

SUTD PhD PROGRAMME

JUST AS IN DESIGNING GREEN CITIES  
OF THE FUTURE, YOUR RESEARCH NEEDS  
EXPERTISE FROM DIFFERENT FIELDS.



SINGAPORE UNIVERSITY OF  
TECHNOLOGY AND DESIGN

Established in collaboration with MIT

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## A Note from the President

### **Dear PhD Programme applicants,**

We welcome you to embark on your PhD journey with us - the Singapore University of Technology and Design, established in collaboration with the Massachusetts Institute of Technology. Together with our partners such as Zhejiang University, we aim to develop a new generation of technologically grounded innovators to better the world around us. Having supervised dozens of PhD students and as an Institute Professor and former Dean of Engineering at the Massachusetts Institute of Technology, I have come to understand that there is nothing more important to achieving breakthrough research than working alongside the very best faculty and student colleagues.

To this end, we at SUTD have assembled a team of the highest calibre international faculty from the world's very best institutions, all eager to collaborate with you in our PhD Programme. By being immersed in SUTD's fluid, stimulating, open environment, you will be able to leverage and tap on a wide range of expertise and intellectual domains, developing multi-disciplinary perspectives that characterise many of the world's leading advancements in today's research. At SUTD, we share your passion for innovation and dedication to cutting-edge research. We look forward to helping you, and indeed inspiring you, to become technologically grounded leaders, ready to launch exciting careers in academia and industry.

**Professor Thomas Magnanti**  
**President**  
**Singapore University of Technology and Design**

# About SUTD

The **Singapore University of Technology and Design (SUTD)** is the first university in the world to integrate the concept of design and innovation as a common thread in research and education. We attract and groom the very best faculty, staff and students to create an environment that will propel SUTD to become an intellectual hub and engine of growth for Singapore, Asia and the world.



SUTD EAST COAST CAMPUS  
DESIGNED BY UNSTUDIO AND DP ARCHITECTS.  
TO BE COMPLETED IN 2014.

# Research Centres

**The presence of these vibrant research centres within SUTD offers students many rewarding research opportunities:**

## SUTD-MIT INTERNATIONAL DESIGN CENTRE (IDC)

The IDC intends to become the world's premier scholarly hub for technologically intensive design. It is built upon the foundations of innovations for societal needs, quality intellectual merit and creating leaders for an innovation-based economy.

## 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 and urban design, development and management. The Centre will study the confluence of governance, social management frameworks, and technology and design innovations.

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“The Lee Kuan Yew Centre for Innovative Cities offers PhD students an exciting opportunity to network, learn and collaborate with leading urban thinkers and innovators from all around the world. They will conduct multi-disciplinary research that solve tough challenges in areas such as spatial density, aging demographics, energy efficiency, transportation networks, and big data.

Urbanisation is the great issue of our time and there is no better place to be immersed in it than in Singapore. Singapore stays on the forefront with innovative solutions that are often admired and studied by many cities. PhD students will find many exciting opportunities to pursue cutting-edge research, and their research will be able to make an impact in Singapore, the region, and beyond.”

Ambassador-at-Large Chan Heng Chee  
Chairman  
Lee Kuan Yew Centre for Innovative Cities

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“I am excited to see SUTD launch its PhD Programme. MIT's joint research project with SUTD, the SUTD-MIT International Design Centre, thrives on vibrant exchange and interaction between MIT and SUTD faculty and researchers, and it will be terrific for both the Centre and for prospective students to be part of this mix.”

Professor Sanjay Sarma  
Director  
MIT-SUTD Collaboration Office

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## TEMASEK LABORATORIES

The 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.

## iTRUST

The iTRUST is a centre for interdisciplinary research in trustworthy infocomm systems. It conducts fundamental and applied research in the broad areas of information and system security, including large and complex cyber physical systems.

## SUTD-GREaT LAB (SGLab)

The SGLab conducts cutting-edge research in the area of games and their development, for entertainment and beyond. In addition, the lab provides educational and training opportunities to students and engineers in Singapore and the broader region.

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“I am thrilled at the launch of SUTD's PhD Programme and extend our congratulations to SUTD.

ZJU and SUTD have been conducting joint research and developing design workshops, student exchanges and course electives. The potential involvement of PhD students will definitely enrich faculty collaboration and student exchange between the two universities.”

Professor Wu Ping  
Vice President for International Affairs  
Zhejiang University (ZJU)

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# Highlights of the SUTD PhD

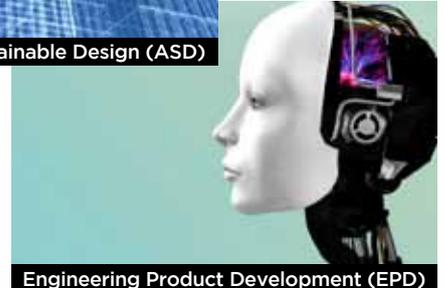
**SUTD offers PhD degrees in the following areas:**

**Architecture and Sustainable Design (ASD)  
Engineering Product Development (EPD)  
Engineering Systems and Design (ESD)  
Information Systems Technology and Design (ISTD)**

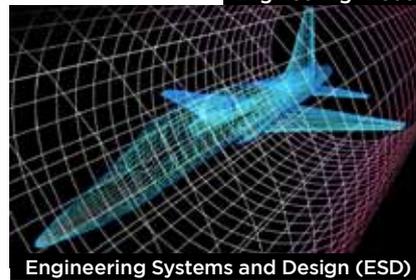
- Emphasises interdisciplinary and collaborative research
- Provides access to world-class faculty at the forefront of their fields, recruited from the very best universities around the world with broad representation from the United States, Europe, Asia, and Singapore
- Caters for a mentoring-intensive environment with co-supervision flexibility, allowing students to work with multiple faculty members
- Offers opportunities for an international research experience through overseas research exchanges at top universities and research institutions worldwide
- Enables close research collaborations and exposure to industry through local or overseas internships
- Allows for participation in a multi-disciplinary design experience and teaching opportunities as instructors
- Enriches students through a professional development opportunities programme focusing on the soft skills, including communication, leadership and entrepreneurship.



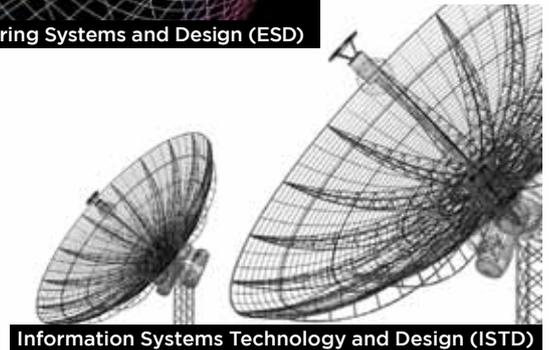
Architecture and Sustainable Design (ASD)



Engineering Product Development (EPD)



Engineering Systems and Design (ESD)



Information Systems Technology and Design (ISTD)

## Singapore - A vibrant research environment

Singapore, being a nexus between the east and the west, uniquely positions our graduates to take advantage of opportunities both in Asia and around the world. The Agency for Science, Technology and Research (A\*STAR) is Singapore's lead agency for advancing world-class research in biomedical sciences, and physical sciences and engineering; and in grooming scientific talent to drive economic growth and transform Singapore into a vibrant knowledge-based economy. Singapore's National Research Foundation (NRF) has also been instrumental in encouraging cutting-edge research in Singapore.

"In an era where technological innovations are key to global sustainability, economic competitiveness and quality of life, engineers with superior design skills and innovation capacity are in high demand. SUTD's PhD Programme is ideally suited to train individuals who want to be at the forefront of the profession, developing solutions for the grand challenges confronting the world."

Professor Chou Siaw Kiang  
President  
Institution of Engineers, Singapore

# SUTD Leaders



**Professor Thomas Magnanti**

President

PhD in Operations Research, Stanford University

Prof Magnanti is an Institute Professor and former Dean of Engineering at MIT. He has devoted much of his professional career to education combining engineering and management, and to teaching and research in various aspects of large scale optimisation. He has focused on educational innovation, industrial and international partnerships, technology-based entrepreneurship, diversity, and innovation in many emerging technical domains. He has received numerous educational and research awards and honorary degrees, has been president of three professional societies and editor of a major journal in his field, and served on several corporate and university boards. He is a member of the U.S. National Academy of Engineering and the American Academy of Arts and Sciences.



**Professor Chong Tow Chong**

Provost

Sc.D in Electrical Engineering, Massachusetts Institute of Technology

Prof Chong has a 15-year career in A\*STAR as Executive Director of the Science and Engineering Research Council and Data Storage Institute, and spearheaded the research agenda in transforming Singapore into a knowledge-based and innovation-driven economy. Prof Chong also held a concurrent appointment as a Professor with the Department of Electrical and Computer Engineering in the National University of Singapore. He has been awarded numerous awards and scholarships, including the President's Scholarship, the Public Service Commission Scholarship, the President's Science and Technology medal in 2010 and the Public Administration Medal (Silver) at the National Day Awards in 2004. He authored and co-authored more than 350 publications in international refereed journals and holds 20 patents. His research has been focused in the field of advanced memory and high-speed electronic and photonic devices for next generation information science and technology.



**Professor Pey Kin Leong**

Associate Provost

PhD in Electrical Engineering, National University of Singapore

Prof Pey was previously Head of the Microelectronics Division, Director of the Microelectronics Centre and Director of the Nanyang Nanofabrication Centre at the Nanyang Technological University, Singapore. He holds a concurrent Fellowship appointment at the Singapore-MIT Alliance (SMA), and is a senior member of IEEE and an IEEE EDS Distinguished Lecturer. He has published more than 310 technical publications (with 160 being internationally refereed) and holds 34 US patents. He is a pioneer in ultrathin gate dielectric reliability research in nanoscale CMOS devices.



**Professor Martin L. Dunn**

Associate Provost,

Research PhD in Mechanical Engineering, University of Washington

Prof Dunn directed the Mechanics of Materials and Design of Engineering Materials Systems programmes at the US National Science Foundation (NSF). He served the NSF while on leave from the University of Colorado, Boulder where he was the Associate Dean for Research in the College of Engineering and Applied Science, a Professor of Mechanical Engineering (and former Department Chair), and held the Victor Schelke Endowed Chair. He has also held positions at Sandia National Laboratories and the Boeing Company. Along with his students, his research on the mechanics and physics of materials and structures has been widely published, cited, and recognised. He is a Fellow of the American Society of Mechanical Engineers.

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# SUTD Leaders

## HEAD OF PILLARS



**Professor Kristin L. Wood**

Head of Pillar, Engineering Product Development (EPD) /  
Co-Director, SUTD-MIT International Design Centre  
PhD in Mechanical Engineering, California Institute of Technology

Prior to joining SUTD, Prof Wood was the Cullen Trust Endowed Faculty Professor in Engineering and University Distinguished Teaching Professor at The University of Texas at Austin. His research focus is in the areas of innovation processes, ideation methods, design-by-analogy, advanced manufacturing processes, such as Solid Freeform Fabrication, methods in product development and innovation, design for manufacturing and tolerance methods, machine-system design, design for product flexibility, design transformer theory, reverse engineering, and design teaching and learning methods. He has received numerous national and international awards in engineering education, teaching and design research.



**Professor Saif Benjaafar**

Head of Pillar, Engineering Systems and Design (ESD)  
PhD in Industrial Engineering, Purdue University

Before joining SUTD, Prof Benjaafar was Distinguished McKnight University Professor at the University of Minnesota where he also served as Director of Industrial & Systems Engineering and Director of the Centre for Supply Chain Research. He was a Distinguished Senior Visiting Scientist at Honeywell Laboratories and a Visiting Professor at universities in France, Belgium, Hong Kong, China and Singapore. He is a fellow of IIE. His influential research on supply chain management and operations has been widely published and recognised by numerous awards and honours. He serves on the editorial board of several journals and has been a consultant for several leading companies and organisations.



**Professor Aditya P. Mathur**

Head of Pillar, Information Systems Technology and Design (ISTD)  
PhD in Electrical Engineering, Birla Institute of Technology & Science

Prior to joining SUTD, Prof Mathur was the Head of the Department of Computer Science at Purdue University. His research spans software testing, reliability, and process control. His foundational work, published in over 130 papers, relates to investigations into the effectiveness of testing techniques and their applicability to the testing of sequential and distributed software systems, methods for the estimation of software system reliability, and techniques and tools for managing a collection of Internet-enabled devices. He has authored several textbooks. His most well-known book "Introduction to Microprocessors" was the first on the subject in India and led to the initiation and subsequent proliferation of undergraduate courses in microprocessors.

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# Pillar Spotlight

## ARCHITECTURE AND SUSTAINABLE DESIGN (ASD)

### Overview

The PhD Programme in ASD is tailored for highly creative and motivated individuals who wish to engage in intensive research related to the built environment. It covers a broad range of subjects, representing the cutting edge of design investigation. Based on a multi-disciplinary approach, it covers areas such as architecture, design technology, urban design, urban planning, and environmental studies, providing rich opportunities for diverse approaches of investigation.

### Research Areas

- Architecture and sustainable design and practice
- Innovative city design and development
- Environmental policy and planning
- Computation pertaining to the description, generation, and construction of architecture
- Development and application of advanced technology for buildings
- Historical, theoretical, and critical approaches to architectural design

### Careers

Our graduates can look forward to a range of prestigious positions in the architecture and building industry, and academia.

#### *Student Type*

*Suitable for students with a background in architecture and related disciplines.*



ASD website  
<http://asd.sutd.edu.sg>

## ENGINEERING PRODUCT DEVELOPMENT (EPD)

### Overview

The PhD Programme in EPD provides a comprehensive and intensive approach in the study of products and their design, whose development cuts across traditional disciplinary boundaries. Through a combination of cutting-edge research and a sound understanding of design principles, students will engage in the development of engineering products to meet society's needs and also in the exploration of new scientific breakthroughs as the emerging technology for future applications.

### Research Areas

- Bio-medical engineering, medical devices and healthcare
- Design theory and science
- Innovation and creativity
- Electronics and photonics
- Robotics, transformers and unmanned platforms
- Energy harvesting and alternative energies
- Materials, ceramics and nanomaterials
- Complex dynamic systems and controls
- Imaging, infocomm and digital media
- Integrated circuits, sensors and semiconductors
- Wireless networks and smartgrid
- Design of quantum systems
- Advanced manufacturing, innovative and rapid prototyping

### Careers

Our graduates have the potential to be leaders in academia, research institutions, industry and start-up companies. Career opportunities span broad technical areas such as robotic systems, automated systems, aerospace, microelectronics, optoelectronics, information technology, digital media, healthcare, energy, defence, manufacturing industries and many others.

#### *Student Type*

*Suitable for students with different backgrounds, such as physics, chemistry, electrical / electronic engineering, mechanical engineering, chemical engineering, materials science and other relevant fields.*



EPD website  
<http://epd.sutd.edu.sg>

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# Pillar Spotlight

## ENGINEERING SYSTEMS AND DESIGN (ESD)

### Overview

Engineering systems entail large scale complex systems whose performance and function depend both on their technology and on the socio-economic context within which they operate. The ESD PhD Programme aims to produce the next generation of engineering systems researchers and thinkers. It provides students with a strong technical foundation and emphasises interdisciplinary and collaborative research. ESD faculty are engaged in leading edge research in a wide range of disciplines and applications, using a variety of approaches and methodologies, including analytical, empirical and experimental.

### Research Areas

- Operations research broadly defined, including optimisation, stochastic modelling, statistics, game theory, and control science
- Operations management with application to manufacturing, services, and the public sector
- Areas at the interface with economics, public policy, organisational behaviour, finance, and marketing
- Large scale complex systems, including supply chains and logistics, transportation systems, healthcare delivery, financial services, telecommunication systems, energy production and distribution, critical infrastructures, and security and defence

### Careers

Our graduates will qualify for academic positions in schools of engineering, business, economics, statistics, applied mathematics, public policy, and public health among others. Our graduates will also qualify for research positions in industries that can leverage analytics (data, algorithms and computing) into better decisions.

#### *Student Type*

*Students with a variety of backgrounds are welcome to apply. Particularly encouraged are students with undergraduate degrees in engineering, physics, mathematics, statistics, computer science, economics, business, and other related fields.*



ESD website  
<http://esd.sutd.edu.sg>

## INFORMATION SYSTEMS TECHNOLOGY AND DESIGN (ISTD)

### Overview

The PhD Programme in ISTD aims to nurture students to conduct cutting-edge research in information systems technology and design. ISTD offers cross-disciplinary education and research opportunities in the fields of computer science, computer engineering and information systems.

### Research Areas

- Information security
- Software engineering
- Wireless and sensor networks
- Multi-modal information retrieval
- Graphics and visualisation
- Human computer interface
- Machine learning and artificial intelligence
- Very large database systems
- Audio analysis
- Natural language processing
- Computer vision multimedia signal processing

### Careers

Our graduates will be poised for careers in research and teaching positions, as software designers/architects, software/system managers and consultants for technical companies among others.

#### *Student Type*

*Suitable for students with a background in computing or related disciplines.*



ISTD website  
<http://istd.sutd.edu.sg>



## Join Us

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

**Residency: 3 to 5 years (full-time)**

### Applications

- Submit your online application at <https://admissions.sutd.edu.sg/phd>
- Shortlisted applicants may be asked for Skype/telephone interviews or, in some cases, face-to-face interviews may be arranged.

### SUTD President's Graduate Fellowship

This 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 First Class Honours or equivalent).

The Fellowship provides for:

- 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 support
- Opportunities for overseas research exchanges and/or industry internships

The Fellowship is bond-free and does not require a minimum service period.

### Contact Us

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Singapore University of Technology and Design  
20 Dover Drive, Singapore 138682

 [www.sutd.edu.sg/phd](http://www.sutd.edu.sg/phd)     [phd@sutd.edu.sg](mailto:phd@sutd.edu.sg)



PhD website



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