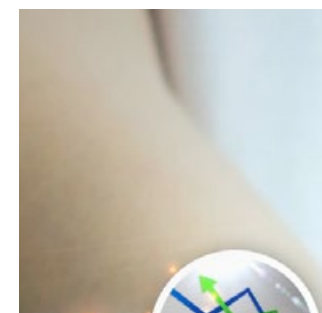


INFORMATION SYSTEMS TECHNOLOGY AND DESIGN



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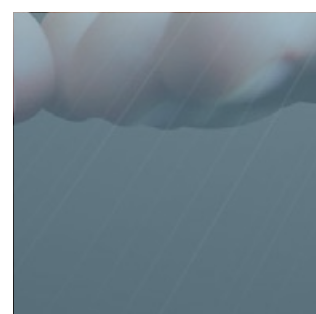
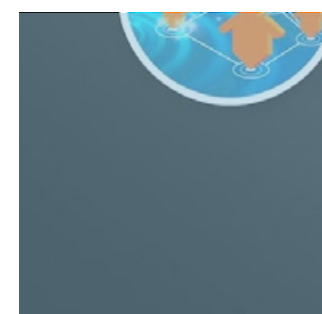
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PROFESSOR ADITYA MATHUR

HEAD OF PILLAR
INFORMATION SYSTEMS TECHNOLOGY
AND DESIGN (ISTD)

MESSAGE FROM HEAD OF PILLAR

Dear PhD Applicants,

Faculty in ISTD are actively engaged in cutting-edge research in audio engineering, cyber security, graphics and visualisation, human-computer interaction, image processing, information retrieval, machine learning, natural language processing, networks, signal processing, software engineering, and wireless and sensor networks. ISTD encourages interdisciplinary and collaborative research. Research projects grow out of real-world problems and are aimed at making social impact. ISTD believes in involving both undergraduate and graduate students in research. Doing so has helped ISTD faculty in creating diverse and vibrant research groups.

ISTD is the host for several SUTD-wide interdisciplinary research centres. These include Project GREaT for research and education in the area of gaming, and iTRUST that focuses on security of cyber physical systems. A Centre for Information Systems for Decision Making is in the process of being established and will focus on cyber security of enterprise systems. All centres involve faculty and students from multiple pillars and engage in cutting-edge, impactful research.

INFORMATION SYSTEMS TECHNOLOGY AND DESIGN (ISTD)

Course Overview

The PhD Programme in ISTD offers cross-disciplinary education and research opportunities in the fields of computer science, computer engineering and information systems.

The ISTD PhD programme aims to

- Train students to independently conduct quality scientific research
- Enable students to initiate their research programme as early as possible
- Graduate students with an in-depth knowledge in at least one area of their choice
- Graduate students who have been exposed to at least one interdisciplinary area

Programme Highlights

- Strong emphasis on interdisciplinary and collaborative research
- Participation in an innovation and entrepreneurship ecosystem
- World-class faculty with co-supervision flexibility
- Opportunities for industry internships and overseas research attachments
- Multi-disciplinary design experience
- Professional development programme and teaching experience

Careers

- Research/Teaching Positions
- Software Designer/ Architect, Software/ System Manager Consultant

Programme Structure

The residency period is between 3 to 5 years, and a typical 4 and 5-year ISTD PhD Programme will follow this structure:

5-Year Programme

Year 1	4 Courses + Seminar
Year 2	2 Courses + Seminar + Qualifying Exam
Year 3	Research
Year 4	International Attachment + Preliminary Exam
Year 5	Research + Thesis Defence

4-Year Programme

Year 1	4 Courses + Seminar
Year 2	2 Courses + Seminar + Qualifying Exam
Year 3	Research + Preliminary Exam
Year 4	Research + Thesis Defence

EXCELLENT FACULTY

**NGAI-MAN
(MAN) CHEUNG**
ASSISTANT PROFESSOR



PhD, University of Southern California

Research Interests:

- Image/video processing and analysis, image recognition
- Signal processing
- Multimedia coding and streaming
- Mobile image processing and analysis for medical applications
- Signal processing for cyber security

ACHIEVEMENTS:

- ACM Multimedia Open Source Competition - Honourable Mention 2011
- 7 U.S. patents granted in image and video processing

**COSTAS
COURCOUBETIS**
PROFESSOR



PhD, University of California, Berkeley

Research Interests:

- Economics of networks and of Internet technologies
- Pricing, regulation policy in telecommunications
- Game theory
- Networking

ACHIEVEMENTS:

- IST project Trilogy - Future Internet Award by EU

YU (JASON) GU
ASSISTANT PROFESSOR



PhD, University of Minnesota

Research Interests:

- Cyber physical systems
- Mobile computing
- Energy/battery management from embedded systems to smart grid
- System security

ACHIEVEMENTS:

- Best Paper Award, The IEEE Wireless Communications and Networking Conference 2013 (WCNC'13), 2013
- Best Paper Award, The 7th International Conference on Mobile Ad-hoc and Sensor Networks (MSN'11), 2011

STANLEY KOK
ASSISTANT PROFESSOR



PhD, University of Washington

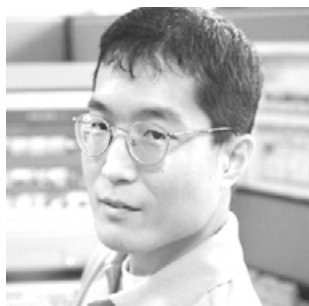
Research Interests:

- Multi-modal information retrieval
- Machine learning and artificial intelligence
- Audio analysis
- Natural language processing

ACHIEVEMENTS:

- Markov Logic Networks subject matter expert

HYOWON LEE
ASSISTANT PROFESSOR



PhD, Dublin City University

Research Interests:

- Human-computer interaction
- Interaction design
- Emerging interactivity
- Usability engineering
- Lifelogging

ACHIEVEMENTS:

- Passionate designer of applications leveraging emerging computational and interaction technologies
- Designer of shakeable mobile devices for a theme park to guide guests to achieve maximum rides with the least waiting time

WEI LU
ASSISTANT PROFESSOR



PhD, National University of Singapore

Research Interests:

- Natural language processing
- Machine learning
- Semantic processing
- Computational linguistics
- Text and data mining
- Artificial intelligence

ACHIEVEMENTS:

- Inventor of the 'Hybrid Tree' framework for connecting language and formal semantics
- Winner of the only Best Paper Award at EMNLP 2011

SIMON LUI
ASSISTANT PROFESSOR



PhD, The Hong Kong University of Science and Technology

Research Interests:

- Audio information retrieval
- Audio style retargeting
- Audio discrimination
- Computer music
- Mobile music
- Speech processing

ACHIEVEMENTS:

- Marie Curie Fellow 2011
- Several #1 best selling iPhone/iPad applications in Hong Kong, Taiwan, Malaysia, Indonesia and Canada, 2010-2011

ADITYA MATHUR
HEAD OF PILLAR AND PROFESSOR



PhD, Birla Institute of Technology and Science, Pilani, India

Research Interests:

- Information security in cyber physical systems
- Software testing, reliability and security

ACHIEVEMENTS:

- Author of top selling book "Foundations of Software Testing, 2nd edition", and "Start Concurrent: An Introduction to Problem Solving in Java with a Focus on Concurrency, 2013 Edition"
- Software testing, reliability and security subject matter expert

JUN SUN
ASSISTANT PROFESSOR



PhD, National University of Singapore

Research Interests:

- Formal methods
- Software engineering
- Program analysis
- System verification
- System security

ACHIEVEMENTS:

- Co-developed a software toolkit PAT which has attracted thousands of registered users and has been used by multiple industrial companies

DAVID YAU
PROFESSOR



PhD, University of Texas, Austin

Research Interests:

- Network security and privacy
- Cyber physical system security and privacy
- Networking and wireless sensor networks
- Smart grid and demand response

ACHIEVEMENTS:

- Best Paper finalist (one of three), IEEE International Conference on Cyber Physical Systems, Networks, and Applications (CPSNA), 2013
- Mark Weiser Best Paper finalist (one of three), IEEE International Conference on Pervasive Computing and Communications (PerCom), 2013

SAI-KIT YEUNG
ASSISTANT PROFESSOR



PhD, The Hong Kong University of Science and Technology

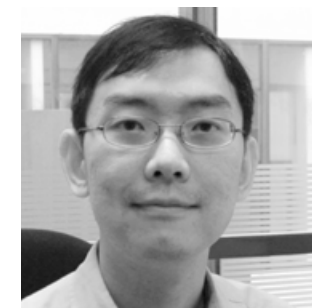
Research Interests:

- Computer vision
- Computer graphics
- Image/video processing
- Fabrication
- Medical imaging
- Computational photography
- Human computer interaction

ACHIEVEMENTS:

- Make it Home and DressUp! - Patented
- DressUp! - Patented

YUE ZHANG
ASSISTANT PROFESSOR



PhD, University of Oxford

Research Interests:

- Machine learning
- Natural language processing
- Machine translation
- Information retrieval
- Artificial intelligence

ACHIEVEMENTS:

- Natural language processing and machine learning subject matter expert
- Leading journals reviewer for Cambridge University Press

NURTURING PLACE

iTRUST

iTRUST is a multidisciplinary research centre funded by Singapore's Ministry of Defence. The focus of iTRUST is on cyber security. Systems of interest include large infrastructure of national importance as well as cyber devices used in health care. Examples of infrastructure systems include the power grid, water treatment, and oil refineries. Examples of cyber devices include pacemakers, defibrillators, insulin pumps, and VNS implants.

iTRUST researchers are drawn from across SUTD. A strong collaboration with MIT enriches the depth, breadth, and quality of research.

iTRUST researchers focus on the development of advanced tools and methods to ensure security and safety of current and future cyber physical systems.

PROJECT GREaT

SUTD is building Asia's leading game design research and training programme that will meet industry needs, nurture entrepreneurs and grow a robust and sustainable pipeline of innovative games that will help to grow Singapore's game industry. SUTD does this by pioneering a unique model of Game Research, Education, and Training that will propel the Singapore game R&D landscape to new heights.

- Research
SUTD is focusing on three areas of research in games. These are: (a) massive multiplayer cloud gaming on mobile devices, (b) gaming to enhance rehabilitation of stroke victims, and (c) futuristic gaming. Faculty across the SUTD pillars participate in these research projects. All research is conducted in collaboration with selected faculty from Nanyang Technological University (NTU) and experts in the area of rehabilitation for stroke victims.

- SUTD Game Laboratory
A key element of Project GREaT is the SUTD Game Lab, which began in October 2012 when SUTD was picked by the Singapore government to be the university to continue the work of the Singapore-MIT GAMBIT Game Lab (GAMBIT). It aims to build on the success of GAMBIT to create opportunities to seed new innovators, entrepreneurs and innovations for Singapore, the region, and possibly even the world.

TEMASEK LABORATORIES

Temasek Laboratories is a centre for excellence in defence-related research. It specialises in systems design and integration - such as unmanned systems, information systems, soldier systems and engineering systems.



SUTD-MIT INTERNATIONAL DESIGN CENTRE (IDC)

The IDC intends to become the world's premier scholarly hub for technologically intensive design. The IDC is built upon the development of the following foundations:

- Innovations for societal needs
- Intellectual merit
- Leaders for an innovation-based economy

Design "Grand Challenges" >>>



LEE KUAN YEW CENTRE FOR INNOVATIVE CITIES (LKY CIC)

The LKY CIC is established to stimulate thinking and research on the critical issues of cities and urbanisation, and to provide breakthrough urban solutions. It is one of the first university centres to focus on the integrated use of technology and design to derive solutions for urban planning, design, development and management. The Centre will study the confluence of governance, social management frameworks and technology and design innovations.

LKY CIC's research will be pursued on three levels. Firstly, it will investigate urban issues and solutions which are of national concern. Secondly, as Singapore is a pace setter in many fields, and what is relevant in Singapore will likely have regional significance in the Asia-Pacific, it will examine urban issues of regional application. Thirdly, it will investigate urban issues of global concern.

RELEVANT RESEARCH



NGAI-MAN (MAN) CHEUNG

- "Medical Image Analysis using Smartphones"
Smartphone-based medical image analysis for cancer diagnosis, in collaboration with National Skin Centre - Singapore and Stanford University Medical School.
- "Multiplayer Mobile Cloud Gaming"
Next generation multiplayer mobile cloud gaming, in collaboration with Nanyang Technological University (NTU), Zhejiang University (ZJU), The Hong Kong University of Science & Technology (HKUST).
- 3D Video Processing / Streaming Research
Collaboration with National Institute of Informatics, Japan, HKUST, ZJU, University of Science and Technology of China (USTC), University of Southern California (USC).

COSTAS COURCOUBETIS

- Economics and pricing of sensor networks, security economics in cyber physical systems

JASON (YU) GU

- Cyber physical system protection
- Personalised and continuous rehabilitation via serious gaming
- Demand focused smart energy management in end user environments for sustainable cities
- Pervasive sensing-based social network study
- Principles and foundations of wireless energy distribution sensor networks
- Unleashing the power of social networks for the next generation of cyber physical systems
- Low duty cycle communication in wireless sensor networks

HYOWON LEE

- Lifelogging
An activity to record all your day-to-day life in a digital way. There are many interesting novel application areas for lifelogging.
- Future-oriented Applications
To research, explore and design future-oriented applications to support Lifelogging activities.

WEI LU

- "How to Uncover Underlying Meaning from Texts"
Highly challenging. Often regarded as the holy grail of natural language processing or even artificial intelligence research.

- "Robust Knowledge Inference"
Address the challenging problem of large scale knowledge inference that automatically discovers new knowledge from existing ones.

SIMON LUI

- "Combining Music Therapeutic Knowledge and the Science of Recovery In Game Design for Stroke Rehabilitation"
- "Audio Aid Design for the Disabled People"

ADITYA MATHUR

- What principles govern the design of a safe and secured cyber physical system?
- How to automate the generation of attack vectors for complex cyber physical systems?

TONY QUEK

- Current research topics include cooperative networks, heterogeneous networks, green communications, smart grid, wireless security, compressed sensing, big data processing, and cognitive radio.

JUN SUN

- Research interests in developing scalable, reliable program testing/verification tools which could greatly reduce software bugs and security vulnerabilities.

SAI-KIT YEUNG

- "High Quality 3-Dimension Image Reconstruction"
A unified approach for high-quality 3D reconstruction
- "Multiplayer Mobile Cloud Gaming"
Rendering for next generation multiplayer mobile cloud gaming
- "Furniture & Fashion Designing"
A learning optimisation paradigm for design processes
- "Medical Imaging for Human Brain"
Accurate hemodynamic data assimilation with MRA/CBV imaging
- "Applications of Human-Computer Interaction (HCI)"
Human-Computer Interaction (HCI): Applications to vision, graphics and computational photography

YUE ZHANG

- Deep Language Understanding
Research goal is for computers to understand human languages with high reliability. It is based on the project ZPar and included deeper studies of syntactic and semantic analysis.

- Machine Translation
This is to explore new architecture in supporting machine translation.

- High Level Applications
How to apply theories in enhancing our lifestyle. Some interesting research topics are stock market prediction based on Internet texts, new event detection from social media and the analysis of literature.

ACHIEVEMENTS



NGAI-MAN (MAN) CHEUNG

- Supervised student Fang Lu (HKUST) who joined the USTC faculty and became a member of China C9 League, top 9 universities in China.
- Supervised student Hossein Nejati (NUS) who joined the MIT Department of Brain and Cognitive Sciences under the SUTD-MIT postdoctoral programme.
- Supervised researcher Mohammad Rostami, who joined the University of Pennsylvania with a full PhD scholarship. He was concurrently offered a full PhD scholarship by Imperial College London.

COSTAS COURCOUBETIS

- Supervised MS/PhD students from network research group spin-off a company named FORTHnet, which is currently the 3rd largest ISP in Greece.

WEI LU

- Led the Machine Reading project at University of Illinois at Urbana-Champaign, USA.
- Co-supervised student Quang Do, University of Illinois at Urbana-Champaign and assisted him in publishing a paper for EMNLP 2012 - 'Joint Inference for Event Timeline Construction'. He developed 1st Model to construct a globally coherent timeline for all events appeared in a complete document.

SIMON LUI

- "DaEnhanced Calendar iPhone Application for University Students" Supervised SUTD undergraduate students Weilong Liu, Tian Xia, Lu Xu and Bolun Wang developed a unified platform for all students to view their schedule and receive push notification of what is happening in school. It had greatly benefitted all students in the school.
- "Showroom" Supervised SUTD undergraduate students Edward Tiong, Olivia Seow and Yong Cheng Toh of research Singapore-MIT Alliance for Research and Technology (SMART) developed a system allowing lecturers to interact with students by offering a drawable PowerPoint presentation, with student Q&A functionality. It had greatly enhanced the entire learning experience.

ADITYA MATHUR

- Supervised numerous research projects conducted under iTRUST and Project GREaT.

TONY QUEK

- IEEE SPAWC 2013 Best Student Paper Award 1st Singapore faculty member to have won this award that was awarded to student, Matthias Wildemeersch, University of Twente, Netherlands.
- A*STAR PhD Scholars Best Poster Award, 3rd Prize Co-supervised researcher, Liang-Ze Wong, Institute for Infocomm Research, had won this award.

JUN SUN

- Enhancing Reliability of Cyber Physical Systems (Staff - Dr. Yongzheng Wu, Dr. Shaojie Zhang) This project aims to improve reliability of Cyber Physical Systems like smart home, wireless sensor networks, etc.
- A Formal Method for Quality Assessment of Large Scale Software Systems (Staff - Dr. Tian Huat Tan) This project aims to improve reliability of Cyber Physical Systems like smart home, wireless sensor networks, etc.
- CPSVerif: a Verifier and Synthesiser for Secure Cyber Physical Systems. This project aims to develop a software toolkit which is capable of not only identifying security vulnerabilities in Cyber Physical Systems but also guiding the designer in fixing them.
- Program Analysis through Testing, Learning and Verification. This project aims to develop a software toolkit which integrates state-of-the-art testing, learning and verification techniques for the purpose of systematic bug finding.

DAVID YAU

- Supervised Varun Badrinath Krishna who is a key developer for ADSC's energy monitoring and analytics middleware. Varun also contributed to the paper on the stability of smart grid real-time pricing under integrity and delay attacks. The paper got into 2013 ACM CCS, a top international conference in systems security.
- Supervised Hoang Hai Nguyen who is another key contributor to ADSC's energy monitoring and analytics middleware. A quick and meticulous learner, he developed expertise in power system simulations (PowerWorld) as well. His results contributed to a paper on profit-optimal load curtailments that appeared in IEEE TSG, a flagship publication venue for smart grid research.
- Supervised Cheng Cheng who is an ambitious and high-power systems builder who likes extreme coding challenges including hacking kernels. VMware wants him so badly that Cheng is constantly juggling between industry and academia, with no verdict yet who will win in the end.

SAI-KIT YEUNG

- Together with Professor Demetri Terzopoulos, co-supervised student Lap-Fai Yu at University of California, Los Angeles (from 2010).
- Led collaborative projects with Microsoft Research Asia

YUE ZHANG

- Supervised students, Yang Liu, University of Cambridge, and Muhua Zhu and Meishan Zhang, had published their works in top conferences such as ACL and COLING.

JOIN US

How to Apply

Applicants should possess at least a Bachelor's degree with excellent academic standing.

Submit your online application at <https://admissions.sutd.edu.sg/phd> with the following.

- Transcripts and certificates for any academic degrees earned or currently in progress.
- Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) score report, if the medium of instruction at your undergraduate institution was not English.
- Graduate Record Examinations (GRE) score report (optional).
- Letters of recommendation from at least 3 references.
- A Statement of Objectives of about 3,000 words.

Shortlisted applicants may be asked to attend Skype interviews or in some cases, face-to-face or telephone interviews may be arranged. Please refer to http://www.sutd.edu.sg/phd_application.aspx for details.

SUTD President's Graduate Fellowship

This bond-free fellowship (up to 5 years) is open to all nationalities, and is awarded on a competitive basis to outstanding full-time PhD Programme applicants (e.g. those with a Bachelor's Degree 1st Class Honours or equivalent). The fellowship supports:

- Full tuition fees
- Monthly stipend of S\$3,000 for each awarded scholar and up to 10% additional stipend for Singapore Citizens and Permanent Residents
- Annual conference funding
- Opportunities for overseas research attachments and/or industry internships

Contact Us

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Website: <http://istd.sutd.edu.sg>



ISTD website

Information is correct as of November 2013.



SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN

Established in collaboration with MIT



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