



# SUTD HONOURS AND RESEARCH PROGRAMME (SHARP)

A BETTER WORLD BY DESIGN.

**SUTD**  
SINGAPORE UNIVERSITY OF  
TECHNOLOGY AND DESIGN





Prof. Ye Ai and his team developed an innovative and highly efficient single cell sorting technology that holds great potential for non-invasive cancer diagnosis and is a big leap towards precision medicine in cancer treatment.

Technology and design are the cornerstones of ensuring society's prosperity and well-being. Multi-disciplinary research is essential in transforming the frontiers of scientific knowledge and technological advancement to create breakthrough solutions to address current and future trends in healthcare, aviation, artificial intelligence, cities and others.

The SUTD Honours and Research Programme (SHARP) is a premier programme for academically bright students with a highly inquisitive mind, and who may aspire to pursue a research-related career later in universities, research labs and high tech industries.

Through close mentorship and a research programme that stretches your technical ability, equips you with research skills, and immerses you in the international world of research, SHARP will nurture you into a future researcher capable of developing breakthrough technologies which will transform industries. A close 1:1 research supervision between you and a faculty member will allow you to learn and to produce high quality research that will be critical for future studies in graduate schools.

Upon graduating with a **Bachelor of Engineering (B.Eng)** or **Bachelor of Science (B.Sc)**, you will have the option of pursuing a **Doctor of Philosophy (PhD) in Engineering or Master of Engineering (M.Eng) (Research)** with SUTD or applying for overseas graduate schools.

## PROGRAMME HIGHLIGHTS AND SCHOLARSHIP

SHARP builds upon SUTD's interdisciplinary learning approach across products, systems, information technology and the built environment, and stretches you by providing in-depth technical training in research. All SHARP students will have the opportunity to explore various research topics before finalising their research project in Term 6, which will culminate in a final research thesis in Term 8. The research projects may include, but are not limited to, those offered in SUTD's four strategic growth areas – Aviation, Artificial Intelligence, Cities and Healthcare.

During your undergraduate studies, you will get the chance to work closely with and be mentored by faculty and partake in fully-funded research projects. In particular, you can look forward to:

- Taking advanced classes during Freshmore year as pre-research training to deepen your foundation and knowledge in key subjects
- Conducting research as an undergraduate research assistant (with research stipends) under a faculty research group
- Gaining overseas exposure through a funded summer programme at a partner university under the Global Leadership Programme (GLP)
- Interning at local or overseas research institutes
- Visiting top overseas research institutes to learn from, and network with prominent scientists
- Presenting your research paper at funded overseas conferences
- Optional - Pursuing your postgraduate studies at SUTD or other overseas graduate schools

Outstanding students who are offered admission to SHARP will be awarded:

- Attractive SUTD-administered scholarships for the undergraduate studies
- \$7,500 in research stipends<sup>1</sup>
- \$7,500 in grants for conference travel, publication charge and other research related expenses

Awardees will also be granted priority consideration for hostel stay after the Freshmore year.

<sup>1</sup> Stipends will be capped at \$1,500 per term to be drawn down from Term 4 onwards upon approval to conduct a research project supported by a faculty member.

## EXAMPLES OF RESEARCH FOCI



### Healthcare

With the ageing population in Singapore and many other countries, you can contribute to the advancement of healthcare innovation in many areas, from providing technology-enabled solutions that address a wide range of pressing healthcare challenges, to optimising hospital infrastructure and new bio-medical products and systems.



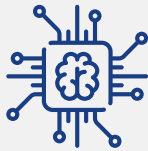
### Aviation

Solutions need to be developed to address the estimated doubling of Asia Pacific air traffic volume within the next 20 years. Airports, airlines, air traffic control and engineering services will need to innovate significantly to keep up with growth. Airports are one of the most complex systems to study and skills developed in the process can be applied to other engineering systems such as financial systems, supply chains and other urban systems.



### Cities

With an estimated 75% of the global population living in cities and megacities by 2050, associated urban challenges will be the leading focus of governments, universities, global think tanks and non-profit organisations. Solutions will have to be explored in the areas of housing, traffic, connectivity, water supply, flooding, energy and climate change.



### Artificial Intelligence (AI)

Smart Nation is Singapore's vision to be an economically competitive global city and a liveable home by harnessing digital technologies to build a brighter future. AI will be one of the key enablers to achieve this and is fast becoming a large part of our everyday life. It is the key technology in many present-day applications and will permeate many other industries such as architecture, city planning, logistics and aviation.



## EXAMPLES OF UNDERGRADUATE RESEARCH PROJECTS

### Artificial Electronic Synapses and Neurons for Neural Networks and Brain-Inspired Computing

Neuromorphic chips are computing systems based on the brain's neural networks, and are considered to be one of the two most promising future technologies, besides quantum computing. Neuromorphic engineering is actively being developed now and will have wide applications in areas such as intelligent robots, security, transportation, biotech, big data analysis, and more. In this project, students are exposed to multi-disciplinary neuromorphic engineering research and get the chance to design, develop and test artificial synapses, neurons and neuromorphic chips.

### Community Design in Singapore

The need to forge social cohesion, identity and belonging, and subsequently community, has always been an explicit agenda in the planning and design of public housing estates, urban amenities and facilities in Singapore. This project aims to map out and analyse the design and development of community spaces in Singapore, including housing precincts, community centres, playgrounds, parks, swimming pools, public libraries, hawker centres, etc.



Prof. Mohan Rajesh and his spider-like transformer robot. He runs a large cleaning robotics research programme funded by the National Robotics Programme. A first of its kind transdisciplinary effort between architecture and engineering, it includes designing spaces that are inclusive for robots.

## PROGRAMME STRUCTURE

The programme duration is 8 terms across 3.5 years for B.Eng or B.Sc. Students who choose to pursue their postgraduate studies may apply for admission to SUTD PhD or M.Eng (Research) programmes or overseas graduate schools.

### Honours sessions

To equip SHARP students with research methodology and to deepen their subject domain knowledge, advanced classes (known as honours sessions) will be offered on top of the regular Freshmore subjects in Terms 1 to 3.

### Research

From Terms 4 to 8, you will conduct an undergraduate research project with one or more faculty members, which will lead to an undergraduate thesis in Term 8.

### Global research exposure

During your two summer breaks, you will participate in an overseas summer programme and a research internship respectively. An optional short overseas field trip will be held during the Independent Activity Period (IAP) in Term 5.

## Academic Calendar for SHARP

YEAR	JAN – APR	MAY – AUG	SEP – DEC
Y1		<b>TERM 1</b> <ul style="list-style-type: none"> <li>Freshmore subjects</li> <li>Honours session</li> </ul>	<b>TERM 2</b> <ul style="list-style-type: none"> <li>Freshmore subjects</li> <li>Honours session</li> <li>Optional UROP<sup>2</sup></li> </ul>
Y2	<b>TERM 3<sup>3</sup></b> <ul style="list-style-type: none"> <li>Freshmore subjects</li> <li>Honours session</li> <li>Optional UROP<sup>2</sup></li> </ul>	<b>SUMMER</b> <ul style="list-style-type: none"> <li>Overseas summer programme</li> </ul>	<b>TERM 4</b> <ul style="list-style-type: none"> <li>Pillar subjects</li> <li>Research project</li> </ul>
Y3	<b>TERM 5</b> <ul style="list-style-type: none"> <li>Pillar subjects</li> <li>Research project</li> <li>Optional overseas study trip during Independent Activity Period (IAP)</li> </ul>	<b>SUMMER</b> <ul style="list-style-type: none"> <li>Research internship at local/overseas research institute</li> </ul>	<b>TERM 6<sup>4</sup></b> <ul style="list-style-type: none"> <li>Pillar subjects</li> <li>Research project</li> </ul>
Y4	<b>TERM 7</b> <ul style="list-style-type: none"> <li>Pillar subjects</li> <li>Capstone project</li> <li>Research project</li> </ul>	<b>TERM 8</b> <ul style="list-style-type: none"> <li>Pillar subjects</li> <li>Capstone project</li> <li>Research thesis submission</li> </ul>	<b>OPTIONAL – TERM 9 (POSTGRADUATE TERM 1)</b> <ul style="list-style-type: none"> <li>Admission to SUTD graduate studies – PhD or M.Eng (Research)</li> </ul>

<sup>2</sup> SUTD Undergraduate Research Opportunities Programme. For more details, please visit [sutd.edu.sg/urop](http://sutd.edu.sg/urop)

<sup>3</sup> For continuation in SHARP, students must pass at least two honours sessions and attain a minimum cGPA of > 3.5 at the end of Term 3. All students are to indicate their pillar preference after the end of Term 3.




<sup>4</sup> SHARP students are also eligible for overseas exchange in Term 6.

## ADMISSION REQUIREMENTS

Application is open to high-achieving students with:

- Outstanding academic results with either GCE A-Levels, local Polytechnic Diploma, International Baccalaureate Diploma or NUS High School Diploma. Applicants should score at least 2 'A's in Mathematics and a Science subject at H2, or the equivalent, to be eligible.
- Strong passion in research.
- Good records of leadership experience and community service.
- Participation in science competitions, engineering fairs such as the Singapore Science & Engineering Fair, SUTD Research Mentorship Programme, DSTA Young Defence Scientists Programme, etc. will be considered favourably.

## APPLICATION PROCESS

-  Apply to SUTD and indicate interest in SHARP
-  Complete a supplemental essay
-  Attend an admission interview if shortlisted

### SUTD Honours and Research Programme (SHARP)

For enquiries: [sutd.edu.sg/prospectivestudent](http://sutd.edu.sg/prospectivestudent)

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