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
- Multidisciplinary 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
<table>
<thead>
<tr>
<th>Year</th>
<th>Courses + Seminar</th>
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<tbody>
<tr>
<td>Year 1</td>
<td>4 Courses + Seminar</td>
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<tr>
<td>Year 2</td>
<td>2 Courses + Seminar + Qualifying Exam</td>
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<tr>
<td>Year 3</td>
<td>Research</td>
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<tr>
<td>Year 4</td>
<td>International Attachment + Preliminary Exam</td>
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<tr>
<td>Year 5</td>
<td>Research + Thesis Defence</td>
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### 4-Year Programme
<table>
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<th>Year</th>
<th>Courses + Seminar</th>
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<tr>
<td>Year 1</td>
<td>4 Courses + Seminar</td>
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<tr>
<td>Year 2</td>
<td>2 Courses + Seminar + Qualifying Exam</td>
</tr>
<tr>
<td>Year 3</td>
<td>Research + Preliminary Exam</td>
</tr>
<tr>
<td>Year 4</td>
<td>Research + Thesis Defence</td>
</tr>
</tbody>
</table>
EXCELLENT FACULTY

NGAI-MAN (MAN) CHEUNG
ASSISTANT PROFESSOR
PhD, University of Southern California
Research Interests:
• Image/video processing and analysis, image recognition
• Signal processing
• Multimodal processing 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

YU (JASON) GU
ASSISTANT PROFESSOR
PhD, University of Washington
Research Interests:
• Human-computer interaction
• Interaction design
• Emerging interactively
• Usability engineering
• Lifelogging

ACHIEVEMENTS:
• Invented the ‘Hybrid Tree’ framework for connecting language and formal semantics
• Winner of the only Best Paper Award at EMNLP 2011

HYOWON LEE
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:
• Software testing, reliability and security subject matter expert

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

WEI LU
ASSISTANT PROFESSOR
PhD, Dublin City University
Research Interests:
• Human-computer interaction
• Interaction design
• Emerging interactively
• 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

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, National University of Singapore
Research Interests:
• Natural language processing
• Machine learning
• Semantic processing
• Computational linguistics
• Text and data mining
• Artificial intelligence

ACHIEVEMENTS:
• Best Paper Award, The IEEE Wireless Communications and Networking Conference 2013 (WCNCT), 2013
• Best Paper Award, The 7th International Conference on Mobile Ad-hoc and Sensor Networks (MSN'T), 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

TONY QUEK
ASSISTANT PROFESSOR
PhD, Massachusetts Institute of Technology
Research Interests:
• Networking
• Resource allocation
• Signal processing
• Wireless communications
• Network science

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

ADITYA MATHUR
HEAD OF PILLAR AND PROFESSOR
PhD, Birla Institute of Technology and Science, Pilani, India
Research Interests:
• Cyber physical systems
• Network security and privacy
• Cyber security

ACHIEVEMENTS:
• Best Paper finalist (one of three), IEEE International Conference on Cyber Physical Systems, Networks, and Applications (CPSnA), 2013

SAI-KIT YEUNG
ASSISTANT PROFESSOR
PhD, The Hong Kong University of Science and Technology
Research Interests:
• Formal methods
• Software engineering
• Program analysis
• System verification
• System security

ACHIEVEMENTS:
• Make it Home and DressUp! - Patented
• DressUp! - Patented

YUE ZHANG
ASSISTANT PROFESSOR
PhD, University of Oxford
Research Interests:
• Natural language processing
• Machine learning
• Natural language processing

ACHIEVEMENTS:
• Natural language processing and machine learning subject matter expert
• Leading journal 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 infrastructures 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”

Design with the Developing World

Sustainable Built Environment

ICT-Enabled Devices for Better Living

Global Collaboration

Experimental Design

Design Computation

Visualisation and Prototyping

SUTD PhD PROGRAMME

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), Shanghai Jiao Tong 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

LEEE 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.

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
• Unlinking 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.

• 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).

• 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).

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/CEV 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 ZHAI 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.

• 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.

• Low duty cycle communication in wireless sensor networks
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 Najati (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 COURCEBETIS
• 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 Du, University of Illinois at Urbana-Champaign and assisted him in publishing a paper for EMNLP 2017 - Joint Workshop 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 Weiling 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 benefited all students in the school.
• “Showroom” Supervised SUTD undergraduate students Edward Tong, Olivia Seow and Yang 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 TRUST and Project GREAT.

TONY QUEK
• IEEE SPAWC 2013 Best Student Paper Award 1st Singaporean 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. Yongzhe 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.

DAVID YAU
• Supervised Varun Radhakrishna 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 faces 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.

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

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.
• Text 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) scores (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.

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Website: http://istd.sutd.edu.sg
Information is correct as of November 2013.

SUTD PhD PROGRAMME