Hong Kong increase cost for future expansion. To secure their future, shipping companies and terminal operators in Hong Kong need to operate in an extremely efficient and effective fashion.

The main thrust of the project is to develop methodologies and systems that help industry make both strategic and operational decisions. With new techniques, the stochasticity and dynamism of logistic models will be considered. Two sub-projects (the scheduling of stevedoring tractors and the real-time algorithms for yard management) have been identified and work is being carried out on them.

Virtual Teaming and Global Management

With the increasing globalization of manufacturing and service industry, Hong Kong has been an important hub to support business across geographical boundaries. Virtual teaming

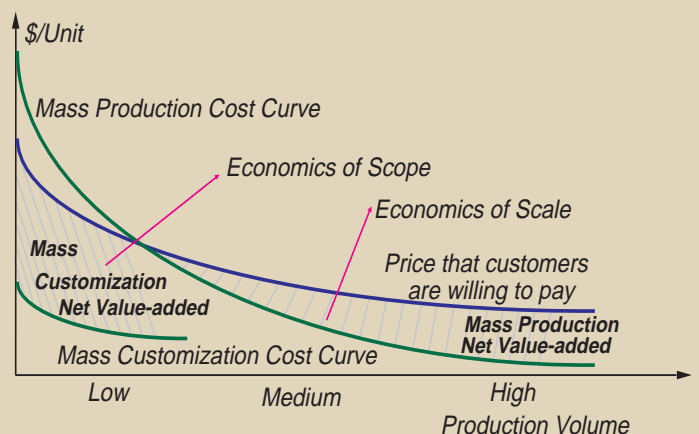
technology is an emerging field that provides the necessary infrastructure to support people to work as a team without sitting next to each other. In the Virtual Teaming Laboratory, facilities such as audioconferencing, videoconferencing, computer conferencing and e-mail have been integrated to enable team members working closely but virtually together.

In last semester, a new course was jointly offered by the Stanford University on global collaboration in supply chain management and product development. Students from both universities were teamed up and worked on projects provided by some global companies. They had to overcome geographical, cultural, and other barriers faced by any virtual teams in the world.

Design for Mass Customization

Mass customization aims to provide customer satisfaction with increasing variety and customization without a corresponding increase in cost and lead time. It emphasizes the economies of scope, rather than the old paradigm of mass production to mass produce standardized products through economies of scale [3]. Figure 1 illustrates the economics of mass customization. In high volume production, the volume is sufficient to defray the cost of investment in equipment, tooling, engineering and others. Mass

Economics of Mass Customization



production clearly shows an advantage. However, in low to medium volume production where production quantity can not justify the investment, customers are willing to pay more because their special needs are satisfied. This is the area where we believe mass customization has a tremendous advantage.

Ergonomic Product Design

Most consumer products are driven by market appeal, aesthetics and price. Very little ergonomics gets built-in even though advertised as ergonomically designed product. As a result, the limitations of these products are well perceived by users during actual usage. The primary reason being that they are not fitted to the person. The basis for this area of research is to use physical, physiological and cognitive abilities of humans to design and develop consumer products at the same time understanding the physical, physiological, and cognitive limitations of these same persons. Research is under way to better understand the capabilities, limitations and perceptions of humans so that they could be built into products such as chairs, tools, equipment, human-computer interfaces, personal protective equipment and the like resulting in safer, user-friendly, less error, injury and accident-prone, and comfortable product.

Footwear

Research related to footwear have been primarily based on usability studies. For example, footwear fit is of major concern to users and is one of trial and error. Traditionally, foot sizing is done by using a Brannock device for the measurement of length and width. However, from a mathematical viewpoint it is almost impossible to generate a foot form of 3-dimensions using a set of 2-dimensional measures of foot length and width. In addition, footwear manufacturers use at least four different shoe scales designated as US, UK, Europe and Metric. On the flip side, these same manufacturers depend on up to 30 different measures to build a shoe last. Hence the mapping is clearly inadequate. The research question is very fundamental: Is length and width the basis for all other measurements or is there a better measurement(s) to represent the human foot? The objective of the research is to find the basis vector or sizing system that best represents the human foot so that all 3-D measurements can be derived. Using state-of-the art 3-D equipment available in the Human Performance Laboratory, feet will be digitized, measured and analyzed to generate computer models that can be generalized.

Footwear cushioning is another area under investigation. Today, each individual may use a one shoe for one application, primarily since the perceived comfort varies in different scenarios. Research in to the perceived needs is another area under investigation using material properties and subjective evaluations. Overall the

► *Foot-shoe interface pressure measurement*



research related to footwear may be applied to actual product thereby resulting in more scientific and technologically driven product.

LABORATORIES

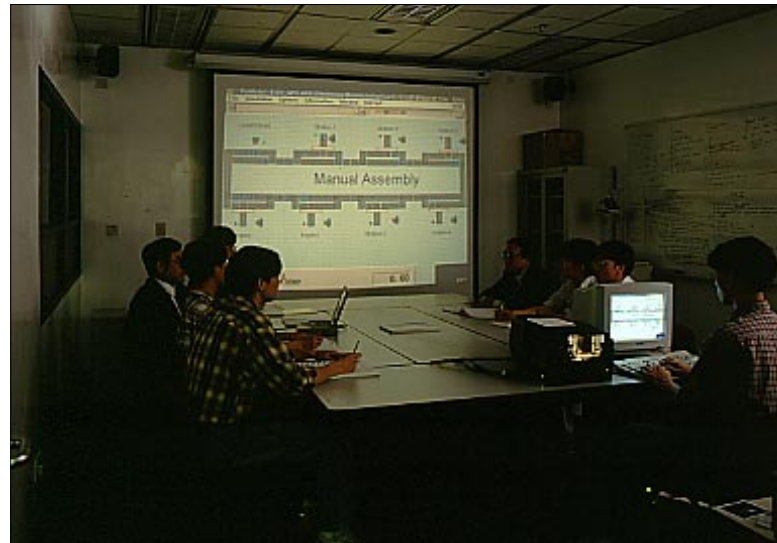
Quality Control Laboratory
Material Handling Laboratory
Flexible Manufacturing Laboratory
Manufacturing Process Laboratory
Human Factor Engineering Laboratory
Virtual Teaming / Concurrent Design Laboratory
Industrial Automation Laboratory
Information System Laboratory
System Design Laboratory

Human Performance Laboratory

The Human Performance Laboratory is designed to evaluate and specify the human cognitive, physiological, and biomechanical capacities for efficient, sustained and healthful performance in different environments. Force, motion, physiological indices, strength, endurance, and environmental stressors can be measured in the laboratory. An infra-red eye-tracking equipment and a head tracker are used to study the cognitive aspects of human-computer interactions. Modelling software is available to simulate motion-time study, work process, and kinematics work. For human-equipment interfaces design, three-dimensional sonic digitizing equipment and Martin Type anthropometers are used. Footwear related equipment, sound and vibration recording instruments are provided for occupational health and comfort study. An environmental chamber is available for controlled environmental research. In the future, an acoustic booth, audiometer system, 3-D motion analysis, high-speed video system, and a precision stadiometer will be added.

Manufacturing Systems Laboratory

The Manufacturing System Laboratory is consists of Rapid Response Assembly System, Material Handling System and Material Processing area. The integration of Material Handling Systems and the Rapid Response Assembly System make the Flexible Manufacturing System. Students can do modeling using the manufacturing modeling and control software before the actual experience of physical operation of flexible assembly



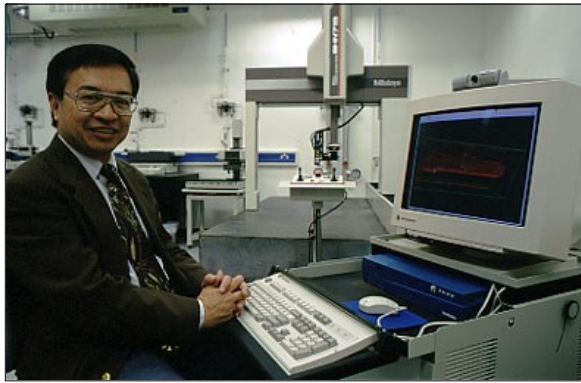
► Teams of students from HKUST and Stanford University are working together on Global Manufacturing Projects

systems. The Material Handling System is designed to expose students to the modern material handling devices and systems. Bar code monitoring system is also equipped. The Material Processing area allows the investigation of the operation and characteristics of traditional material processes.

Virtual Reality Applications Laboratory

Virtual Reality (VR) is an emerging technology to facilitate computer-generated simulation in a three dimensional environment. In the 3D environment, the user is able to view, manipulate, and interact with virtual objects. The Virtual Reality Applications Laboratory is equipped with ONYX and Indigo2 SGI workstations, Pentium PCs, Head Mount Displays, Cyber Gloves, 3D Camera, 3D Projector, and many other VR systems on which various virtual environment can be built. These virtual environments are currently utilized for conducting research and experiments in the area of manufacturing, industrial training, architecture walkthrough, and factory design.

DEPARTMENT OF MECHANICAL ENGINEERING



► Professor Ping Cheng, Head

Mechanical engineering is a broad-based discipline that applies technical skills to design and manufacture mechanical/thermal systems (or devices) as well as consumer goods for the purpose of improving the quality of life. The Department of Mechanical Engineering at HKUST was established in 1989. It now has 21 full-time faculty members, 261 undergraduate students, and 62 (FTE) post-graduate students. The Department offers four degree programmes leading to Bachelor of Engineering (BEng), Master of Science (MSc), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD).

The first batch of 45 BEng graduated from the department in June 1995. All of the graduates are gainfully employed and some of them had two to three job offers when they graduated last year. According to the 1995 statistics, 60% of our graduates are employed in building services and utilities companies, 25% in manufacturing, 10% in advanced studies and the remaining 5% in technical sales. The department has been given full accreditation by the Hong Kong Institution of Engineers (HKIE).

A major undergraduate curriculum revision was carried out during the academic year 1995/96. The new undergraduate curriculum will become effective in Fall 1996. The revised curriculum offers three streams of specialization which are reflected in the four technical electives chosen by the students beginning in the Spring semester of the second year. These three streams are:

1. Building Services, Energy and Environmental Engineering
2. Mechatronics, Design and Manufacturing
3. Materials, Structure and Reliability Engineering

The 2nd Industrial Advisory Committee meeting was held on campus on March 6, 1996. The Departmental Academic Advisory Committee consisting of Professors K. T. Yang (University of Notre Dame), Professor C. Andrew (University of Cambridge), and Professor J. G. Williams (Imperial University of London) visited the Department on March 11-14, 1996. In addition, the Department was the host of 31 distinguished visitors from abroad who gave seminars and workshops. In particular, Professor Chang-Lin Tien, Chancellor and A. Martin Berlin Professor at the University of California/Berkeley, gave a Distinguished Lecture on "Microscale Thermal Phenomena in Modern Technology", which was held on Friday, February 23, 1996.

During the academic year 1995/96, many ME faculty members received honors, awards, and professional recognition. Dr. Y. Zohar and Dr. Lilong Cai were the recipients of the Teaching Appreciation Award given by the School of Engineering for their excellent teaching performance in Fall 1995 and Spring 1996 respectively. Professor P Cheng has been elected as a member of editorial boards of two international journals: Numerical Heat Transfer and Experimental Heat Transfer. Dr. Q. P. Sun received two awards from China for his contributions to macro- and micro-constitutive theories of solid materials: a Natural Science Award (3rd class) and a Scientific and Technological Achievement Prize (1st class). Prof. T.X. Yu received a ScD (Doctor of Science) from University of Cambridge (UK) for his significant contributions in solid mechanics and impact dynamics; he has been appointed as a Guest Professor by the Institute of Mechanics (the Chinese Academy of Science in Beijing, China) and by the University of Science and Technology of China in Hefei, China. Dr. J. K. Kim received the best paper award for his paper entitled "Effect of silane coupling agents on impact performance of glass woven fabric laminates" at the International Symposium on Interfacial Materials Science of Composite Materials held in Fukuoka, Japan in May 1996; he has been elected as a member of the advisory board of Internal Journal Polymers and Polymer Composites.

In the past academic year, eleven ME faculty members received RGC grants (totaling HK\$4.8 million) and three faculty members received RIG grants (totaling HK\$1.3 million). In addition, Dr. Matthew Yuen was awarded an ITDC grant (HK\$4.1 million) on "3D Garment Design for Hong Kong Apparel Industry". Another ITDC project of HK\$ 1 million dollars on "Roadmap for Electronics Packaging and Assembly (EPA) in Hong Kong" has been awarded to Prof P Tong, Drs. Matthew Yuen, J. K. Kim, R. S. W. Lee, and Dr. P. C. H. Chan (EEE). This project (jointly with HKPC and HKEIA) is aimed specially to investigate and establish a roadmap for EPA in the next 10 years. It will provide a framework for guiding the R & D sector to meet the increasingly complex technology needs of the local semiconductor industry. ME faculty and students are also heavily involved in the design and installation of the Operational Wind-Shear Warning System at the new airport. The project is progressing smoothly and passed critical examination by an international expert panel. With the warning system in place, the airport can still be operational even if the typhoon warning signal #8 is hoisted.

The research work of the ME faculty has resulted in a number of patents. Drs. Yang Leng and Tong-Yi Zhang together with their Ph.D. student, F. Kang, have filed two patents on "Method for Manufacturing Flexible Graphite" and on "Foric Acid-Graphite Intercalation Compound and Method of Producing the Same". Both of these inventions are related to the methods of synthesizing new flexible graphite (a promising materials for less corrosive sealing materials at elevated temperatures) which has wide applications in nuclear power plants and other industries.

The ME faculty continues to provide professional service to the local community. Prof P. Tong and Dr. Yang Leng were retained as consultants to investigate the cause of an MTR accident (due to failure of a powerline insulator) occurred on September 22, 1995 which caused the suspension of service for four hours and affected 100,000 Hong Kong residents during the rush-hours; they found that the accident was caused by the combined effect of thermal degradation and stress concentrations in the insulator. Dr. Y. Leng and Professor T. X. Yu helped an electronic packaging company to analyze repeated mechanical failures of their products. Upon the request of a solicitor agent, Professor Yu also provided a mechanics analysis to a structure accident of a tower crane. The high-speed ground transportation railway to the new airport is currently under construction. Prof. J. Chen and Dr. Kot serve as consultants on the design of a high-wind warning system so that high-speed ground transportation to the new airport can be operational during the typhoon period.

FACULTY

Professor and Head of Department

Ping CHENG

BS Oklahoma State;

MS MIT;

PhD Stanford

Email: mepcheng@usthk.ust.hk

Tel: (852) 2358 7182



Convective, boiling and condensation heat transfer in porous media; oscillatory flow and heat transfer, computational heat transfer.

Professor

Jay-Chung CHEN

BS Cheng Kung;

MS, PhD California Inst of Tech

(Director of Research Centre)

Email: rcjchen@usthk.ust.hk

Tel: (852) 2358 6901



Structural dynamics, including development of analytical and experimental methods, test/analysis correlation criteria, dynamic test of complex structural systems, structural system identification, damage assessment structure-control interaction, and aviation technology.

Pin TONG

BS National Taiwan; MS PhD California

Inst of Tech

Email: pintong@usthk.ust.hk

Tel: (852) 2358 7202



Solid mechanics; fracture, finite element methods; structural integrity; micromechanics; computational mechanics; electronic packaging; bioengineering and composite materials.

Reader

Tongxi YU

BSc Peking;

PhD ScD Cambridge

Email: metxyu@usthk.ust.hk

Tel: (852) 2358 8652



Impact mechanics; dynamic plasticity; structural crash-worthiness and failure; energy absorbing devices; mechanics of metal forming.

Associate Professor / Senior Lecturer

Chin-Tsau HSU

BS, MS National Taiwan;

MS, PhD Stanford

Email: mechtsu@usthk.ust.hk

Tel: (852) 2358 7188



Heat and mass transfer in multiphase flows; microelectronic cooling; air-sea interaction; remote sensing; flow-structure interaction and control.

See-Chun KOT

BS Illinois (Urbana-Champaign);

MEng, PhD Cornell

Email: mesckot@usthk.ust.hk

Tel: (852) 2358 7187



Computational and environmental fluid mechanics, field studies; physical and computer modelling of atmospheric dispersion in urban areas; airport wind shear.

Matthew M.F. YUEN

BSc(Eng) Hong Kong; PhD Bristol

Email: meymf@usthk.ust.hk

Tel: (852) 2358 7189



Design theory, computer-aided design and manufacturing, intelligent CAD/CAM systems, numerical control of machine tools, novel manufacturing processes, vibration control, electronic packaging.

Tong-Yi ZHANG

MS, PhD U of Sci & Tech (Beijing)

Email: mezhangt@usthk.ust.hk

Tel: (852) 2358 7192



Materials science and engineering; relationships of microstructure and properties in materials and defects in crystals.

Assistant Professor/Lecturer

Lilong CAI

BS Tianjin;

PhD Toronto

Email: melcai@usthk.ust.hk

Tel: (852) 2358 7209



Robotics; nonlinear system control; automation of manufacturing processes; instrumentation.

Yong-Sheng GAO

BSc, MSc Huazhong U of Sci & Tech

PhD Birmingham

Email: meygao@usthk.ust.hk

Tel: (852) 2358 8649



Manufacturing process modelling and control; grinding technology; high speed machine systems; precision measurement technology; rapid part manufacturing.

Jang-Kyo KIM

BSc Seoul National;

MS Monash;

PhD Sydney

Email: mejkkim@usthk.ust.hk

Tel: (852) 2358 7207



Interface science and engineering; composite mechanics; composite manufacturing and processing; damage and fracture in advanced engineering materials; structure-properties relationships; microelectronics packaging; failure analysis.

David Chuen-Chun LAM

BSc California (Berkeley);

PhD California (Santa Barbara)

Email: medclam@usthk.ust.hk

Tel: (852) 2358 7208



Rapid prototyping and manufacturing, powder processing; microarchitecture design; composite and materials; mechanics of processing, electronic materials.

Steve Hon-Keung LEE

BE Cooper Union;

MS PhD Rutgers

Email: shklee@usthk.ust.hk

Tel: (852) 2358 7186



Experimental and computational method; heat transfer in electronic packages; studies of transport during materials processing.

Ricky Shi-Wei LEE

BS National Taiwan;

MS Virginia Polytech & State U;

PhD Purdue

Email: rickylee@usthk.ust.hk

Tel: (852) 2358 7203



Electronic packaging; smart materials for sensors and actuators, composites engineering, experimental solid mechanics.

Yang LENG

BS Chongqing;

MS Michigan Tech; PhD Virginia

Email: meleng@usthk.ust.hk

Tel: (852) 2358 7185



Mechanical behaviour/microstructure relationships; metal matrix and polymer composites; biomaterials; fracture and fatigue at elevated temperature; novel processing of new materials.

Weiping LI

BS Beijing U of Aeronautics &

Aeronautics;

MS PhD MIT

Email: mewli@usthk.ust.hk

Tel: (852) 2358 7210



Mechatronics (manufacturing system control), manufacturing system automation, nonlinear system control, CAD/CAM/CNC systems.

Huihe QIU

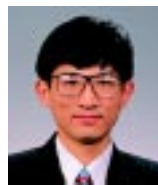
*BEng, MEng Tianjin;
PhD Erlangen-Nuermberg
Email: meqiu@usthk.ust.hk
Tel: (852) 2358 7190*



Fuel combustion; spray evaporation; bubbly flow; laser material processing and manufacturing; flow instrumentation and optical flow sensors; laser/diagnostic; image processing; particle material property recognition.

Qing-Ping SUN

*BS, MS Wuhan;
PhD Tsinghua
Email: meqpsun@usthk.ust.hk
Tel: (852) 2358 8655*



Mechanics of phase transformations in solids; material toughening; and micromechanics constitutive theory.

Wai-Ming TO

*BSc Glasgow;
PhD London
Email: mewmto@usthk.ust.hk
Tel: (852) 2358 7196*



Experimental model analysis; sensitivity analysis of mechanical structures; model updating; vibro-acoustic study; architectural acoustics; noise control.

Jing-Shen WU

*BS U of Sci & Tech of China;
PhD Sydney
Email: mejswu@usthk.ust.hk
Tel: (852) 2358 7200*



Processing-morphology-property relationship of polymer materials; deformation and fracture of polymers and their composites; advanced plastics recycling technology.

Tian-Shou ZHAO

*BS, MS Tianjin;
PhD Hawaii
Email: metzhao@usthk.ust.hk
Tel: (852) 2358 8647*



Oscillatory fluid flow and heat transfer; multiphase and multicomponent flow in capillary media; electronic cooling; advanced air conditioning and refrigeration systems; heat pipes.

Yitshak ZOHAR

*BS, MS Technion-Israel Inst of Tech;
PhD Southern California
Email: mezohar@usthk.ust.hk
Tel: (852) 2358 7194*



Micro-electro mechanical systems; microsensors and microactuators; turbulent shear flows; boundary layers; unsteady aerodynamics; flow control.

RESEARCH AREAS

The Department focuses its research in four areas which are relevant to the economic development of Hong Kong, suitable for the university environment, and likely to yield important advances. These areas are described below.

Solid Mechanics and Dynamics

Research in this area entails the application of mathematics, theoretical mechanics, and computational skills to the design and analysis of mechanical components and systems. Research activities include technical assessments, computer modeling and testing the linear and non-linear behaviour of structures and continua, the mechanical behaviour of both conventional and new engineering materials, computational mechanics for analyzing solids and structures, and the study and control of failure of mechanical components and systems.

Materials Characterization and Processing

Materials engineering focuses on characterising new materials, developing processes for controlling their properties and their economical production, generating engineering data necessary for design, and predicting the performance of products. Potential research topics include: interface properties of composites; fracture and fatigue; residual life assessment; thermo-mismatch



► Overview of Automation Lab

of electronic board and chip-carrier modules; hydrodynamics and instability in processing systems; metal forming; plastics flow in injection molding; advanced powder processing; desktop manufacturing; and instrumentation and measurement techniques.

Thermal and Energy Engineering

Research in thermal and energy engineering includes the improved design of heat pipes and cryocoolers for electronic cooling, innovative designs of heat pumps and dehumidifiers for indoor environmental control, the development of new thermally assisted methods for materials processing, waste heat management and effective use of energy in support of local manufacturing industries.

Environmental and Fluid Engineering

Research activities in this area include technical assessments of environmental pollution, computer modeling of air pollution, studies of thermal discharges into ocean, and development of new technologies to improve waste-treatment methods for the reduction of the discharge of pollutants, and to halt the degradation of and/or to rejuvenate already polluted surroundings. Field work is undertaken to collect critical data needed to evaluate systems, concepts and models.



► Oscillating heat transfer system

Design and Manufacturing

Mechanical design and manufacturing are at the heart of mechanical engineering in which engineers conceive, design, build and test innovative solutions to “real world” problems. Key areas such as electronic packaging and polymer processing are some of the multi-disciplinary programs initiated in this group. Research work is being conducted in the areas of geometric modeling, intelligent design and manufacturing systems, manufacturing process modeling and optimization, in-process monitoring of manufacturing processes, rapid part manufacturing.

Mechatronics and Control

Research topics in this area include servosystem control, robotics, mechatronics, prime-mover system control, sensor technology and measurement techniques, control systems for manufacturing integration, in-process monitoring of manufacturing processes, inspection systems, and multi-media interfacing for automated mechanical systems.

Microsystems

Micro Electro Mechanical Systems (MEMS) is an emerging multi-disciplinary research field which promises to have a major impact on our daily life. Fundamental and applied research work is being conducted in this area. Basic micromechanics such as fluid and solid mechanics, heat transfer and materials problems unique to micromechanical systems are studied. New ideas to produce microsensors and micro actuators are explored. Technology issues related to the micro fabrication of these devices are being addressed.

LABORATORIES

Micromachine Laboratory
Laser Diagnostic Laboratory
Photo Processing Laboratory
Solid/Structural Dynamic Laboratory
Environment/Fluid Engineering Laboratory
Undergraduate Laboratory
Department Terminal Room
Automation/Manufacturing Laboratory
Control & Robotics Laboratory
Materials Preparation Laboratory
Design Project Laboratory
CAD Research Laboratory
Energy Technology Laboratory (under construction)

APPENDIX 1 – ADVISORY COMMITTEES



► Engineering Advisory Committee members visiting the Engineering Laboratory

SCHOOL OF ENGINEERING

Sir Eric A. Ash, CBE, FEng FRS

*University College London
UK*

Dr. George Bugliarello

*Chancellor
Polytechnic University
Brooklyn
USA*

Professor David A. Hodges

*Roy W. Carlson Professor of Engineering
University of California
Berkeley
USA*

Professor John Hopcroft

*Joseph Silbert Dean of Engineering
Cornell University
USA*

Professor Hau L. Lee

*Thomas Ford Professor and Deputy Chairman
Department of Industrial Engineering and
Engineering Management
Stanford University
USA*

Professor Axel Meisen

*Dean of Applied Science and Professor of
Chemical Engineering
The University of British Columbia
Canada*

Professor J.D. Plummer

*Professor & Associate Dean
Department of Electrical and Electronics
Stanford University
USA*

Dr. John A. White, Jr.

*Dean
College of Engineering
Georgia Institute of Technology
Atlanta
USA*

Professor Kwang-tzu Yang

*Viola D. Hank Professor of Engineering
Dept. of Aerospace & Mechanical Engineering
University of Notre Dame
Indiana
USA*

The School of Engineering held its Advisory Committee on October 24-26, 1996.

DEPARTMENT OF CHEMICAL ENGINEERING

Professor. John Garside

*Head, Department of Chemical Engineering
University of Manchester Institute of Science
& Technology, and President, Institution of
Chemical Engineers
UK*

Professor Edmond I. Ko

*Professor of Chemical Engineering
Carnegie Mellon University
USA*

Mr. Angus Wing-Keung Leung

*Luboil Plant Manager
Shell Hong Kong Limited
Hong Kong*

Dr. Michael Lung

*President, Greater China
Dow Chemical Pacific Limited
Hong Kong*

Mr. Malcolm Mathews

*Managing Director
Hong Kong and China Gas Company Limited
Hong Kong*

Professor Axel Meisen

*Dean of Applied Science and Professor of
Chemical Engineering
The University of British Columbia
Canada*

The Department of Chemical Engineering held its Advisory Committees on 3-4 May 1995 and 5-6 June 1996.

DEPARTMENT OF CIVIL AND STRUCTURAL ENGINEERING

Mr. R. James Blake

*Former Secretary for Works
Works Branch
Government Secretariat
Hong Kong*

Professor H.C. Chan

*Head, Department of Civil and Structural Engineering
University of Hong Kong
Hong Kong*

Dr. Raymond C.T. Ho, MBE, JP

*Chairman
Capital China Group
Hong Kong*

Mr. M.S. Hu, JP

*Director of Water Supplies
Water Supplies Department
Government Secretariat
Hong Kong*

Dr. Robert M. Kennard

*Managing Partner
Harris and Sutherland (Far East) Consulting Engineers
Hong Kong*

Dr. J.S. Kuang

*Lecturer, Department of Civil and Structural Engineering
The Hong Kong University of Science and Technology
Hong Kong*

Mr. H.S. Kwong, JP

*Secretary for Works
Works Branch
Government Secretariat
Hong Kong*

Mr. Geoffrey W. Lovegrove

*Director
Mott Connell Limited
Hong Kong*

Mr. Michael D. Sargent

*Chairman
Ove Arup & Partners (Hong Kong) Limited
Hong Kong*

Professor C.K. Shen

*Professor, Department of Civil and Structural Engineering
The Hong Kong University of Science and Technology
Hong Kong*

Mr. Chuen Siu, OBE

*Former Director of Drainage Services
Drainage Services Department
Hong Kong Government
Hong Kong*

The Department of Civil and Structural Engineering held its Advisory Board Meeting on March 5, 1996.

DEPARTMENT OF COMPUTER SCIENCE**Dr. Herbert Chang**

*Executive Vice President
Business Development and Strategy
AT&T China, Inc.
Beijing, PRC*

Professor Yuling Feng

*Director
Institute of Software
Chinese Academy of Sciences
Beijing, PRC*

Professor John Guttag

*Associate Head
Department of Electrical Engineering and Computer Science
Massachusetts Institute of Technology
USA*

Professor John Hopcroft

*Joseph Silbert Dean of Engineering
Cornell University
USA*

Professor Edward Lazowska

*Chair, Department of Computer Science and Engineering
University of Washington
USA*

Professor Robert Wilensky

*Chairman, Computer Science Division
University of California, Berkeley
USA*

Professor Stu Zweben

*Chairman
Department of Computer and Information Science
Ohio State University
USA*

The Department of Computer Science held its Advisory Committee Meeting on June 15-16, 1995.

DEPARTMENT OF ELECTRICAL & ELECTRONIC ENGINEERING**Professor Po-Sheun Chung**

*Dean, Faculty of Science and Technology
City University of Hong Kong
Hong Kong*

Professor Stephen Director

*Dean of Engineering
Carnegie-Mellon University
U.S.A.*

Professor Ernest Kuh

*Professor Emeritus
Department of Electrical Engineering and Computer Science
University of California, Berkeley
U.S.A.*

Professor Rafael Reif

*Professor and Director
Microsystems Technology Laboratory
Massachusetts Institute of Technology
U.S.A.*

Professor Omar Wing

*Dean of Engineering
Chinese University of Hong Kong
Hong Kong*

Professor Safwat Zaky

*Chairman, Department of Electrical and Computer Engineering
University of Toronto
Canada*

The Department of Electrical and Electronic Engineering held its Advisory Committee Meeting on May 30-31, 1995.

DEPARTMENT OF INDUSTRIAL ENGINEERING AND ENGINEERING MANAGEMENT

Academic Advisory Board:

Professor Tien Chien Chang

Professor, Industrial Engineering
Purdue University
USA

Professor Martin G. Helander

Professor, Industrial Ergonomics
Linköping Institute of Technology
Sweden

Professor Way Kuo

Chairman, Industrial Engineering Department
Texas A&M University
USA

Professor Hau L. Lee

Thomas Ford Professor and Deputy Chairman
Department of Industrial Engineering and
Engineering Management
Stanford University
USA

Professor Stephen Lu

David Packard Chair Professor, Manufacturing
Engineering
University of Southern California
USA

Professor Tony Woo

John M. Fluke Distinguished Chair,
Manufacturing Engineering
Department of Industrial Engineering
University of Washington
USA

Industrial Advisory Board:

Dr. Lily Chiang

Executive Director
Chen Hsong Holdings Limited
Hong Kong

Dr. Ken Chih

General Manager
Information Systems Department
Orient Overseas Container Line Limited
Hong Kong

Mr. Brian Li

Managing Director
Car Audio Group
GP Electronics Limited
Hong Kong

Dr. James Liu

Chief Executive Officer
Hong Kong Industrial Technology Centre
Corporation
Hong Kong

Mr. W.K. Lo

Managing Director
Computer Products Asia-Pacific Limited
Hong Kong

Mr. Peter Lui

General Manager - Planning
Hong Kong Air Cargo Terminals Limited
Hong Kong

The Department of Industrial Engineering and Engineering Management held its Advisory Committee Meeting on June 5-6, 1995 and July 1-3, 1996.

DEPARTMENT OF MECHANICAL ENGINEERING

Academic Advisory Board:

Professor Colin Andrew
Dept of Engineering, Manufacturing
Engineering
University of Cambridge
United Kingdom

Professor J. G. Williams

Department of Mechanical Engineering
Imperial College of Science & Technology
England

Professor Kwang-tzu Yang

Viola D. Hank Professor of Engineering
Dept. of Aerospace & Mechanical Engineering
University of Notre Dame
Indiana
USA

Industrial Advisory Board:

Mr. Alastair J. Budge-Reid

Project Engineering Manager
Mass Transit Railway Corporation
Hong Kong

Mr. Lo-Kwan Chan

Director
Intra-Tech (HK) Limited
Hong Kong

Dr. Lily Chiang

Executive Director
Chen Hsong Holdings Limited
Hong Kong

Mr. James Kwan

General Manager - Engineering
Hong Kong and China Gas Company Limited
Hong Kong

Mr. Edmund Leung

Chairman - Management Executive
ACER Consultants Far East Limited
Hong Kong

Mr. Raymond Leung

Principal Environmental Protection Officer
Environmental Protection Department
Government Secretariat
Hong Kong

Mr. Raymond Leung

Executive Vice President
SAE Magnetic (HK) Limited
Hong Kong

Mr. Ping-Wa Tang

Chief Power Plant Service Engineer
Hong Kong Electric Company Limited
Hong Kong

The Department of Mechanical Engineering held its Industrial Advisory Committee Meeting on March 6, 1996 and its Academic Advisory Committee Meeting on March 11-14, 1996.

APPENDIX 2 – RESEARCH GRANTS

CENTRAL ALLOCATION VOTE (RESEARCH GRANTS COUNCIL)

Computing resources for research on high-performance video compression

LIU, Ming, Electrical & Electronic Engineering
AHMAD, Ishfaq, Computer Science

DIRECT ALLOCATION GRANT (UNIVERSITY GRANTS COUNCIL)

Chemical Engineering

Removal of colour from effluents using column adsorption

MCKAY, Gordon

An optimization model for the retrofit of heat exchanger networks

YEE, Terrence F.

Civil & Structural Engineering

Numerical analysis of slope stability under various ground water conditions

NG, Charles W.W.

Development of a new high rate hybrid bioreactor for wastewater treatment

CHEN, Guang Hao

Chinese water resources from Hong Kong perspective

YEN, Ben; SHEN, C.K.

Bayesian evaluation of liquefaction resistance

TANG, Wilson

Constitutive modelling of saturated interfaces with application to boundary value problems

RIGBY, Douglas

Computer Science

Depth of random directed acyclic graphs

ARYA, Sunil

A scalable, high-performance memory-promoted database system

NGAI, Tin-Fook; SHUM, Chung-Dak

Design and analysis of contention sensitive synchronization protocols for parallel and distributed systems

CHOY, Man-Hoi

Knowledge discovery in database

WUTHRICH, Beat

Generating functions approach in analysis of cell loss control

MISIC, Jelena

Data communications over ATM networks

LI, Bo

Electrical & Electronic Engineering

Spread by coding in FH-CDMA channels

CHENG, Shu-Kwan Roger

Lateral isolation methodologies in SOI CMOS technology

CHAN, Mansun J.

Cost-based admission and routing for broadband integrated service networks

LEA, Chin-Tau

Research and development of dimmable electronic ballast

KI, Wing-Hung

Low power algorithmic and architectural design for the video signal processor of a portable video-phone system

TSUI, Chi-Ying

Monolithic BiCMOS RF power amplifier

MOK, Philip K.T.

Industrial Engineering & Engineering Management

Ability to localize a secondary sound source while listening to a bone conducting device: a comparison with the use of ear phone

SO, Richard

Development of real time optical measurement device for manufacturing precision improvement

LEE, Neville

Integrated production scheduling and shop floor control

LIU, Ji-Yin

An interactive scheduling system

YEN, Benjamin

Development of model for the successful integration of organization and people for successful JIT production in Hong Kong

DUFFY, Vincent G.

Mechanical Engineering

Investigations and development of a miniature capillary pumped loop

ZHAO, Tian-Shou

Prediction and measurement of impact forces

YU, Tong-Xi

Computer control of crane-type mechanical systems

LI, Wei-Ping

A new non-intrusive method for measurements of particle properties in multiphase flows

QIU, Hui-He

Processing and characterization of Poly(ethylene)/polycarbonate/impact modifier (PET/PC/IM) blends

WU, Jing-sheng

A study of high speed workpiece actuators for surface grinding control
GAO, Yong-Sheng

COMPETITIVE EARMARKED RESEARCH GRANT (RESEARCH GRANTS COUNCIL)

Chemical Engineering

Biodegradation of dyestuffs by white-rot fungi and fungal
YU, Jian

Blending of immiscible polymers
CHAN, Chi-Ming

Preparation of porous polymeric tubular membranes by extrusion/extraction method for microfiltration
MI, Yongli; CHAN, Chi-Ming; SHEU, Fwu-Shan; CHAN, Chi-Ming; YUE, Po-Lock

Source apportionment by chemical analysis of size-segregated aerosols in Hong Kong
CHAN, Chak-Keung; CHAN, Chi-Ming; PORTER, John

Warpage analysis of integrated circuit packages
CHAN, Chi-Ming

Civil & Structural Engineering

Development of dynamic optimal traffic control models for congested road networks
YANG, Hai

A new damage detection methodology for civil structures using vibration monitoring
KATAFYGIOTIS, Lambros S.; KUANG, Jun-Shang

Property enhancement of short fibre reinforced cementitious composites
LI, Zong-jin; CHANG, Paul T.Y

New composite liners for soil contamination prevention
LO, Irene M.C.

A study of bubble dynamics to optimize gas transfer in two-phase flows
HUANG, Howard J.C.

Damage detection for long suspension bridge under aerodynamic loads
KATAFYGIOTIS, Lambros S.

Nonlinear dynamics response of runway pavements
CHANG, Paul T.Y.

Computer Science

Indexing and query processing for distributed object management
LOCHOVSKY, Frederick H.; LEE, Dik L.

Intersection searching for polygons and curved objects
CHENG, Siu-Wing

Lopsided trees: analyses, algorithms and applications
GOLIN, Mordecai

Multidimensional visual coding in the brain: computations, development, and applications
LI, Zhao-Ping

Speeding up probabilistic reasoning through the unification of bayesian networks and rule-based systems
ZHANG, Nevin Lian-Wen

Statistical acquisition of structural and lexical resources for Chinese-English machine translation
WU, De-Kai

A bayesian approach to image segmentation and the integration of vision modules
PONG, Ting-Chuen

An automated behaviour analysis technique for distributed finite-state systems
CHEUNG, Shing-Chi

Automated testing and verification of distributed object-oriented software systems
CHANSON, Samuel; CHEUNG, Shing-Chi

Dynamic resource management on Intel paragon and on Cray T3D
HAMIDZADEH, Basak

Dynamical neural networks: from wetware to hardware
STIBER, Michael D.

Files structures and search techniques for document ranking
LEE, Dik L.

Analog VLSI cellular neural networks
STIBER, Michael D.

Electrical & Electronic Engineering

Dynamical neural networks: from wetware to hardware
SHI, Bertram

Analog VLSI cellular neural networks
SHI, Bertram

Development of sinogram restoration techniques for resolution improvement and limited angle-hallow projection problems in computer-aided tomography
YAU, Mark S.F.

Device and circuit isolation in bulk and SOI CMOS technology
SIN, Johnny K.O.; LUONG, Howard C.; NGUYEN, Cuong T.

Fractal video compression for very-low-bit-rate applications
LIU, Ming; AU, Oscar C.L.

Highly sensitive and low power magnetometer based on lateral carrier domain effect

LAU, Jack; CHAN, Philip C.H.; KO, Ping K.; NGUYEN, Cuong T.

Integrated gas sensor technology

CHAN, Philip C.H.; CHEUNG, Peter W.; SIN, Johnny K.O.

Intelligent control using fuzzy systems, with application to integrated planning and control of mobile robots

WANG, Li-Xin

Intelligent manufacturing: efficient algorithms for workpiece localization and dimensional inspection

LI, Ze-Xiang

Low-power analog and digital integrated circuits using SOI technology

LUONG, Howard C.; KO, Ping K.; LAU, Jack; NGUYEN, Cuong T.

Optical-coherence microscopy for probing highly scattering materials

SCHMITT, Joseph M.; MURCH, Ross D.

Performance evaluation and analysis of code division multiple access communications over optical fibre local area networks

LETAIEF, K. Ben

Performance study of ATM switches and its optimization with discrete event system theory

CAO, Xi-Ren

Porous silicon opto-electronic devices

POON, Vincent M.C.; KO, Ping K.; SIN, Johnny K.O.; WONG, Man

Robust control of discrete time systems with 1 gap uncertainties

QIU, Li

Sigma-delta Modulation with non-linear digital correction postprocessing

NGUYEN, Truong-Thao

Silicon smart spatial light modulators integrated with micro-optical elements

HUANG, Ho-Chi; KARIM, Zaheed S.

Temporal interpolation for video as a postprocessing technique

AU, Oscar C.L.

Towards building universal vector quantization codebooks for image compression

ZENG, Bing

Gaseous flow in microchannels

WONG, Man

Industrial Engineering & Engineering Management

Development of robust design methods for circuit design optimization

TSUI, Kwok-Leung

Fuzzy inference and beam search based production management

SHIH, Heloisa H.O.; LIU, Ji-Yin

Investigation of an optimum seat surface for long-term use

GOONETILLEKE, Ravindra S.

OSCAP: A PDES-based open architecture process planning system

JONEJA, Ajay; SU, Chuan-Jun

Theoretical development of the adaptive partitioned random search for global optimization

TANG, Zhuang Bo

To approximate the mean and the distribution of the makespan of a stochastic project

WAN, Yat-Wah

Mechanical Engineering

Wind-induced vibration control of long-span bridges using multiple active tuned mass dampers

CHANG, Chih-Chen; TO, Wai-Ming

Gaseous flow in microchannels

ZOHAR, Yitshak

A study of bubble dynamics to optimize gas transfer in two-phase flows

HSU, Chin-Tsau; QIU, Hui-He

Optimization of the performance of a regenerator in an orifice pulsed-tube refrigerator/cryocooler

CHENG, Ping; HSU, Chin-Tsau

Warping analysis of integrated circuit packages

YUEN, M.F. Matthew

Residual stresses and fracture of thin films

ZHANG, Tong-Yi; MAI, Yiu-Wing

Process control and interface optimisation of high performance thermoplastic composites

KIM, J.K.; MAI, Yiu-Wing

Nonlinear dynamics response of runway pavements

TONG, Pin

Micromechanics constitutive study on the temperature dependence of material instability during stress-induced transformation in ceramics

SUN, Qing-Ping

Fundamental studies on the interface fracture phenomena in advanced fibre composites

MAI, Yiu-Wing; KIM, J.K.

Damage detection for long suspension bridge under aerodynamic loads
CHEN, Jay-Chung

A new approach to improve performance of servo systems via active inertia control
CAI, Li-long

Blending of immiscible polymers
MAI, Yiu-Wing

Property enhancement of short fibre reinforced cementitious composites
MAI, Yiu-Wing

MATCHING FUNDS GRANT (UNIVERSITY GRANTS COUNCIL)

A study of hydraulic fill performance in Hong Kong - Phase II
Civil & Structural Engineering – SHEN, C.K.; LEE, K.M.; LI, X.S.

RESEARCH INFRASTRUCTURE GRANT (UNIVERSITY GRANTS COUNCIL)

Advanced motion control systems for microelectronics applications
*Electrical & Electronics Engineering – QIU, Li
Industrial Engineering & Engineering Management – LEE, Ka Shek Neville
Mechanical Engineering – YUEN, M.F. Mathew*

Process dynamic modelling and adaptive control of thermoplastic injection molding
*Chemical Engineering – GAO, Furong; CHAN, Chi-Ming
Civil & Structural Engineering – YANG, Q.S.
Mechanical Engineering – YUEN, Matthew M.F.*

Research and collaboration with shipping industry in Hong Kong
Industrial Engineering & Engineering Management – WAN, Yat-Wah; MURTY, Katta G.; LIU, Ji-Yin

Forming and fracture of bamboo-metal sheet laminates for applications to air cargo containers and similar structures
*Chemical Engineering – CHAN, C.M.
Civil & Structural Engineering – LI, Z.J.
Mechanical Engineering – YU, Tong-Xi; KIM, J.K.*

Development of a portable microbial sensor for fast detection of biodegradable substances in water
*Chemical Engineering – RENNEBERG, R.
Electrical & Electronics Engineering – CHEUNG, Peter*

Development of a micro device systems and technologies for biomechanical applications
*Electrical & Electronics Engineering – WONG, Man
Industrial Engineering & Engineering Management – LEE, N.K.S.; GOONETILLEKE, R.S.
Mechanical Engineering – ZHANG, Tong-Yi; ZOHAR, Yitshak*

Selective hot compaction forming for rapid part manufacturing
*Industrial Engineering & Engineering Management – JONEJA, Ajay
Mechanical Engineering – LAM, David C.C.; YUEN, Matthew M.F.*

INDUSTRY DEPARTMENT

Communication infrastructure for Hong Kong Textile and Apparel Industry Global Applications (HKTAIGA)
Industrial Engineering & Engineering Management – TSENG, Mitchell; SU, C.J.; SO, Richard H.Y.; YEN, Benjamin P.C.

Development of a three dimensional computer-aided-design system for the garment industry
*Computer Science – SHEN, Helen
Mechanical Engineering – YUEN, Matthew; SUN, Q.P.*

Establishment of an Analog Integrated Circuits Fast Prototyping Centre for Electronics Industries in Hong Kong
Electrical & Electronics Engineering – CHEUNG, Peter; LO, T.C.; SIN, Johnny; TSUI, C.Y.; LUONG, Howard; KI W.H.; MOK, Philip; KARIM, Zaheed

Roadmap for electronics packaging and assembly for Hong Kong
Mechanical Engineering – TONG, Pin; YUEN, Matthew

Cyberspace Centre for Software Industry
Computer Science – CHANSON, Samuel; PONG, T.C.; LEE Dik-Lun; DREW, Pamela; GRAY, James W.; STIBER, Michael

ASM ASSEMBLY AUTOMATION LTD.

Integrated circuit package design and analysis program
*Electrical & Electronics Engineering – CHAN, Phillip
Mechanical Engineering – YUEN, Matthew; ZOHAR, Yitshak*

CROUCHER FOUNDATION

Bacterial enzyme-enhanced sulfur removal from coal
Chemical Engineering – YU, Jian

Advanced polyamides for microelectronic applications
Chemical Engineering – KO, Tsz-Man; MI, Yong-Li

A study of fixed bed reactor for wastewater treatment by activated carbon sorption

Chemical Engineering – HU, Xi-Jun

COMPUTER PRODUCTS INC.

Design for mass customization of power supply products

Industrial Engineering & Engineering Management – TSENG, Mitchell

ENVIRONMENT AND CONSERVATION FUND / WOO SHEELLOCK GREEN FUND

Characterization of traffic noise in open areas

Mechanical Engineering – TO, W.M.; YUEN, Matthew

THE BRITISH COUNCIL

Multicomponent adsorption equilibrium and kinetics of gases in heterogeneous microporous solids

Chemical Engineering – HU, Xi-Jun

Inter-continental tele-presence applications: a preliminary study of the effects of time lag

Industrial Engineering & Engineering Management – SO, Richard

KUMAGAI GUMI (HK) LTD., GAMMON CONSTRUCTION LTD.

Second International Symposium on Civil Infrastructure Systems Research

Civil & Structural Engineering – CHANG, Paul; CHANG, Chih-Chen

METACOM INDUSTRIES (HK) LTD.

Synthesis of graphite intercalation by an electrochemical method

Mechanical Engineering – ZHANG, Tong-Yi

MASS TRANSIT RAILWAY CORPORATION

Investigation of overhead line support component failure

Mechanical Engineering – TONG, Pin; LENG, Yang

Investigation of Spring Strip Failure in point machine

Mechanical Engineering – LENG, Yang

RADAR CO. LTD.

Fabrication & mechanical behavior of in-situ polymer composites

Mechanical Engineering – LENG, Yang

RESPIRONICS (HK) LTD.

Development of thickness control system for air filled membrane product

Industrial Engineering & Engineering Management – LEE, Neville

STERLING PRODUCTS LIMITED

Global collaboration for supply chain management & product development

Industrial Engineering & Engineering Management – TSENG, Mitchell

SINO SOFTWARE RESEARCH CENTRE

Intelligent video manipulator - Video classification, clustering & retrieval

Computer Science – LEE, C.M.; LI, Qing

Hidden Markov model based on-line handwritten Chinese character recognition/ On-line handwritten Chinese character databases

Computer Science – YEUNG, Dit-Yan; LI, Xiao-Lin

The development of geographic information exchange architecture for Hong Kong

Computer Science – DREW, Pamela; Civil & Structural Engineering – McINNIS, Duncan

Development of MATLAB Toolbox for multirate sample-data control

Electrical & Electronics Engineering – LI, Qiu; Computer Science – GU, Jun

An expert system for integrated analysis and design of tall buildings

Civil & Structural Engineering – CHANG, Paul; CHAN C.M.

Computer Science – KEAN, Alex; Mechanical Engineering – TONG, Pin

A fast probabilistic inference system

Computer Science – ZHANG, Nevin Lian-Wen

A knowledge based system for minimising environmental problems in process industries (MEPPI)

Chemical Engineering – YUE, Po-Lock; Computer Science – KEAN, Alex

Multilingual robust speech recognition

Computer Science – LI, Zhao-ping; WU, Dekai

Electrical & Electronics Engineering – SHI, Bertram; AU, Oscar

Vehicle licence plate number recognition system

Computer Science – LEE, John C.M.

Information resource integration and management

Computer Science – LEE, Dik L.

A case study on the use of advanced heterogeneous database management technologies in industrial information system environments

Computer Science – DREW, Pamela

Parallel multimedia/video disk server

*Computer Science – SHUM, Chung-Dak;
NGAI, Tin-Fook; CHENG, Siu-Wing*

Design and implementation of a flexible form processing system

*Computer Science – YEUNG, Dit-Yan;
CHIN, Roland; LEE, John C.M.; SHEN, Helen*

SinoLib: HKUST's Digital Library Research Project

*Computer Science – SHEN, Vincent;
DREW, Pamela; LEE, Dik L.; WU, Dekai;
Gan, Kok-Wee; LOCHOVSKY, Amelia
Fong*

Development of MATLAB toolbox for multirate sample-data control

*Computer Science – GU, Jun
Electrical & Electronics Engineering –
QIU, Li; POTVIN, Andrew*

An integrated environment for multimedia applications on heterogeneous networks

*Computer Science – CHEUNG, Shing-Chi;
CHANSON, Samuel; NGAI, Tin-Fook*

A flexible parallel load balancing system for heterogeneous computing systems and networks

Computer Science – CHANSON, Samuel

SHATIN DISTRICT BOARD

A study on water quality improvement and odor control in Shing-Mun River

*Civil & Structural Engineering – CHEN,
Guang-Hao; HUANG Howard; YEN, Ben;
LO, Irene*

APPENDIX 3 – SCHOOL OF ENGINEERING

HOME PAGE ON INTERNET WORLD-WIDE WEB

University	http://www.ust.hk/
School of Engineering	http://www.seng.ust.hk/
Chemical Engineering	http://www.ust.hk/~webceng/
Civil and Structural Engineering	http://cesu2.ust.hk/
Computer Science	http://www.cs.ust.hk/
Electrical & Electronic Engineering	http://www.ee.ust.hk/
Computer Engineering	http://www.cpeg.ust.hk/
Industrial Engineering & Engineering Management	http://www-ieem.ust.hk/
Mechanical Engineering	http://www-mech.ust.hk/
Centre for Display Research	http://www.ee.ust.hk/~cdr
Computer Aided Design & Manufacturing Facility	http://cadcam.ust.hk/
Cyberspace Centre	http://www.cyber.ust.hk/
Microelectronics Fabrication Facility	http://www.ust.hk/~webopa/mfc.htm
Wind Wave Tunnel Facility	http://www.ust.hk/~webopa/windtunnel.htm