Message from the Department Head and Introduction

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- Bachelor of Science in Computer Science
- Bachelor of Science in Creative Media
- Bachelor of Engineering in e-Logistics and Technology Management
- Master of Science in Computer Science
- Master of Science in Electronic Commerce
- Research Degrees

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- Bioinformatics Laboratory
- Cloud Computing and Distributed System Laboratory
- Laboratory of Software Engineering & Methodology
- Video Retrieval Innovation Laboratory

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Staff Profile
In recent years, the rapid development in information and communication technology has catalyzed the development of a global information economy, and facilitated a transition towards a knowledge society. In computer science, as in modern life, change has become a constant. Big data, cloud computing, social media and other emerging technologies have brought an unforeseen dynamism to life, from doing business, to finding friends, to keeping in touch with family. To achieve general literacy and to develop a professional workforce, education in computer science has ascended to new heights of importance.

The Department of Computer Science at City University places student development at the forefront of our priorities, and strives to equip our graduates not only with expert knowledge, but also the technical skills to utilize and develop their knowledge, and a sense of professional ethics to guide them in their career and personal development. The Department achieves this not only by recruiting and developing high-calibre staff and maintaining high standards in our pedagogy and research, but also in fostering internationalization, participation in industry, and awareness of cutting-edge developments in the field. Through this, we hope to nurture in our students not only the knowledge and skills for the future, but also the perspectives of tomorrow, which is of paramount importance to a dynamic and rapidly evolving field such as our own.

Our research endeavours have led to the establishment of applied research centres and laboratories. The Centre for Innovative Applications of Internet and Multimedia Technologies (the AIMtech Centre) promotes applied research and development in the areas of multimedia and Internet technologies in collaboration with industry partners. The Multimedia-software Engineering Research Centre (MERC) contributes to the development of technologies of multimedia and emerging media-types in Hong Kong and Mainland China. A number of research laboratories are also set up for conducting a wide range of research projects. Currently, the Department is actively conducting over 90 research projects related to information and communication technologies vital to the future, such as multimedia coding/analysis, cloud computing, machine learning and bioinformatics. Our research underpins the academic programmes which prepare our students for the challenges they will face in their professional lives. Our students have achieved outstanding accomplishments in recent years, including winning awards in numerous prestigious competitions and top-notch conferences, as well as securing positions in well-known establishments such as Google, Thomson Reuters and IBM. This demonstrates the quality and dedication of our staff who help develop the pedagogical experience for our students. In recognition of our successful research and pedagogical development, a recent US News investigation ranked our Department as the 20th best Computer Science Department globally.

This prospectus highlights the range of programmes offered, research and pedagogical achievements of students and staff, and the future development of our Department. We look forward to prospective students joining our Department for a stimulating and holistic learning experience. Looking into the future, we will continue to pursue excellence in conducting the computer science research of tomorrow and cultivating the computer science talents of tomorrow. Much like the world has been transformed by the global sharing of ideas through digital technology, your thoughts and ideas are invaluable to the further development of our department in research and pedagogy, and will be welcomed warmly by the CS Department.

Professor KWONG Tak Wu Sam
Head, Department of Computer Science
The Department of Computer Science was established in 1984, and has evolved from a teaching-oriented department into one that excels in both teaching and research.

**Introduction to the Department**

The Department launched its first BSc in Computer Studies in 1987 (renamed and restructured as the BSc Computer Science in 2000), followed by the MSc in Computer Science in 1991. The Department also produced its first Ph.D. graduate in 1994.

In addition to offering traditional courses such as foundations of computer science, computer architecture and software engineering, our curriculum exposes students to the latest advances in cloud computing, data science, machine learning, and bioinformatics. Students have the opportunity to undertake a major design and development project in areas such as electronic commerce, virtual reality, multimedia, computer vision, cloud computing, and information security.

All teaching within the Department is subject to stringent quality assurance procedures. The Department maintains state-of-the-art computing facilities, including a private cloud infrastructure for teaching activities support and a high-throughput computing cluster for computationally intensive tasks involved in various research activities.

The Department’s research foci include bioinformatics, cloud computing, data science, evolutionary computation and metaheuristic, information security, machine learning, mobile computing, multimedia computing, software engineering, computer vision and graphics. Our staff have contributed intellectually and professionally to the advancement of these fields.

For details, please visit our website: http://www.cs.cityu.edu.hk
Professor Andrew Chi-Chih Yao is the Dean of the Institute for Interdisciplinary Information Sciences at Tsinghua University; he is also a Distinguished Professor-at-Large at the Chinese University of Hong Kong. Professor Yao’s research interests are the theory of computation and its applications to cryptography and quantum computing. He was the recipient of the prestigious A.M. Turing Award in 2000 for his contributions to the theory of computation, including pseudorandom number generation, cryptography and communication complexity. He has received numerous other honours and awards, including the George Polya Prize, the Donald E. Knuth Prize, and several honorary degrees. He is a member of the US National Academy of Sciences, the American Academy of Arts and Sciences and the Chinese Academy of Sciences.

Professor Frances Foong Yao is currently a member of the Chair Professor Team at IIIS of Tsinghua University. She received her PhD in Mathematics from MIT in 1973. After serving on the Computer Science faculty at the University of Illinois, Brown University and Stanford University, she joined Xerox PARC (Palo Alto Research Center) in 1979, where she managed the Theoretical Computer Science area and served as Principal Scientist. In 2003 she joined the Computer Science Department of the City University of Hong Kong and served as Head until 2011. She is a Fellow of the American Association for the Advancement of Science, and is a recipient of the Lester R Ford Award from the Mathematical Association of America.
Professor Philip S Yu is currently a Distinguished Professor in the Department of Computer Science at the University of Illinois at Chicago and also holds the Wexler Chair in Information Technology. Before joining UIC, he was with IBM, where he was a manager of the Software Tools and Techniques group. Prof Yu is a Fellow of the ACM and the IEEE. He is the Editor-in-Chief of ACM Transactions on Knowledge Discovery from Data. He is on the steering committee of the IEEE Conference on Data Mining and ACM Conference on Information and Knowledge Management and was a member of the IEEE Data Engineering steering committee. He was the Editor-in-Chief of IEEE Transactions on Knowledge and Data Engineering (2001-2004). He received the IEEE Computer Society 2013 Technical Achievement Award for “pioneering and fundamentally innovative contributions to the scalable indexing, querying, searching, mining and anonymization of big data”, the ICDM 2013 10-year Highest-Impact Paper Award, the EDBT Test of Time Award (2014) and the Research Contributions Award from IEEE Intl. Conference on Data Mining (2003). He has received several IBM honours including two IBM Outstanding Innovation Awards, an Outstanding Technical Achievement Award, two Research Division Awards and the 94th plateau of Invention Achievement Awards. He holds or has applied for more than 300 US patents and was an IBM Master Inventor.
Professor T Y Chen is a Chair Professor of Software Engineering, and the Leader of the Software Analysis and Testing Group at Swinburne University of Technology, Australia. He has published papers in random testing, partition testing, category-partition testing, testing of Boolean specifications, test suite reduction, adaptive random testing, metamorphic testing and fault localization. He is a member of the editorial board of the Journal of Software Testing, Verification and Reliability, and has been recognized several times as one of the most published scholars in the field of Systems and Software Engineering.

Professor Witold PEDRYCZ
MSc PhD DSc (Habilitation) Silesian U of Tech

Professor Pedrycz is a Professor and Canada Research Chair (CRC - Computational Intelligence) in the Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Canada. He is also with the Systems Research Institute of the Polish Academy of Sciences, Warsaw, Poland. In 2007 he received a prestigious Norbert Wiener award from the IEEE Systems, Man and Cybernetics Council. He was also a recipient of the IEEE Canada Computer Engineering Medal 2008 and a Cajastur Prize for Soft Computing from the European Centre for Soft Computing for "pioneering and multifaceted contributions to Granular Computing" in 2009. In 2009 he was elected a foreign member of the Polish Academy of Sciences. In 2012 he was elected a Fellow of the Royal Society of Canada. In 2013 he was awarded a Killam Prize. In the same year he received a Fuzzy Pioneer Award from the IEEE Computational Intelligence Society.

He is an Editor-in-Chief of Information Sciences and Editor-in-Chief of WIREs Data Mining and Knowledge Discovery (Wiley). He served as Editor-in-Chief of IEEE Transactions on Systems, Man and Cybernetics - Part A.
Academic Programmes

- Bachelor of Science in Computer Science
- Bachelor of Science in Creative Media
- Bachelor of Engineering in e-Logistics and Technology Management
- Master of Science in Computer Science
- Master of Science in Electronic Commerce
- Research Degrees
The application of technologies is crucial for the success of Hong Kong as a knowledge-based economy, and healthy technological development depends on the availability of well-qualified personnel. The Bachelor of Science in Computer Science is designed to meet these important ICT needs of Hong Kong businesses and industries. The programme provides a solid foundation in computer science knowledge and focuses on a wide range of modern technologies, design and development processes, and IT professionalism.

Aims of the Programme
The programme aims to provide students with thorough training in the theoretical and practical aspects of computer science that are necessary for successful careers as professional developers, system analysts, system architects and technology officers. The programme enables students to develop a strong foundation in the overall discipline and to specialize in particular areas through a flexible curriculum with a wide range of electives.

Prospects
Graduates of the programme will be equipped for jobs that involve state-of-the-art technology and building large-scale software systems. They can look forward to professional advancement in technical expertise or in corporate technology management. They will also be well prepared to pursue research and development careers.

Special Features
After completing two years of full-time study, students will join the IT Professional Placement (ITPP) to work in companies joining our placement programme for a year in related fields to gain real work experience. During the placement year, students will take one day off weekly from their work to complete a number of courses. ITPP enables students to integrate and apply their knowledge in an actual working environment. It also gives students a head start in their careers after graduation as it is recognized as one year of work experience. The ITPP sponsor organizations include international computer vendors such as
IBM; banks such as Hong Kong Bank, Shanghai Commercial Bank and the Bank of East Asia; Hong Kong government and related organizations such as the Education Bureau, the Office of the Government Chief Information Officer, the Hospital Authority and the Housing Authority; and other enterprises, such as Thomson Reuters, Hongkong Electric and Hong Kong Disneyland.

**Programme Structure**

The curriculum includes highly focused core courses and a wide range of electives. The core courses focus on areas such as computer systems, problem solving and analysis, programming and logic, software design and practices, communication skills, and professional knowledge.

The electives cover a wide spectrum including information security, e-commerce, mobile computing, internet computing, computer graphics, multimedia technologies, and data science, to give broad exposure and choices to students.

**Study Streams**

Study streams are provided to allow students to study in depth in a selected area, which will enhance their competitiveness in developing their careers.

The four study streams are:

- **Information Security Stream**
  focuses on computer and network security.

- **Multimedia Computing Stream**
  focuses on the technologies in computer graphics, human computer interfaces and multimedia systems.

- **Software Engineering and Project Management Stream**
  focuses on software design and quality, and project management.

- **Data Science Stream**
  focuses on the extraction of knowledge from data.

**Professional Recognition**

This programme is the first computer science programme in Hong Kong accredited by the Hong Kong Institution of Engineers (HKIE).

**Entrance Requirements**

Students with DSE electives in different disciplines can apply. To be eligible for admission, applicants must satisfy the City University General Entrance Requirements.

Non-local students with equivalent qualifications can also apply. For detailed information, please visit the website (http://www.cityu.edu.hk/gso).

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### Graduate Employment Distribution 2013

- **Graduate Employment Distribution 2013**
  - **Systems Analysis & Computer Programming**: 73.5%
  - **Economic, Statistical & Mathematical Work**: 13.3%
  - **Engineering & Technical Work**: 13.3%
  - **Civil Service**: 1.0%
  - **Construction**: 3.1%
  - **Manufacturing**: 6.1%
  - **Business Service/Real Estate**: 39.8%
  - **Financial/Insurance**: 16.3%
  - **Transport, Storage & Communication**: 16.3%
  - **Engineering, Architectural & Technical Services**: 1.0%
  - **Trading (Wholesale & Retail)**: 3.1%
  - **Others**: 3.1%
  - **Marketing/Sales**: 3.1%
  - **Protective Services**: 1.0%
  - **Scientific & Research Work**: 2.0%
  - **Secretarial/Clerical Work**: 1.0%
  - **Community, Social & Personal Services**: 6.1%
  - **Educational Institutions**: 4.1%
  - **Advertising/Public Relations**: 1.0%
  - **Civil Service**: 1.0%

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**Job Nature of 2013 Graduates**
Aims of the Programme
The programme aims to produce computing professionals with a strong background in creative media. The main emphasis of the programme is on the technology underlying digital media, but students will also receive a solid foundation in the creative process including production management, at least two studio disciplines (video, photography, sound or creative writing) and digital media creation. The programme combines the core courses from both the Department of Computer Science and the School of Creative Media to produce graduates that bridge the gap between the technical and artistic side of the media field.

Prospects
The programme is ideal for students who have a strong technical background, but are also interested in creative media. Graduates are qualified to work in a wide range of digital media companies including computer animation, special effects, computer games and internet-based media. They will be part of creative teams where they can contribute to both the technical and creative sides of media projects. With a solid background in both the technical and creative sides of the field, they will be ideal candidates for management positions in the future.

Special Features
The School of Creative Media has exchange agreements with universities in Mainland China, other parts of Asia and North America, giving students the opportunity to spend a semester at another university and explore different cultures. The School runs a summer internship programme where students can work in a media company. Students are encouraged to submit their artwork to media festivals and competitions and have achieved great successes. Students also have access to the extensive software and hardware facilities at the laboratories of the Department of Computer Science.

Programme Structure
The programme combines core courses from the BSc in Computer Science and the BA in Creative Media, providing students with a solid background in both areas. Students will have the opportunity to mix with students in both the Department of Computer Science and the School of Creative Media to develop their team work skills and a true understanding of both fields.

Entrance Requirements
After being admitted to the School of Creative Media (Admission code: JS1041), students may choose the BSc Creative Media programme as their “major” following the first year of study. For admission to the School of Creative Media, applicants must satisfy the CityU General Entrance Requirements.
Applicants may be invited to attend an interview and/or other assessment processes to gauge their creative potential. To facilitate the assessment of applications, applicants are strongly encouraged to submit a portfolio of creative work through an online system to the School of Creative Media. Please refer to the School’s website (www.scm.cityu.edu.hk) for the most current submission deadlines and specifications for the portfolio.

Consideration may be given to employment records, travel and other examples of life experience.

Bachelor of Engineering in e-Logistics and Technology Management
工學士（電子物流及科技管理學）
Admission Code: JS1209, Government-funded, Full-time mode

Aims of the Programme
The programme aims to equip students with analytical, technical, managerial, and behavioural skills/knowledge in aspects of e-logistics and technology management in order to prepare them to play key professional and managerial roles in the global logistics industry amidst increasing challenges.

Prospects
Graduates from the programme will find career opportunities in a broad range of logistics-related industries, such as international freight forwarding, inventory management and warehousing, transportation, supply chain planning and control, and industrial/manufacturing services. Typical starting positions include logistics analysts/officers, logistics engineers, distribution systems analysts/engineers, production and materials controllers, supply chain planners, etc.

課程目標
本課程旨在灌輸有關資訊年代的物流及科技管理知識，使學生能在競爭激烈的全球物流業中擔當重要的專業及管理角色。畢業生可從事與物流相關行業，如國際航運；庫存管理及倉貯；運輸分銷、供應鏈計劃及管理；工業/製造業服務等。
Programme Structure

There are five main programme building blocks:
- Basic Technologies
- e-Logistics
- Integrative Project
- Language and Out-of-Discipline studies
- Logistics and Technology Management

Innovative teaching approaches are adopted in the delivery of the curriculum in order to integrate theories with industrial practices. Problem-solving and student-centred activities, experience-based learning, integrative management workshops, as well as the provision for industrial attachment, co-operative education, and industry-based projects are typical means to help achieve the targets.

Entrance Requirements

After being admitted to the Department of Systems Engineering and Engineering Management (Admission code: JS1209), students may choose the BEng e-Logistics and Technology Management programme as their major following the first year of study. For admission to the Department of Systems Engineering and Engineering Management, applicants must satisfy the CityU General Entrance Requirements.

Alternative Entry

Holders of Higher Diploma / Associate Degree in relevant engineering disciplines or other equivalent qualifications.

Professional Accreditation

This programme is designed to fulfil the accreditation requirements of the Hong Kong Institution of Engineers (HKIE).

Special Features

The Department offers students practical placement opportunities through the Industrial Attachment Scheme and the Co-operative Education Scheme. These schemes provide students with full-time attachment in companies in Hong Kong and the Pearl River Delta region as well as overseas.
Aims of the Programme

There have been dramatic changes in IT during the last decade due to the advent of powerful low-cost workstations and mobile computing devices, ultra-high-speed and broadband networks and the internet, as well as the development of open systems and standardization, thereby creating tremendous opportunities yet substantially increasing the technical complexities of building and maintaining a diversity of computing platforms. Computing professionals often find it hard to keep pace with the increasingly rapid technological advancement. Ad-hoc training courses and vendor presentations often lack coherence and fundamental underpinnings. The primary aim of the programme is to enable professionals to effectively and systematically upgrade their technical capabilities to tackle increasing demands in information systems and services development. The courses cover theoretical foundations, technologies and applications in computer networks and the internet, software engineering, data sciences, information security, and multimedia, mobile, and e-commerce technologies. The programme also prepares graduates to take up advanced innovative development work in the industry as well as to pursue higher research degree qualifications.

Programme Structure

The study programme includes 12 credits of required courses and 18 credits from a rich set of elective courses. The following is a partial list of the available electives:

- Algorithms and Techniques for Web Searching
- Advanced Database Systems
- Cloud Computing: Theory and Practice
- Computer Games Design
- Cryptography: Theory and Practice
- Data Engineering
- Data Warehousing and Data Mining
- Guided Study
- High-Speed Multimedia Networks
- Information Security Technology Management
- Internet Application Development
- Introduction to eCommerce
- Machine Learning
- Mobile Computing
- Multimedia Technologies and Applications
- Project
- Software Quality Engineering
- Topics on Information Security
- Virtual Reality and Game-Engine Technologies

The Postgraduate Diploma in Computer Science (PGDCS) is awarded after the completion of 24 credits (including all required courses) if the student decides not to continue with the Master of Science in Computer Science Programme.

The Postgraduate Certificate in Information Security (PGCINSE) is awarded after the completion of 12 credits (from a specified course list). Upon graduation from the PGCINSE programme, students may continue their studies by applying for the Master of Science in Computer Science programme, with credit transfer of a maximum of 9 credit units. Alternatively, students may opt to continue their studies by programme transfer to the Master of Science in Computer Science programme, with credit transfer of a maximum of 12 credit units.
Master of Science in Electronic Commerce
電子商貿理學碩士
Non-Government funded, Combined mode

Electronic commerce is a major global trend and critical to the development and maintenance of competitiveness. The MSc in Electronic Commerce is inter-disciplinary in that participants will acquire adequate capabilities in the technological, business, and legal aspects of e-commerce, which will enable them to effectively evaluate, build, and deploy e-commerce services and systems.

Aims of the Programme
The programme aims to produce a new generation of IT professionals who will be competent in evaluating and developing e-commerce systems and services within a business context, in both the manufacturing and service sectors. In contrast to similar programmes offered elsewhere in Hong Kong, which tend to concentrate either on technology or business aspects, this programme takes a broad-based inter-disciplinary approach. Students will gain knowledge of core business and technical-related subjects, together with an in-depth understanding of the specific business, legal and technical issues that are involved in the exploitation of e-commerce, and the necessary knowledge and skills to analyze, plan, design, develop, and maintain e-commerce systems.

Entrance Requirements
To be eligible for admission, applicants must have:

- a recognized bachelor’s degree in a computing discipline such as Computer Studies, Information Technology, Computer Engineering or Information Systems; or
- a recognized bachelor’s degree in a related discipline such as Electronic Engineering, Applied Mathematics, Manufacturing Engineering and Quantitative Analysis or equivalent, together with applicable working experience in information technology; and
- fulfil the minimum English proficiency requirement as specified by the University.
**Programme Structure**

The programme consists of 33 credit units consisting of required and elective courses. Students are expected to complete the programme within 1 to 2 years. The courses fall into one of the following categories:

- Courses that provide technical knowledge and skills for developing e-commerce systems
- Courses that are related to e-commerce systems management and applications
- Courses that deal with the business and legal aspects of e-commerce

A student must take all eight required courses. Up to three courses can be credit transferred based on the student’s previous studies.

**Required Courses (27 credit units)**

- Introduction to eCommerce
- Computer Networks and the Internet
- Analysis and Design of eCommerce Systems
- Internet Application Development
- eBusiness System Integration
- Information Security for eCommerce
- eCommerce Business Strategies and Management
- eCommerce Project

**Elective Courses (6 credit units), choose two out of a variety of courses including:**

- Algorithms and Techniques for Web Searching
- Data Warehousing and Data Mining
- eCommerce Law
- Information Security Technology Management
- Knowledge Management
- Multimedia Technologies and Applications
- Project Management and Quality Assurance
- Supply Chain Management
- etc.

**Entrance Requirements**

Applicants must have sufficient command of the English language and must satisfy the following minimum requirements:

- a recognized bachelor’s degree in a Computing discipline (e.g. Computer Science, Information Systems or Information Technology); or
- a recognized bachelor’s degree in a related discipline (e.g. Electronic Engineering, Economics and Finance, Applied Mathematics, Manufacturing Engineering, Business Information Technology), preferably with applicable IT experience; or
- have obtained a good alternative qualification with substantial IT professional experience that is acceptable to the University.
The research degree programmes of the Department of Computer Science equip students with the skills and knowledge that are needed to meet the challenge of satisfying present and future IT development needs. The Department offers the research degrees of Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) in Computer Science, both of which have coursework components. In addition to the traditional areas of research in computer science, students are encouraged to choose applications from other research areas in science, engineering and business. Students may also look at the specialized areas of staff members to identify a research area.

Research Areas
- Multimedia Computing
- Distributed Mobile Computing and Wireless Networking
- Applied Algorithms
- Artificial Intelligence and Knowledge and Data Management
- Systems, Software Engineering and Internet Applications
- Evolutionary Computation

Structure of Research Degree Programmes
The MPhil programme consists of 7 credit units and the PhD programme consists of 14 credit units. The submission of a thesis is also required.

Financial Assistance
Financial assistance is available in the following forms:
- Postgraduate Studentships for full-time research students
- Research Tuition Scholarships
- Conference Grants for attending conferences
- Research Activities Fund
- Chow Yei Ching School of Graduate Studies Entrance Scholarships
- Government Grants and Loans and External Financial Awards/Assistance

Related Websites:
Chow Yei Ching School of Graduate Studies
http://www.sgs.cityu.edu.hk

Department of Computer Science
http://www.cs.cityu.edu.hk/academic/pgcs
Research

- Research Centres
- Research Areas
The Centre promotes applied research and development in the areas of multimedia and internet technologies, collaborates closely with industry partners in the technology transfer of such technologies and is enhancing CityU’s reputation as the focal point for innovative applications of these technologies for the local industry.

The Centre achieved sustainable successes in attracting external competitive funding to further these endeavours. The funding included HK$2.7 million to provide a novel virtual reality learning environment for severely intellectually disabled students in Hong Kong, and HK$2.5 million to develop, in collaboration with another local university, a suite of Chinese Handwriting Assessment Tools (CHAT) for evaluating the handwriting performance of primary school children in Hong Kong. Other research-oriented projects included RGC-funded projects in multimedia data and motion data analysis and web-based systems for e-commerce and education.

The Centre also regularly hosts or co-hosts international conferences at CityU to disseminate the latest multimedia and internet technologies.
The Multimedia-software Engineering Research Centre (MERC) targets at contributing to the development of technologies of multimedia and emerging media-types in Hong Kong, the Pearl River Delta region, and other areas of China as a whole, enabled by research with high societal impact, educated human resources, and commercialization of new software from top-class engineering researchers. The Centre promotes an eco-system of industrial, educational, research, and government organizations so as to enhance the performance of engineering and industrialization and contribute to the sustainable development of society.

Positioning itself as a key hub in China for global partnership in research, knowledge exchange, technology transfer, education and industrial development in all aspects of multimedia science and engineering, the Centre aims to develop global partnerships and transnational research involving multimedia software design, development, standardization, and industrialization. The Centre also serves to facilitate the realization of the commercial and industrial potentials, and works to establish an open technology service platform based on the application requirements for enterprise informatization and multimedia knowledge engineering.

Website: http://www.cityu.edu.hk/merc

### Bioinformatics 生物訊息學

Bioinformatics is a growing area which applies the techniques of algorithms, statistics, data science, graphics, etc. to solve problems and verify hypotheses in biology. It plays an essential role in understanding life, health, and diseases at the molecular and cellular level. In the past decade, the DNA sequences of many individuals and various species have been deciphered. Instances of severe diseases are treated with genome sequencing techniques. Terabytes of data are produced daily. It challenges the current data processing and analysis techniques, and brings many opportunities to research and development. Successful addressing of the problems will have a high impact on our lives and society.

### Cloud Computing 雲端計算

Cloud computing promises to provide better agility at lower cost and has the potential to become the next generation model of utility. To fulfil the potential of cloud computing, there are many fundamental research issues to be investigated such as availability, security, privacy and dynamic elasticity. The cloud computing research group is engaged in solutions of cloud security and privacy, congestion control, load balancing, service-level traffic management using SDN, and dynamic resource provisioning.
**Data Science 數據科學**

Data science is a research area which spans many different disciplines such as machine learning, data mining, data warehousing and information retrieval with a common objective of extracting useful information from data. One emerging challenge in this research area is how to handle a large amount of structured and unstructured data through high performance computing technologies. A data science practitioner, i.e., a data scientist, may use their skill sets in the aforementioned disciplines to solve a complex problem in a specific domain, such as genomics, drug design, social networks, security and meteorology.

**Embedded Systems 嵌入式系統**

Embedded systems are computer systems with dedicated functions within mechanical or electrical systems, often with real-time computing constraints. It is embedded as part of a complete device often including hardware and mechanical parts.

Embedded systems range from portable devices, such as smart watches and MP3 players, to large stationary installations like traffic lights, factory controllers, and complex systems like hybrid vehicles, MRI, and avionics. With the recent development of technology, embedded systems are now everywhere and having a significant impact on our daily lives. For example, Google acquired the smart thermostat company Nest Labs for US$3.2 billion recently, which is only a 4-year-old company. Another example is the recently announced Apple iWatch, which is expected to transform how we interact with technology in our daily lives.

**Evolutionary Computation and Metaheuristic 進化計算和超啟發式方法**

Our major research focus is to combine ideas and techniques from evolutionary computation, traditional mathematical programming, and machine learning for designing efficient metaheuristic algorithms for dealing with hard search and optimization problems in fields ranging from engineering design to e-commerce and management planning. The metaheuristic optimization group has an excellent research track record. The multi-objective evolutionary optimization algorithms based on decomposition (MOEA/D) developed by us have become one of the most widely used algorithmic frameworks in our area.

**Information Security 資訊安全**

Information security covers the general areas of applied cryptography, cloud computing & big data security, and network security. We have a strong group of devoted researchers and competent students working in various
Machine Learning  機器學習

Machine learning is the study of algorithms and systems for computers to learn from data to make predictions. Our current research projects in machine learning focus on probabilistic graphical models, time-series models, deep learning, active learning, kernel methods, clustering, manifold learning and Gaussian processes. Machine learning is also applied to fields such as computer vision, computer graphics, multimedia information retrieval, software engineering, cognitive science and bioinformatics. Another research topic is to hybridize machine learning techniques and various optimization methods for handling expensive and noisy optimization problems in engineering fields, with applications for car-crash simulations and telecommunication system design.
of different media for novel and interactive multimedia applications. The department has established a strong track record in the broad areas of multimedia computing, ranging from motion capture, media storage and coding, and information retrieval to emerging topics in social media, big data analytics, and health care. The developed systems for smart ambience therapy, interactive dancing, smart classroom, scalable video coding, and cross-media retrieval have won numerous awards in international exhibitions and conferences.

Software Engineering 軟件工程

Software is increasingly more complex in regard to its infrastructure, execution environments and the characteristics of big data to be processed. Its pace of evolution is also speeding up, while multiple versions of the same piece of software may still be actively used. The Software Engineering Research Group tackles fundamental and real-world research problems raised from the needs of developing and operating high-quality software systems. Our research addresses foundational, contemporary as well as emerging problems from a wide spectrum of software engineering and programming languages topics in cloud computing, big data, software-defined networking, shared-memory, parallel or distributed software systems, global software development, software processes, software quality, and software project management. We are particularly interested in the areas of software analysis, testing and management.

Our research outcomes have not only been disseminated in prestigious international journals and conferences, but also formed a strong basis that informs both teaching and practice, as well as knowledge transfer to the industry.

Theoretical Computer Science 理論計算機科學

Theoretical computer science aims to explore the foundations of computer science, especially from the mathematical point of view. There are two major directions within, namely algorithm design and complexity. In algorithm design, researchers aim to design better algorithms. In complexity theory, researchers study the relationship of different complexity classes with the final goal of settling the problem of whether P=NP. Our research groups mainly focus on designing efficient algorithms for real-world problems like energy efficient scheduling and wireless coverage. We are also interested in exploring the optimal structures for some combinatorial problems and truthful mechanism designs in game theory.

Vision & Graphics 計算機視覺及圖形學

The field of computer vision focuses on processing, interpreting, and understanding images and videos. Our current research projects in computer vision range from low-level vision (optical flow, stereo vision, sensor fusion, image denoising, illumination & reflection) to mid-level vision (tracking, 3D reconstruction, dynamic textures, background subtraction, image/video segmentation) to high-level vision (human pose estimation, crowd counting, semantic image/video annotation, object recognition, visual discovery).

The field of computer graphics covers the analysis, editing, and synthesis of images, videos, and graphics. Our current research applies computer vision and machine learning techniques to assist image and video synthesis. Representative projects include data-driven comic production, 3D image/video editing, computational photography, data-driven crowd animation and sketch-based object analysis.

Highly detailed and structured 3D collages of mechanical elements (large silver models) automatically produced from coarse proxy models (small colour models)
Laboratory Facilities and Resources

- Computer Science Laboratory
- Bioinformatics Laboratory
- Cloud Computing and Distributed System Laboratory
- Laboratory of Software Engineering & Methodology
- Video Retrieval Innovation Laboratory
The Computer Science Laboratory (CSLab) provides general computing facilities for both undergraduate and postgraduate programmes. It has 270 PCs in eight terminal rooms for teaching and general usage and 120 PCs for project development by final-year students. The CSLab has three IBM BladeCenters equipped with 30 HS22 blade servers which form a server cloud of 300 virtual Windows/Linux servers for teaching and research support.

The CSLab also has a HTCondor high-throughput computing cluster consisting of 144 Intel computing core and seven K20 GPU nodes for computationally intensive research activities.

A wide variety of software tools including Matlab, CSIM, Rational Rose, Sybase, Oracle, and Adobe Creative Suite are available for general use in teaching and development. The CS Department is also a member of the Microsoft MSDNAA programme; CS students and staff are licensed to use most of the Microsoft OS and development tools without additional cost.
Bioinformatics Laboratory

Today, all the top universities in the world have bioinformatics research groups or programmes. Our research lab in the department has formed collaborations with biologists to address a number of core problems in this area: gene expression data analysis, binding site prediction, protein sequence clusters, haplotype detection, protein docking, protein structure prediction and NGS data analysis. The results have been published in leading journals such as SIAM Journal on Computing, Bioinformatics, Journal of Computational Biology, IEEE/ACM Transactions on Computational Biology and Bioinformatics, etc.

Cloud Computing and Distributed System Laboratory

In the big data era, more and more institutions or companies choose to upload their ever growing data to the cloud. However, cloud servers are not fully trustable. Data owners are always concerned about whether the data stored in the cloud can become corrupted or leaked to unauthorized users. One of our projects is the design of secure auditing algorithms for cloud storage systems, which ensures data safety and security. We also have some other projects aiming to develop privacy-preserving data search algorithms and data mining techniques over encrypted data in the cloud.

Laboratory of Software Engineering & Methodology (LOSEM)

The Laboratory of Software Engineering and Methodology is a research laboratory established in 2014. It conducts world-class research to solve real-world software engineering problems. In 2012-2014, our overall successful rate in applying prestigious research grants from Research Grants Council under the General Research Fund and Early Career Scheme is 80%, which is about 100% higher than the average successful rate among all Hong Kong universities. The laboratory is equipped with state-of-the-art computing facilities and experimental software engineering infrastructures for members and students to explore and test their interesting ideas.
The Video REtrieval grOup (VIREO) was founded in 2005, focusing research on topics related to large-scale video retrieval, ranging from multimedia semantics analysis, big data mining and social media to multimedia analytics. VIREO has nurtured over 20 post-doc scholars and PhD students over the past decade, developing various system prototypes, open resources, and dataset benchmarks publicly available to the research communities. The open resources, such as VIREO-374, SOTU ( ), VIREO-VH and CC_Web_Video, receive thousands of downloads. VIREO maintains close collaboration with world-leading research groups in multimedia, including the Informedia lab in Carnegie Mellon University, DVMM lab in Columbia University and Microsoft Research Asia.
International Exposure & Co-curricular Activities

- Student Exchange Programme
- Cultural and Language Immersion Scheme (CALIS)
- Other International Exposure Activities
- IT Professional Placement
- Student Mentoring Scheme (SMS)
- Professional Mentorship Programme (PMP)
- Research Mentoring Scheme (RMS)
International Exposure and Co-Curricular Learning

The Department is dedicated to broadening the outlook and enhancing the career competitiveness of our students by providing a wide range of international exposure opportunities and out-of-classroom learning experiences.

Student Exchange Programme

The Department strongly supports and encourages students to participate in student exchanges to enrich their university life and gain valuable cross-cultural exchange experience.

Some of our students have studied for a semester in the following overseas universities.

- University of Kent, UK;
- University College London, UK;
- Tsinghua University, China;
- National University of Singapore;
- University of Illinois at Urbana-Champ, USA;
- Stockholm University, Sweden;
- Yonsei University, Korea.

AO Ran
BScCS Year 3 student
Exchange at the University of Kent, UK

Student exchange is not only about changing the place for learning technical knowledge, but rather about immersion, adaptation and advancement at a cultural level. With a will to explore and an open mind, I had priceless experiences and made great friendships for life during my year in the UK.

I experienced a totally different lifestyle and academic environment. I tried to go out of my comfort zone by chatting with others. They were very nice and willing to share their opinions. After six months, I felt more confident to speak English and was able to understand different accents. During my free time, I travelled around Europe. The journey was so memorable. I won’t forget anything.

You may dream to have an exchange experience. Dreams won’t come true unless you strive for them. There are lots of architecture, cultures and adventures waiting for you to explore.

HO Sze Nga
BScCS Year 4 student
Exchange at the University College London, UK
Participating in the exchange and placement programme has been one of the most valuable experiences in my university life. It gave me a chance to absorb the excellence of a different education environment, as well as experience a real software development process applied by a multinational information technology enterprise. It has also greatly broadened my horizons and improved my communication skills. All the experiences I gained make me ready and confident to take on new challenges in both my academic studies and professional career in the future.

CHI Fung Cheung Rigsby BScCS Year 3 student Exchange at the University of Kent, UK & placement in IBM (UK)

Student exchange is a valuable experience. I have met friends from different countries, experienced the culture differences, built up my confidence and developed my personality as well as strengthened my language skills. I strongly recommend my fellow students to apply for a student exchange.

LEUNG Tsz Piu Bill BScCS Year 4 student Exchange at Tsinghua University, China

I found this half-year exchange experience precious. After this exchange, I became more independent and now understand more about myself – both my strengths and weaknesses in different situations. I seldom have the chance to deal with everyday issues myself in HK. However during the exchange, I had to handle everything. I feel that I have grown up after this experience.

LIU Han BScCS Year 2 student Exchange at Maastricht Universiteit, Holland

The experience was really fantastic after I got used to foreign food, local transport and public facilities etc. I felt humanity and kindness from my host family couple. They taught me how to think wisely which I never learned from my parents, and shared hundreds of years of family secrets with me. The experience has changed the way I think about the world and people. I started to believe in some kinds of mutual feelings, communications and connections between diverse people; what's more, it's pretty easy for me to communicate with Western people now as it has almost become one of my intuitions after this half-year experience.

YAU Yet Chi BScCS Year 2 student Exchange at the University of Kent, UK

International Exposure

International Exposure
Doing voluntary work in a different country was an excellent experience for all of us. This time we volunteered in a primary school and a home for the elderly. The visit to the home for the elderly made me reflect on my life. The words I heard most often were “getting old is not funny”. Children in the primary school wished to be adults and free from their parents. In contrast, the elderly just wanted to stay with their families as they felt that life was going away from them. It was truly impressive to see how differently we are at different stages of life.

This trip really helped enhance my self-sufficiency. Since this was my first trip to Europe, let alone England, we needed to have plenty of preparation if we wanted to go to somewhere in our free time. We had to use the internet to gather information. My horizons were broadened every time I visited a new place and learnt about local cultures. Moreover, this trip taught me how to enjoy life rather than only focusing on my studies as I did in Hong Kong before. After the trip, I am now not afraid of facing new challenges.

The experience on this one-month programme has definitely broadened my horizons – not just language enhancement, but also cultivation of abilities to admire a different culture. It gave us a chance to understand more about ourselves because knowing more about other cultures enables us to realize the aspects in relation to which we are more advanced than others as well as the aspects with regard to which we are lacking in comparison. That is why we are always encouraged to step out of our comfort zone.

In collaboration with Middlesex University, UK, CALIS is a 4-week summer programme which provides an opportunity for students to improve their English by taking intensive language classes and explore the cultural aspects of the UK through living with a local family as a home stay with a wide variety of cultural and social activities such as visits to a primary school and Parliament.
I am lucky to have met two nice Teaching Assistants who not only taught us in the lab sessions and undertook tours together, but also drove us to other places on Saturdays. It was a two-hour drive from the host university to a place called “Walt Disney Hometown Museum”. I was very impressed by their kindness and generosity. The people here are generally nice, and they were willing to have conversations with us. Although the place where we stayed (Columbia, MO) is a small town, we had already explored the lifestyle led by 70% of Americans (stated by a student from Baylor University).

I am really pleased that I have a chance to participate in this oversea internship program – doing research work in Singapore. I have learnt a lot about the operations and implementation of data mining and the technological development of one of the four leading dragons in Asia - Singapore. I would like to thank Dr. Shuai Cheng Li for organizing this program. Singapore is really a nice country; although it is small, nothing is missed.

Other International Exposure Activities

The Department has been actively seeking other international exposure opportunities for students including overseas summer school programmes and research internships in overseas universities / institutions such as the National University of Singapore; the Beijing Genomes Institute (BGI), Shenzhen; and Zhejiang University, China.

We made some new friends in the evening party on USA Independence Day!
Co-Curricular Learning

Throughout the academic year, regular informal gatherings are organized by student mentors to help new students adapt smoothly to university life. A variety of activities are organized such as orientation tours, company visits and study workshops in which student mentors can share their experiences with new students as well as monitor their continued progress.

IT Professional Placement

The IT Professional Placement has been an essential and highly commended component of our BScCS programme. Third-year students work in companies joining our undergraduate placement programme including HSBC, the Hong Kong Hospital Authority, IBM, etc. to gain a year of real work experience. During the placement year, students take one day off weekly from their work to complete a number of elective courses. The programme has also been extended to overseas. Students can opt for placement offered by overseas universities / institutions such as IBM (UK), Intel (Shanghai) and the Beijing Genomics Institute (BGI), Shenzhen.

Our placement programme is highly regarded by employers with an average score of 3.97 out of 5 rated by company supervisors. Feedback from students also indicated that the experience had been very valuable to their study and could not be obtained in classroom learning.

Student Mentoring Scheme (SMS)

Throughout the academic year, regular informal gatherings are organized by student mentors to help new students adapt smoothly to university life. A variety of activities are organized such as orientation tours, company visits and study workshops in which student mentors can share their experiences with new students as well as monitor their continued progress.
Co-Curricular Learning

With support from the CS Departmental Advisory Committee, the Department organizes a Professional Mentorship Programme, which provides an opportunity for CS students to understand the business environment and different areas in the IT industry, enhance their soft skills, and interact with senior IT professionals. The programme is well received by both mentors and mentees. Students in general feel that they are benefited by the programme and have learnt from their interactions with mentors.

Professional Mentorship Programme (PMP)

Research Mentoring Scheme (RMS)

To motivate students to strive for excellence, the Department organizes a Research Mentoring Scheme where outstanding undergraduate students are assigned experienced faculty members as their mentors and join in the research work of academic staff. Students are also encouraged to develop their research discovery into tangible outcomes. Two students published a conference paper at the Annual Meeting of the Cognitive Science Society (CogSci 2013, Berlin) and the 19th International Computing and Combinatorics Conference (COCOON 2013, Hangzhou) respectively based on their research projects under the Scheme.
Student Achievements and Awards

- Student Awards
- Scholarships
Student Achievements and Awards

With the organization and sponsorship of the Department, our students actively participate in various contests, and have achieved outstanding performance. Students have also received scholarships from overseas universities for further studies. The following awards have been obtained in recent years.

- **Student Workshop held in conjunction with the 10th International Conference on Emerging Networking Experiments and Technologies (ACM CoNext) 2014**
  - Best Paper Award

- **Hong Kong ICT Awards Best Digital Entertainment (Interaction Design) 2014**
  - Bronze Award

- **Graduate Student Research Paper Competition, organized by the IEEE (HK) Computational Intelligence Chapter 2014**
  - First Runner-up

- **HKIE Outstanding Paper Award for Young Engineers Researchers 2014**

- **IBM Students for a Smarter Planet Award, IBM University Research 2014**

- **11th Final Year Project (FYP) Competition, organized by the IEEE (HK) Computational Intelligence Chapter 2014**
  - Merit Award

- **31st Computer Graphics International Conference 2014**
  - Best Paper Award

- **Intel Cup Undergraduate Electronic Design Contest - Embedded System Design Invitational Contest, Shanghai 2014**
  - Third Prizes
IBM Inter-University Programming Contest 2010, 2012, 2013
- Champion University Award
- First runner-up
- Third Prize
- Champion Prize
- Best Paper Award
- Gold Award

Champion University: City University of Hong Kong

First runner-up: IBM representative, Miss HO Sze Nga, Mr KWONG Ka Wa

Miss NI Chenying
Champion Prize, Student Project Exhibition 2013

Amway Pan-Pearl River Delta Region Universities IT Project Competition 2012
- Gold Award
  Mr. MOK Ho Leung
In recent academic years, our students have received scholarships from various organizations and foundations, such as:

- Chan Wing Fui Scholarships
- Chiap Hua Cheng's Foundation Scholarships
- HKSAR Government Scholarship
- Hong Kong Association of University Women
- Hong Kong Mediation and Arbitration Centre Professional Award Scheme
- HSBC Hong Kong Scholarship
- IEEE (Hong Kong Section) Prizes
- Li Po Chun Charitable Trust Fund Scholarships
- Pang Miu Ping & Yeung Lan Scholarship Scheme
- PCCW Foundation Scholarships
- Shun Hing Education & Charity Fund Scholarships
- Simatelex Charitable Foundation Scholarships
- Sir Edward Youde Memorial Awards for Disabled Students
- The Hong Kong Management Association IT Management Club Scholarships
- Tian Teck Scholarships
- Yvonne Industrial Co., Ltd. Scholarships
Staff Profile
# Academic Staff Members

## Head & Professor

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<thead>
<tr>
<th>Name</th>
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<tbody>
<tr>
<td>Sam Tak-Wu KWONG</td>
<td></td>
<td>BSc NY State MSc Waterloo PhD Fernuniversitaet Germany</td>
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## Associate Head & Associate Professor

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<tr>
<th>Name</th>
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<tr>
<td>Edward CHAN</td>
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<td>BSc MSc Stanford PhD Sunderland MIEEE</td>
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## Chair Professor of CS

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<tr>
<td>Horace Ho-Shing IP, MH</td>
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<td>BSc(Hons) PhD (UCL) CEng FBKS FHKIE Fellow IAPR</td>
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## Professor

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<tr>
<td>Qing LI</td>
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<td>BEng Hunan MSc PhD Southern California Distinguished Member CCF Senior Member IEEE Fellow IET</td>
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<td>Chong-Wah NGO</td>
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<td>BSc MSc NTU PhD HKUST MIEEE MACM</td>
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<td>Wing-Kwong CHAN</td>
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<td>BEng MPhil PhD HKU</td>
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<tr>
<td>Andy Hon-Wai CHUN</td>
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<td>Lam-For KWOK</td>
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<td>BSc MPhil CNAa PhD QUT CEng FBKS FHKIE MIEEE</td>
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<td>Kam-Yiu LAM</td>
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<td>BSc PhD CPHK</td>
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<td>Rynson Wing-Hung LAU</td>
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<td>BSc Kent PhD Cambridge SMIEEE</td>
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<td>Min-Ming LI</td>
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<td>BEng MEng PhD Tsinghua</td>
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<tr>
<td>Yu MONG</td>
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<td>Chee-Wei TAN</td>
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<td>Jian-Ping WANG</td>
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<td>BSc MSc NankaiU PhD Texas (Dallas)</td>
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<tr>
<td>Yuen-Tak YU</td>
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<td>BSc CertEd HKU GradDip PhD Melbourne</td>
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## Assistant Professor

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<td>Ted Chi-Yin CHOW</td>
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<td>BA, MPhil (HKPolyU) MSc PhD (Minnesota) MIEEE MACM SIGSPATIAL</td>
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<td>Gerhard Petrus HANCKE</td>
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<td>BEng MEng Pretona PhD Cambridge LLB UNISA SrMIEEE MACM MIEEE</td>
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<tr>
<td>Jacky Wai KEUNG</td>
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<td>BSc Sydney PhD New South Wales MACM MIEEE</td>
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<tr>
<td>Victor Chung-Sing LEE</td>
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<td>BSc MPhil PhD CityU HK MACM, MIEEE</td>
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<td>Howard Wing-Ho LEUNG</td>
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<td>BEng McGill MSc PhD Carnegie Mellon MIEEE</td>
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<td>Shuai-Cheng LI</td>
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<td>BSc MSc NUS PhD U of Waterloo</td>
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<td>Zheng LU</td>
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<td>BComp PhD NUS</td>
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<tr>
<td>Sarana NUTANONG</td>
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<td>PhD - University of Melbourne BEng - University of Melbourne</td>
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<tr>
<td>Cong WANG</td>
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<td>BEng MEng Wuhan Univ. PhD Illinois Inst. Tech. MACM MIEEE</td>
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<td>Ka-Chun WONG</td>
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<td>Jason Chun XUE</td>
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<tr>
<td>Qing-Xiong YANG</td>
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<td>BEng UST of China PhD UIUC</td>
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## University Lecturer

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<tr>
<td>Mang-Tang CHAN</td>
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<td>BSc MSc HKU PhD Reading CEng FBCS</td>
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## Instructor I

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<td>Ji-Ying WANG</td>
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<td>Raymond Hau-San WONG</td>
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<tr>
<td>Xiao-Hua JIA</td>
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<td>BSc MEng UST of China DSc Tokyo FIEEE</td>
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<td>Lu-Sheng WANG</td>
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<td>Qing-Fu ZHANG</td>
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<td>BSc Shanxi MSc PhD Xidian</td>
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