FUSION

THE POTENTIAL OF TECHNOLOGY AND DESIGN

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

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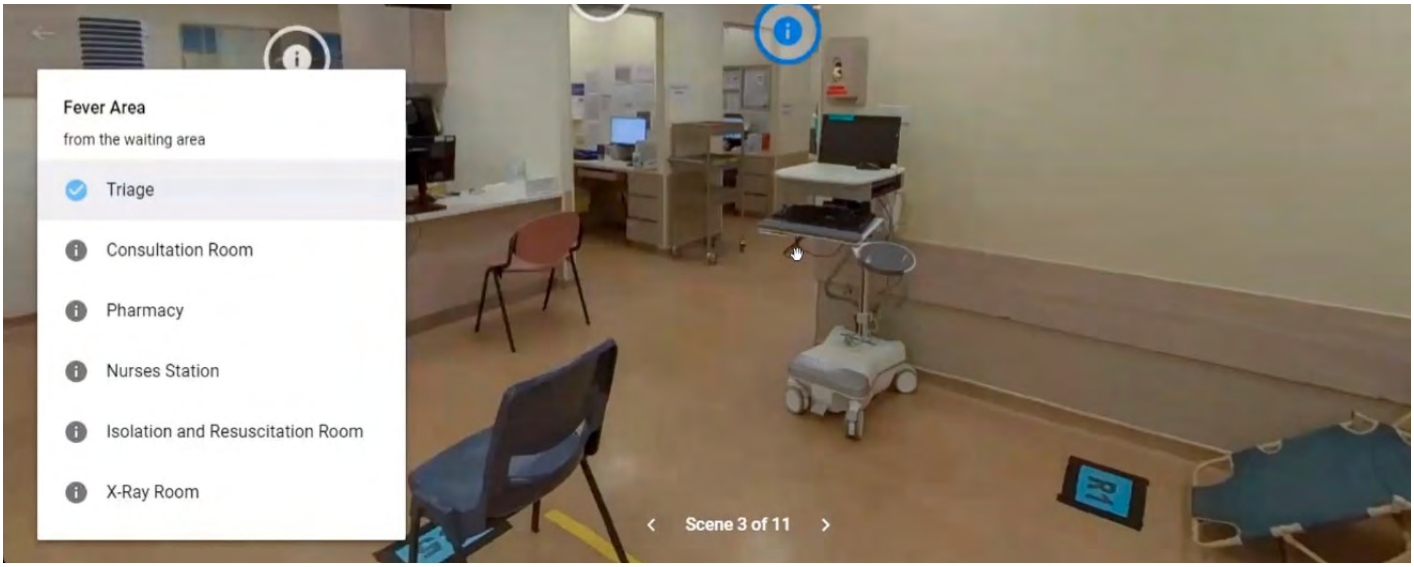
AN IMAGE OF A MARTIAN MADE FROM MARTIAN BIOLITH

RE-IMAGINING COVID-19 THROUGH DIGITAL LEARNING AND INNOVATION BY DESIGN

BY WILLIAM SIEW JING WEN, EVAN SIDHI PERADIJAYA, BINA RAI, AND XIAOJUAN KHOO



Virtual 360° immersive tour of the CGH emergency department

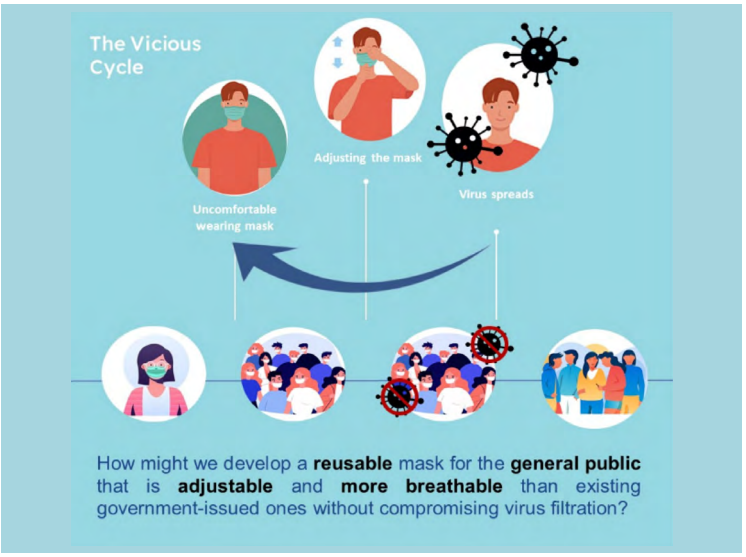
In June 2020, SUTD and Changi General Hospital (CGH) co-organised the inaugural Virtual Ideation Challenge (VIC) centred around the theme of "Re-imagining Healthcare in the Time of COVID-19". The two-day programme challenged student participants to ideate innovative and timely solutions to key healthcare challenges that emerged from the pandemic through the use of design methodology and tools.

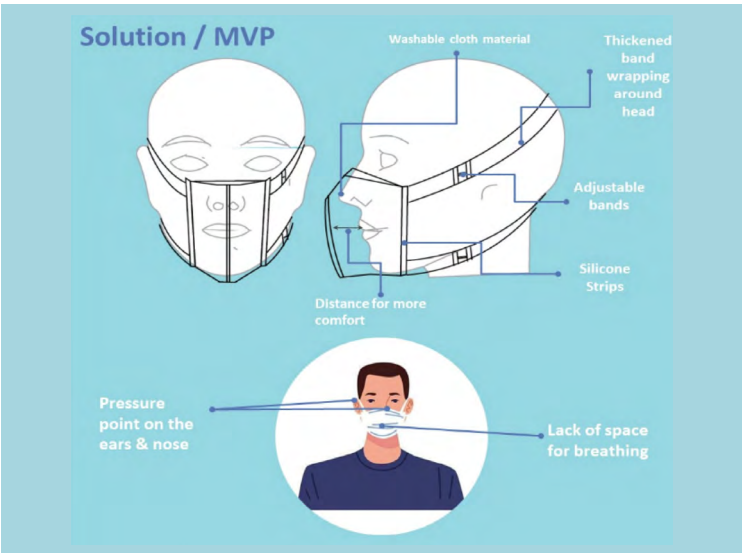
A Virtual Ideation Challenge in a Digital Age

The opening session brought together about 100 SUTD students, faculty, and staff via a Zoom webinar to learn about specific COVID-19 healthcare challenges during pre-, ongoing-, and post-pandemic phases. The panel of speakers from CGH included Assistant Professor How Choon How, ACEO Assistant Professor Selina Seah, and Dr Jimmy Goh, who shared their perspectives in managing the COVID-19 situation through the lens of the regional health services, hospital and clinician leader, respectively. This series of talks were supplemented by a virtual 360° immersive tour of the CGH emergency department and a migrant worker dormitory, which provided a rare insider view of the COVID-19 frontlines and contextual knowledge prior to the ideation process.

Following the large-group webinar session, 58 student participants of the VIC were then grouped into 14 teams to identify the design gaps and opportunities through their interactions with clinical leaders and graduate mentors, each tackling one of 14 COVID-19 case scenarios and problem statements.

At the end of the ideation challenge, all 14 teams successfully delivered their pitch to a panel of SUTD and CGH judges. Eventually, one winning team and two runner-up teams were selected. The winning team tackled the problem of disposable mask shortage in the pre-pandemic phase of COVID-19, by reimagining the design of a reusable face mask.





The winning idea centred around the redesign of the reusable facemask

SUTD SIGNS MOU WITH SHENZHEN TECHNOLOGY UNIVERSITY

This July, SUTD signed a memorandum of understanding with the Shenzhen Technology University (SZTU) to collaborate on faculty and student visits, academic activities and joint research activities.

The immersion programme between the two universities will translate into a one-week joint programme in SZTU for up to 50 SUTD and SZTU students. Slated to begin in 2021, the programme ties in to SUTD's first-year courses and will fall under the Freshmore Asian Cross-curricular Trips (FACT) programme launched in 2019.

The virtual signing ceremony was attended by SUTD President, Professor Chong Tow Chong, SUTD Associate Provost for Research and International Relations, Professor Yeo Kiat Seng, SZTU President, Professor Ruan Shuangchen and SZTU's Distinguished Professor & International Affairs Officer of Sino-German College of Intelligent Manufacturing, Professor Julian Chan.

Professor Ruan said that this collaboration between the universities is synergistic, with both schools placing great importance in leveraging science, technology and innovation to nurture technically grounded leaders and innovators. Professor Ruan added, "SZTU and SUTD are two young universities with great potential for development in the area of faculty-student exchanges and scientific research collaboration."

Professor Chong also acknowledged SZTU's unique insights into the maker culture and anticipates that the collaboration will integrate both universities' pedagogical approach to continually improve the curriculum and promote knowledge creation and innovation.

Professor Chong said, "SUTD is steadfast in our mission to provide students with overseas exposure. We strongly believe such experiential learning will truly widen students' mindsets and better develop leaders and innovators with a foundation in STEM, design thinking and an entrepreneurial spirit to contribute to society and solve real-world problems."

SUTD CELEBRATES ITS FIRST QUALIFIED ARCHITECT

From SUTD's pioneer batch, Class of 2016 Master of Architecture, Ar. Bianca Su Fen Gill is the first graduate to become a qualified architect.

Earlier this year, she had successfully completed and passed the Singapore Board of Architect's Professional Practice Examination to obtain the title of 'Qualified Architect'. The University is truly proud of her achievement!

Bianca shares her journey here:

"Success consists of going from failure to failure without loss of enthusiasm."

These wise words from Sir Winston Churchill beautifully sum up my journey in obtaining my Practising Certificate as a Qualified Architect.

My late grandfather was a great storyteller who happened to design and build affordable low-cost housing as Chief of Housing Board in Malaysia. He later became the Chief of Human Settlements Division in ESCAP, United Nations where he was invited by third world countries to advise on their housing issues. One of my favourite stories was his visit to China in 1981. It was a conference to understand the state of living and how his team can improve it. He saw the ideological and cultural challenges as the beauty of Architecture; empathy for the people we are designing for. That sparked my love for Architecture. There will be obstacles faced in different projects, and whenever the challenges seem insurmountable, I remember why I do what I do—that my work as an Architect can make the world a more inclusive place."

SUTD'S FIRST VIRTUAL CAPSTONE SHOWCASE

Due to the COVID-19 pandemic, this year SUTD had to organise a virtual version of its yearly Capstone exhibition to showcase the final-year projects completed by senior students. There were 63 projects on display, each addressing various real-world problems that span from healthcare to finance and even sustainability.

Listed here are some highlights and all the projects have been placed up on the Capstone Showcase website https://capstone.sutd.edu.sg/, which is still available for online viewing until January 2021.

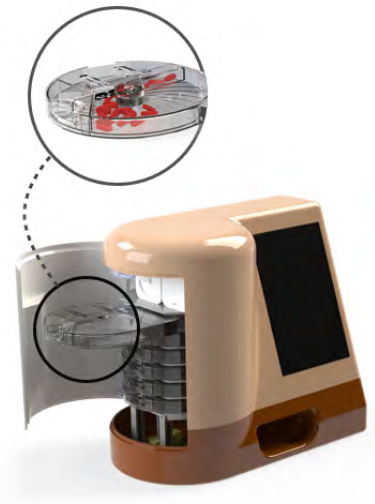
MeCo

MeCo is a smart medication management system that automates pill dispensing. It streamlines the process of medication administration, sorting and consumption, minimising the time spent and errors that may occur during the intake of medication, especially for complex regimens.

Instead of manually sorting pills, users simply place their medication into the medication reservoirs inside MeCo. A corresponding QR code with dosage information is attached to each reservoir. The device reads the QR codes and uses a state-of-the-art dispensing system to prepare the medications.

A customisable reminder video is played at the scheduled time to alert the user. They can then retrieve the medication with the right dosage from the device. The device also has a companion app that allows clinicians and caretakers to monitor the medication dispensed. This IOT device is updated in real time with the ability to detect errors, late or missed medication.

See more at capstone.sutd.edu.sg/projects/meco



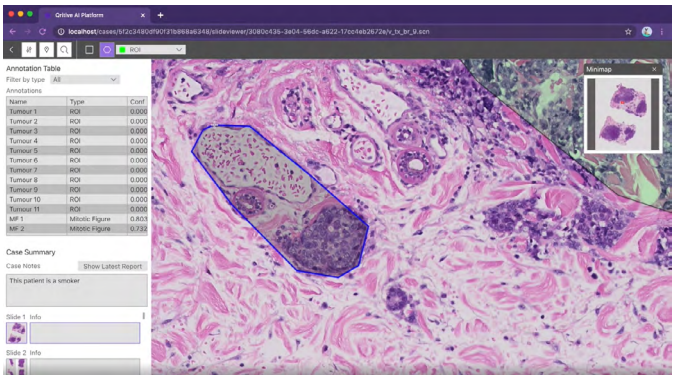
Qurie

Qurie is an AI-augmented histopathology analysis platform that makes use of advanced AI to help cancer researchers examine microscopic tissue. It provides a digital slide viewer that facilitates the efficient and accurate analysis of the slides using a combination of AI and human analysis tools.

For each AI analysis, a report is automatically generated to provide aggregated insights about the slide. Researchers can also use Qurie to share files and collaborate digitally with other researchers. This end-to-end platform aims to streamline the histopathology process.

Qurie's modular design allows the platform to be customised across AI models and analytics components, catering to the needs of different clients.

See more at capstone.sutd.edu.sg/projects/qurie



SOULAR

Soular aims to improve energy accessibility to rural areas. This is done by providing a decentralised solar energy power generation and storage system, with solar panels owned by individual households, connected to a central battery storage located within the village. Owners of the solar panels have the ability to generate their own energy for personal consumption or to sell excess energy back to the market where profits can subsidise their electricity cost.

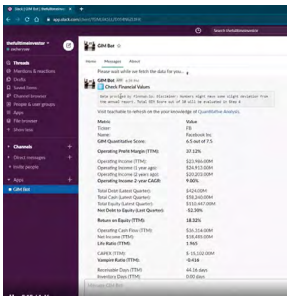
Modular and smart, this system is designed to automatically angle the panels towards the sun throughout the day to generate maximum power and is easily deployable in different terrains.

The machine learning model in the system uses the energy consumption data to predict the energy patterns of the villages and dynamically updates the energy pricing according to supply and demand. The energy contracts are created with blockchain technology, hence users and governments are able to track and trace the energy consumption accurately for data collection purposes while justifying the prices based on the model and not by a third party company controlling the energy prices.

See more at capstone.sutd.edu.sg/projects/soular

ALL THE PROJECTS CAN BE FOUND ON THE CAPSTONE SHOWCASE WEBSITE AND ARE AVAILABLE FOR VIEWING TILL JAN 2021.

10X Capital Investment Fintech



10X Capital Investment leverages an online investment education community of retail investors who share financial insights, ask questions and discuss the latest market news. This project aims to enhance 10X Capital Investment's existing communication platforms for the screening of stock information, boosting digital engagement rates, as well as a reputation system for its users.

There are three main aspects to this turnkey solution:

- A chatbot that helps beginners take their first step into the financial market with a step-by-step guide. It also doubles as a quick stock screening tool for seasoned investors.
- An automated quiz system complete with an AI-powered auto-grader that periodically tests the community's understanding of financial terms and investment concepts.
- A reputation system that infers and indicates each member's reputation, similar to those used in Twitter's recommender systems and in Google Search.

The entire solution runs on cloud architecture, making it extremely cost-effective.

See more at capstone.sutd.edu.sg/projects/10x-capital-investment-fintech-solution

PlanAhead

PlanAhead is a mobile application that provides accessible and personalised education and career guidance for junior college students. This is done via personality tests and profile creation quizzes.

The app allows students to browse through various jobs and degree options where they can compare multiple career pathways to enable them to make more informed decisions.

To give students more insights, PlanAhead also contains videos showing how various industries fit in the economy and the employment opportunities available. The app is also linked to social media platforms, allowing students to share their recommendations with their friends.

See more at capstone.sutd.edu.sg/projects/planahead

NEW SUSTAINABLE TECHNOLOGIES FOR MANUFACTURING IN MARS

SUTD researchers developed a manufacturing technology to build tools and shelters on Mars with minimal energy requirements and without specialised equipment. The study "Martian biolith: A bioinspired regolith composite for closed-loop extraterrestrial manufacturing" was published in PLOS ONE journal.

Assistant Professor Javier Fernandez, Associate Professor Stylianos Dritsas and PhD student Ng Shiwei narrowed down the survival in Mars to the material, chitin. Since chitin, made from the shells of molluscs and crustaceans is produced and metabolised by organisms across most biological kingdoms and is known for its ubiquity, it will likely be part of any artificial ecosystem.

They used simple chemistry to combine chitosan with a mineral designed to mimic the properties of Martian soil and reconstructed a new material, Martian Biolith. After which, they used Martian Biolith to construct a wrench and a model of a Martian habitat. This demonstrated that this material enables the rapid manufacturing of objects ranging from basic tools to perhaps even rigid shelters that could support humans in a Martian environment.

While the technology was developed to primarily create circular ecosystems in urban environments, it has also proven to be the most efficient and scalable method to manufacture in a closed, extremely scarce environment — just like that of Mars or any other lifeless planet or satellite.

Assistant Professor Fernandez noted: "Against the general perception, bioinspired manufacturing and sustainable materials are not a substitute technology for synthetic polymers, but an enabling technology defining a new paradigm in manufacturing that allow us to do things that are unachievable by the synthetic counterparts. Here we have demonstrated that they are key not only for our sustainability on Earth, but also for one of the next biggest achievements of humanity: our transformation into an interplanetary species."

SWIFT APP DEVELOPMENT PROGRAMME 2020

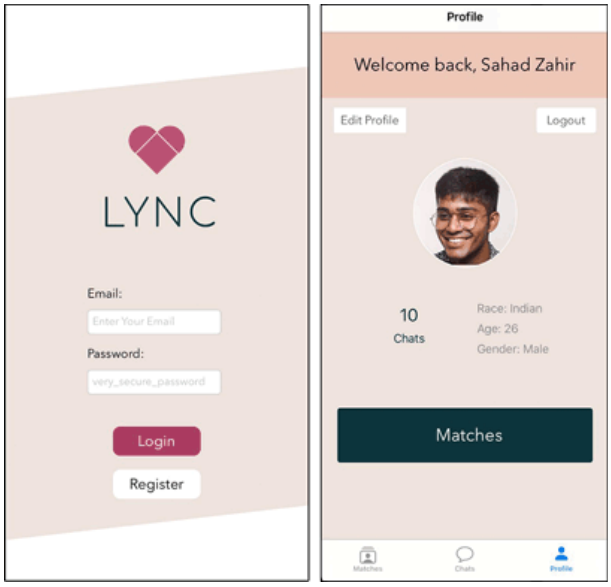
The pioneer batch of students in the Swift App Development programme graduated in a virtual ceremony on 30 October. Spanning over eight months, students received guidance from industry mentors and instructors to learn app development with the Swift programming language by Apple.

In total, eight students formed teams to produce four apps. The apps were placed online where the public voted for their favourite, with over 3500 votes received. In the end, ReVent, an app that improved the equipment booking process for the SUTD Fabrication Laboratory received the honour of being everyone's favourite app.

These were the apps developed by the four teams:

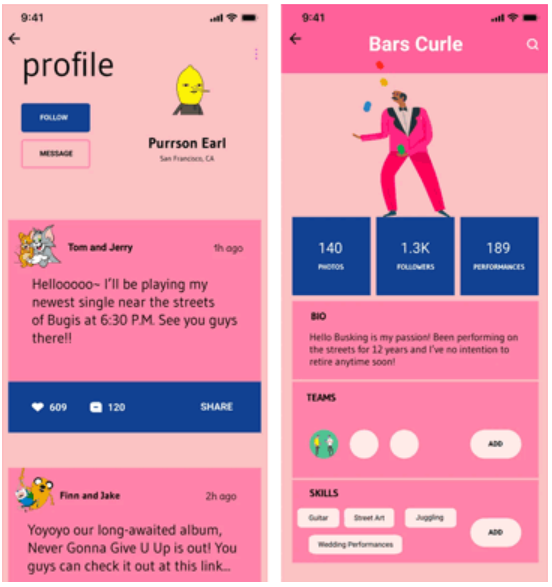
Lync.

A dating app for serious relationships. The self-designed algorithm matches compatible individuals based on simple situational questions. Five ideal matches will be displayed to the user every day.



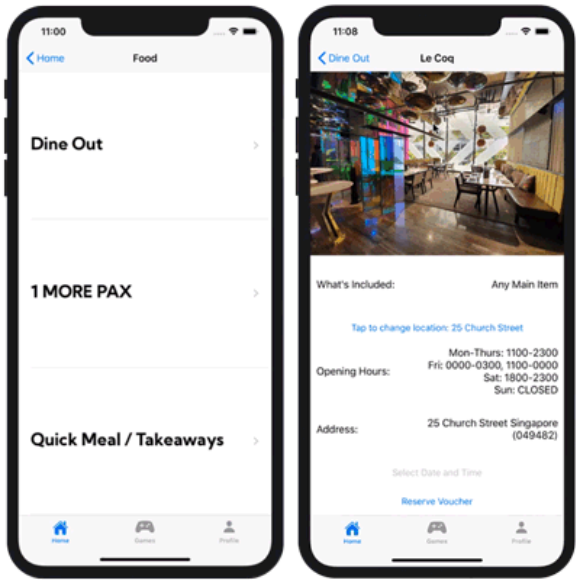
BUSK

A social platform for buskers to connect with fellow buskers and fans.



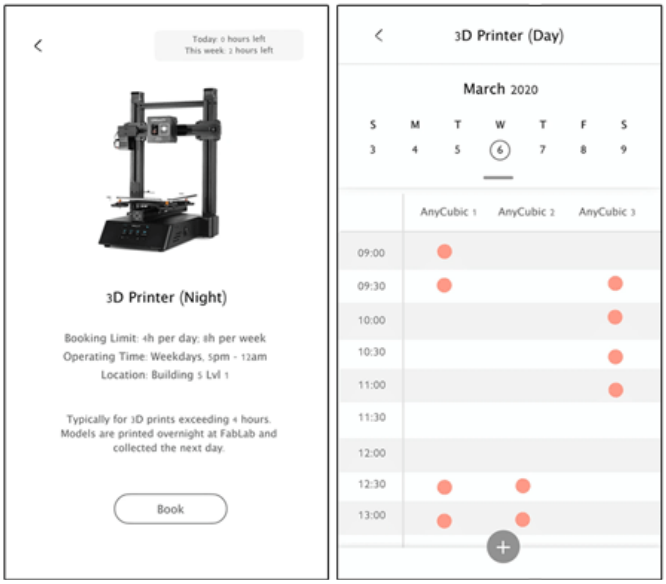
DealBuddies

Book dining deals for specific dates and be matched with other users to enjoy 1-for-1 deals.



ReVent App

An improved equipment booking system for the SUTD Fabrication Lab. It provides ease of use for the administration (managing inventory of equipment and availability) and users (booking of timeslots).



SUTD'S CLASS OF 2020

SUTD graduated its sixth batch of students in September this year. However, due to the COVID-19 pandemic, the actual graduation ceremony will be postponed to September 2021. Instead, the University shared e-congratulatory messages with the students in lieu of a physical ceremony for this year.

Around 73% of this batch of fresh graduates have either secured jobs, have plans to pursue graduate studies or work on their own start-ups. Top hiring sectors for the graduates include Information & Communication, Business & Management Consultancy, Financial & Insurance and Scientific Research & Development.

Every student finds their own path at the end of their education journey. Here are some stories from our Class of 2020 to inspire you.

Wang Wei Liang
Bachelor of Engineering in Engineering Product Development

Wei Liang took the long route to enter university. His biggest setback was during his time in Saint Andrews' Junior College, where he neglected his studies due to his focus on canoeing and had to be retained. He took his parents' advice to take an alternative education route and went to Singapore Polytechnic where he subsequently excelled and even got onto the honour roll. He joined SUTD with a merit scholarship.

During his time in SUTD, Wei Liang worked on various notable projects, such as an adjustable prosthetic socket for diabetic amputees to aid in early mobilisation, done in collaboration with Tan Tock Seng Hospital. He also customised an air vacuum system for a rural village in Pajangan, Yogyakarta, Indonesia. Wei Liang also has a heart for the less fortunate and spent his last two Christmases in Myanmar organising and celebrating the occasion with children from orphanages.

After graduating, Wei Liang is now focusing on his start-up Proccoli, an e-procurement tool for facilities management. Separately, he is also continuing research work for Edubridge, an education/vocational training company that lines up with his belief of a more inclusive education system which accounts for the mental health and the wellbeing of children.

Faith See Wan Yi
Bachelor of Engineering in Information Systems Technology and Design

Faith is a student with great tenacity. A week before her pivotal "A" Level examinations, her best friend passed away. With the support of her friends, family and religious beliefs, she was able to complete her examinations and subsequently secure a spot in university. Having chosen to pursue her interest in art and biology in junior college, she lacked a strong background in the core pillars of engineering, mathematics and physics. This rendered her education in SUTD a tremendous challenge with an extremely steep learning curve.

However, with the support of her professors and peers, Faith was able to surmount the academic challenges. The concurrent pursuit of her interests in school, church and the community allowed her to grow immeasurably. Despite her less than ideal "A" Level examination results, she had a wealth of new experiences. This included her internship experience in Portugal, which allowed her to secure the Singapore Digital (SG:D) Scholarship following her Freshmore year — a testament to her efforts.

After countless sleepless nights and hard work, Faith has proudly graduated with a Bachelor of Engineering in Information Systems Technology and Design. She is now with DBS Bank's Graduate Associate Programme, Seed, in the cybersecurity team.

Avenash Mirchandani Changaroth
Bachelor of Engineering in Engineering Product Development

Since young, Avenash has had a keen interest in cars, or more specifically, modifying cars. He has been participating in car rallies in Malaysia since his junior college days. While racing and fixing cars became his hobby, he yearned to gain a deeper understanding of the mechanics behind the automobile.

His deep-rooted interest in engineering led him to join SUTD in a bid to pick up skills and knowledge to further his passion. He also joined SUTD's Electric Vehicle Club and was nominated its president in 2018. During his time in the club, he participated in the Shell Eco Marathon Asia 2018. He was also the lead organiser of the Electric Vehicle Design Challenge 2019, an outreach activity to teach students from polytechnics, junior colleges and secondary schools how to design and assemble go-karts.

After graduating, Avenash joined Dyson as a design engineer, a dream job for him as he would be using skills he picked up at SUTD to design and develop new products that could impact the world. Over the weekends, Avenash fuels his passion by restoring classic cars that he has acquired. He hopes to setup a classic car restoration business one day.

Safafisalam Bohari Jaon
Bachelor of Engineering in Engineering Systems and Design

During his time at SUTD, Safafisalam contributed a lot to the SUTD community. Besides being in the student government, he was also the president of SUTD Bands where he played drums for multiple bands, as well as a member of the football and touch rugby team. He pioneered the inaugural Intervarsity Jam — the first student-led intervarsity concert across SUTD, SMU and NUS music clubs. Despite all his fifth row (extracurricular) activities, Safafisalam excelled in his schoolwork and graduated with a high GPA.

One of the biggest challenges he faced during the COVID-19 circuit breaker period was keeping the ones important to him close. Although this was the first time he celebrated Hari Raya through a screen, he was happy to connect with relatives and friends virtually, despite the physical distance.

Safafisalam is now working with FWD Insurance as a Digital Graduate to help drive FWD's digital strategy and vision of changing the way people feel about insurance. He also looks forward to contributing more directly and sustainably to the community, with him as a youth mentor under Yayasan MENDAKI. At the same time, he hopes to learn more about the challenges that the wider Malay-Muslim community faces, and how he can play a larger role in helping to overcome them.

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