FUSION

THE POTENTIAL OF TECHNOLOGY AND DESIGN

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

ISSUE 11 / 2018

THE SINGAPORE PAVILION AT THE 16TH VENICE BIENNALE

SUTD LEADS IN THE CURATION OF THE SINGAPORE PAVILION AT THE 16TH VENICE BIENNALE

For the first time, SUTD led in the curation and design of the Singapore Pavilion for the 16th International Architecture Exhibition – La Biennale di Venezia. Commissioned by the the DesignSingapore Council (Dsg) and the Urban Redevelopment Authority (URA), in collaboration with NUS, this year's Singapore Pavilion asks if there is indeed No More Free Space? in the island state, in response to the overarching theme Freespace conceptualised by curators Yvonne Farrell and Shelley McNamara.

Led by SUTD's Architecture and Sustainable Design pillar head, Professor Erwin Viray, the exhibition was curated by faculty members from both universities and celebrates how architects and planners have innovated and borrowed from nature to create useful and delightful spaces and places.

The exhibition features 12 Singapore-based projects that showcase the resourcefulness of the architects, their inspirations and the realisation of ideas, while borrowing natural resources such as light, air, greenery and water. They also display the architects' imagination, openness, discovery and resolution to turn constraints into possibilities.

The Pavilion's centrepiece features an immersive installation, an ethereal cloud, in the form of an inverted pyramid, made of skilfully handcrafted acrylic knots suspended in the vast spaces of the Sale d'Armi – a venue provided by the National Arts Council. The exhibit also comes with a multi-sensory projection of lights, sounds, scents and images of Singapore.

Curators of the Singapore Pavilion at La Biennale di Venezia. L to R back row, Tomohisa Miyauchi, Dr Chong Keng Hua, Prof Erwin Viray; L to R front row, Dr Jason Lim, MCI Permanent Secretary Gabriel Lim, Wu Yen Yen

The Venice Biennale opened to the public on 26 May and will close on 25 November 2018. The Singapore Pavilion exhibit will be restaged in Singapore in 2019.

"SUTD is honoured to lead the curation of this year's Singapore Pavilion at the Biennale Architettura 2018. Through 'No More Free Space?', my fellow curators from architectural practice, SUTD and NUS hope to present to the world the delightful possibilities of designing spaces out of limited or even non-existent free space. Drawing from the best 12 Singapore projects, we hope to spur our imagination of the possibilities and elicit an appreciation of free space of architecture," said Prof Erwin Viray.

SUTD and NUS students help out with the Singapore Pavilion

SUTD alumnus Inez Ow and Kendrick Tay, who were involved with the project management and production of the Singapore Pavilion

This is the first time students from SUTD and NUS worked together with faculty and architects to help produce the Singapore Pavilion at the Venice Architecture Biennale. The design and production of the exhibits as well as the logistics were all managed by students.

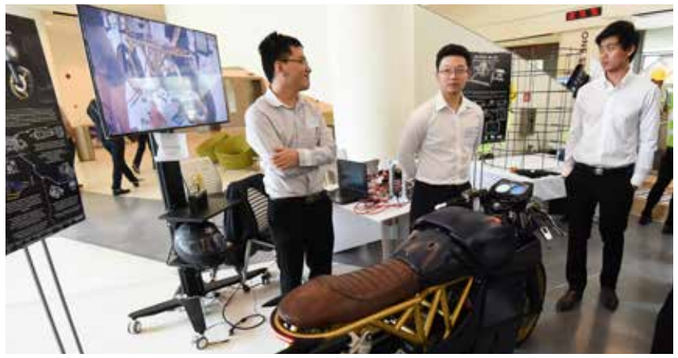
SUTD alumnus, Kendrick Tay, who worked as a project manager and coordinator for this project, said: "It was an honour to be invited to participate in the Singapore Pavilion. As Project Manager – a role which entailed long nights, language barriers, disparate time zones, multiple stakeholders, pressing deadlines and never-ending last-minute surprises – it was a unique challenge of monumental proportions, one which I'm glad to have had the opportunity to tackle as a fresh graduate from SUTD. Grappling with shipping, logistical and custom snags, production and sourcing complications, the quandary of endless meetings, and content creation and curation challenges – there was never a dull day on this project!"

Another alumnus and Kendrick's fellow classmate, Inez Ow, who interned at TakahashiLim A+D, the firm fabricating the inverted acrylic pyramid, was also heavily involved in the centerpiece cloud installation. She said: "My biggest takeaway from this experience would be having the opportunity to witness and better understand the processes that go into the making of such large scale events, from project management to budgeting and logistics — areas we do not typically engage with in architecture school."

CAPSTONE 2018

This August, the fourth batch of SUTD students exhibited a total of 55 final year projects at the annual Capstone Design Showcase that addresses real-world challenges. Some of these projects were initiated by industry partners, such as A*STAR, The Esplanade, SMRT and SIA to name a few, while others were borne from the students' ideas.

The projects spanned areas of smart technology to interactive user and learning interfaces to artificial intelligence among many others, and a few have the potential for commercialisation. There were also student-initiated entrepreneurship projects, where students came up with ideas and plans for setting up a company to market their product.



SHOWCASE HIGHLIGHTS

Electric Motor Development & Motorcycle Platform

The project has two parts — the first was adapting Shado's (an electric vehicle design company) proprietary technology into the development of the electric motor for the motorcycle, and the second, required the redesign of the motorcycle dashboard platform to include modern features currently missing from traditional ones, such as live maps integration and weather predictions, while having smartphone integration and charging.

Do-do

Do-do is a robot designed and engineered to deliver parcels for last-mile logistics. It aims to complement delivery drivers, increasing productivity and combatting manpower shortages.

AEOLUS

An advanced unmanned aerial system for hazardous confined-space inspection that can navigate autonomously in a GPS-denied environment and detect defects, reducing the need for manual inspection.

uParcel

This is an integrated solution (application) with a user-friendly interface for delivery agents to find suitable delivery jobs. A secondary aspect of this app is that it is able to recommend suitable jobs to users. Going forward, the company that mentored this Capstone team has plans to use the solution proposed by the students in their business.

SINGAPORE NIGHT FESTIVAL 2018

Three of the Singapore Night Festival 2018 (SNF) light installations, Hyperbands, Orbit and The Search, were designed and fabricated by multi-disciplinary teams of SUTD students and alumni.

Hyperbands – located outside the SMRT walkway

Hyperbands – a flowing light ribbon

Hyperbands by KopI/O

The team behind Hyperbands, a final year capstone project comprising students from different pillars, was inspired by the vibrant and lively energy of Singapore. Thus, they decided to physically embody this energy within a 20-metre flowing light ribbon which pulsated with growing intensity as more and more visitors interacted with the structure. Architecturally, the installation uses algorithms as part of the design process to generate its unique interlocking serpentine form. Using unique digital fabrication processes, the entire installation does not require any adhesives to be assembled and its materiality and tectonic formation creates a distinctive “banded” light. Machine learning, computer vision and audial sensing were also employed to track visitors as they moved and interacted with the installation – effectively creating an engaging experience for large crowds.

As the installation is approximately 20 metres long, with around 1,000 unique panels and 500 lights plus sensors, it was no easy feat to ensure all the pieces came together perfectly while keeping within the constraints of budget and construction time. Despite these challenges, the group felt that the entire experience was all the more gratifying and empowering when they saw the public engaging and enjoying the fruits of their labour. Through this project, they hope to inspire future students to be bold and courageous in seizing new opportunities to showcase technology and design to improve everyday lives.

Orbit by LiteWerkz x 3M

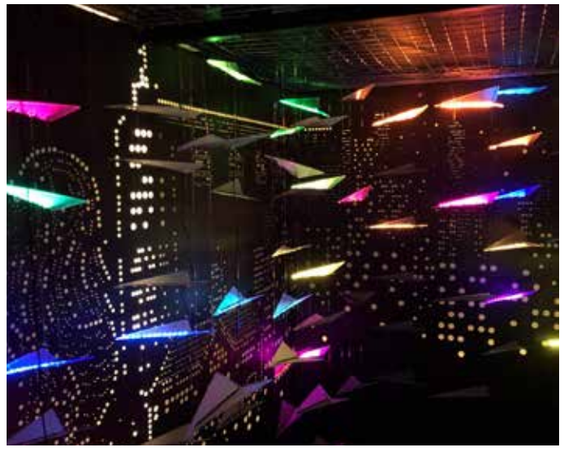
The Orbit light installation was inspired by the solar system and aimed to be a reiteration of the solar system phenomenon; eight planets revolving around a Sun and within each one of them lies a different world. Each star in this night sky is a powerful source of energy where planets orbit around (the sun) or are just scattered around in the galaxy, more powerful than what it seems from the Earth.

The team aimed to mimic this play on perspectives and portray the bodies of stars emitting energy and as a shining light from earth by using retroreflective materials. The material reacts differently to light sources coming from a direct viewer, such as a phone’s flash light, a diffused lamp light, or merely skylight. In addition to spinning around the sun, the planets could also be spun around its own axis, offering unique experiences for individual interaction. Using design to reinterpret a scientific phenomenon, the team aimed to reinvent night light installation methods by adapting materials that are rarely used in art/light installations to mimic nature.

Some challenges the team faced while producing the installation include the use of the retroreflective material, which was something new to them. A substantial amount of time was spent testing the retroreflective sheets by 3M with different intensities of light and environments to see what effects could be achieved. Fabrication cost was also high as the installation included custom-designed parts; the team had

Close-up of Orbit

Orbit - inspired by the solar system and the vast space beyond



The Search – Paper aeroplanes flying through the Singapore cityscape

to find ways to make some of the parts on their own as well as source some from overseas suppliers. Modularity was another aspect that was lacking in the installation as it was difficult for the team to disassemble the parts for storage to be reused at other events. However, this year, the team tried hard to design their installation with modularity in mind. This is the third time that the LiteWerkz team has participated in the SNF, and they felt that it was a great platform for them to work with other stakeholders and network with other artists.

The Search by The Search Party

The Search was inspired by how Singaporeans are always chasing something. Sometimes what we chase after is physically tangible, and at other times, it is abstract. Everyone is struggling and searching for something, be it an answer, happiness, relief, or even someone. Hence, the team hoped to remind everyone that even in this journey of searching, the experiences itself can still be beautiful and everything or everyone met along the way should be celebrated.

The team used about 300 paper aeroplanes to tell their story. The planes represented a multitude of things, from the innocence of childhood to the idea of motion and departure. The students faced some challenge in building the main structural frame, which had to be an enclosed space. This had to be outsourced to contractors and they had to find a suitable one that could fit the budget given. Fortunately, the students managed to get a sponsorship from local supplier Paper Carpenter. The entire team was also on internships during this period so all of them could only fabricate the installation after working hours. However, the team felt that this experience helped them to learn how to implement their design in real life. Many a times, what they designed may look good on paper or prototype, but when they had to build an actual life-size version of the installation, they found that they not only had to adhere to many rules and regulations, but they also had to ensure that the installation still carried the concept and remained durable and feasible to execute and maintain.

MODULAR MASTERS FOR ADULT LEARNERS

SUTD’s adult learning institution, SUTD Academy, launched a new and unique programme – the ModularMasters (MM) – to provide more learning options for adult learners. This programme was developed as part of the SkillsFuture Series, supported by SkillsFuture Singapore, which aims to help working adults develop in emerging skills areas required across different sectors. The MM in Cybersecurity is the first such programme launched by the SUTD Academy on 10 September.

The MM consists of bite-sized skills-based modular courses (SBMC) that carry credits and students can stack the courses up to eventually earn an MM certificate. SUTD Academy has also partnered Temasek Polytechnic to develop transferable SBMCs that can contribute to the MM certificate in Cybersecurity. Students taking recognised modules from Temasek Polytechnic or other educational institutions will be able to transfer over a set number of subject credits to SUTD Academy if they wish to pursue an MM in Cybersecurity.

Adult learners who wish to further develop their knowledge in cybersecurity may also apply to SUTD to pursue the full Master of Science in Security by Design (MSSD) degree by passing an entrance exam and meeting SUTD’s admissions criteria for the MSSD. Upon admissions, they can use the MM in Cybersecurity certificate to offset subject credits from the MSSD programme.

Professor Pey Kin Leong, SUTD’s Associate Provost for Education, SUTD Academy and Digital Learning said: “SUTD Academy wanted to provide more flexible options and opportunities for working individuals and adults to upskill or reskill themselves. Hence, we came up with the idea of the ModularMasters, which allows participants to stack up short modules that they take up either out of interest or for reskilling purposes, and eventually allow them to obtain a certificate. We believe this will encourage them to continually keep pace with the rapidly changing requirements of the workplace and stay relevant in today’s knowledge-intensive and technology-driven economy.”

Other new MM programmes in the pipeline include one each in data analytics, AI and design innovations. SkillsFuture Credit can also be used to off-set course fees for these programmes.

CONGRATULATIONS, CLASS OF 2018!

Graduates from the Class of 2018 together with SUTD faculty and staff

Over 400 SUTD students celebrated their graduation on 8 September. This fourth batch of graduates also includes the first batch of students from the SUTD-SMU Dual Degree programme (DDP) and the Masters of Science in Security by Design (MSSD), as well as our largest batch of PhD students.

Similar to past years, SUTD graduates continue to be well-sought after even prior to graduating, with over 74% of undergraduates having already either secured jobs, setting up their own startups or pursuing further education. Among those who have secured employment, three-quarters of them found Smart Nation-related jobs. The top three industry sectors of those who found jobs include Information & Communication, Financial & Insurance and Business & Management Consultancy. Some companies, such as Accenture, Changi Airport Group, JP Morgan and Schneider Electric, have consistently been hiring SUTD students over the past three years.

At this year's graduation ceremony, besides congratulating the graduands for completing a rigorous and challenging programme, new SUTD President, Professor Chong Tow Chong also exhorted them to continue seeing a world of possibilities and to have the courage and determination to realise the dreams that stir in their hearts. He reminded the students:

> "To remain true to yourself - discover your own voice, know your worth, and above all, stay open-minded and humble in your lifelong quest to learn new things."

Prof Chong added that SUTD has equipped our students with the necessary multi-disciplinary knowledge and fundamentals of human-centric design thinking, as well as holistic competencies beyond book knowledge. This prepares them for the fast-evolving global economy, and the University will continually refine its unique curriculum and pedagogy to nurture technically-grounded leaders and innovators who can help create a better world through technology and design.

Some of this year's graduates:

After working in Credit Suisse for a year, Information Systems Technology and Design pillar alumnus, Darren Ng decided to take up the MSSD full-time, while he continued working, and graduated from the programme's first batch this year. He said that the MSSD programme enabled him to learn more about secure software engineering, which as a software developer, had some impact on his work as it taught him to think about the principles behind secure coding and to adhere to security design principles, ensuring the robustness and validity of the systems that he built. Prior to completing the MSSD programme, Darren was head-hunted by a few firms and finally accepted an offer from GIC, where he now works as an associate under the Trading, Transaction Cost Analysis department.

Siti Nurhayati Binti Rahim graduated from the first batch of SUTD-SMU DDP. She is multi-talented, excelling in both sports and academics, as well as in entrepreneurship. In 2015, Siti and her brother set up Gom Gom, a sandwich shop at SUTD. Besides being an outstanding badminton player, who represented Singapore at the ASEAN University Games in 2014, she has also clinched several medals in Windsurfing while competing at tertiary and national levels. After graduation, Siti joined Restaurant Brands International, which runs Burger King, under their Leadership Development Programme.

Vivek Kalyan graduated with a Bachelor of Engineering degree from the Information Systems Technology and Design pillar. He has a strong passion for machine learning and artificial intelligence. He is fascinated by the amount of power computers can have in the near future and wants to be in the forefront of the advancements in the future. After graduation, Vivek joined DC Frontiers (a Singapore fintech start-up) as a machine learning engineer. He not only hopes to solve difficult problems such as automation, but also wants to lead the discussion of how people can cope with the ramifications of unemployment that is likely with increased automation.

MULTIPLE ACCOLADES AT THE ASME CONFERENCE

Various SUTD faculty and researchers were awarded accolades by the American Society of Mechanical Engineers (ASME) this year. Associate Provost for Graduate Studies, Professor Kristin Wood, received the Design Theory and Methodology (DTM) Award at the ASME 2018 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE), which was held in Quebec, Canada in August. This award recognises sustained and meritorious contributions to research, education, service, training of researchers or practitioners, overall leadership in advancing the field, or any combination of these in the field of Design Theory and Methodology.

Additionally, the Temasek Lab's robotics team led by Engineering Product Development Assistant Prof Soh Gim Song also received a Mechanisms and Robotics Best Paper Award. Their research aims to design and develop innovative biologically-inspired unmanned robotic platforms at greatly reduced scales with collaborative capabilities to perform Intelligence, Surveillance and Reconnaissance (ISR) in an urban environment.

Prof Kristin Wood (left) receiving the Design Theory and Methodology (DTM) Award

Suite of autonomous ISR robots designed by the Temasek Lab's robotics team

The multi-disciplinary research team, which also comprised Ms Audelia G. Dharmawan, Dr Priti Xavier, Mr David Anderson, Mr Blake Perez, Dr Hassan H Hariri, Assistant Prof Foong Shaohui, Assistant Prof Avinash Baji, Associate Prof Roland Bouffanais, Associate Prof Low Hong Yee and Prof Kristin Wood, recently developed a suite of autonomous ISR robots named after the Orion constellation, each with its own set of unique capabilities, capable of performing indoor space mapping, monitoring and threat detection in a collective manner.

Among these is a climbing robot that uses a Gecko-inspired adhesive and mechanism for establishing inter-floor communication and providing a bird's eye view of the ISR space. It has been observed from nature that the mechanism for attachment to the surface in climbing animals is completely different from its detachment. The general principle uses entire-surface attachment and peel-like detachment such that strong adhesion can be instantaneously generated while minimal effort is required for contact release. Guided by this principle, the robot is capable of climbing a variety of indoor surfaces commonly found in SUTD such as acrylic, glass, whiteboard and even metal lift door.

It also transits seamlessly from floor to wall, which is still a very challenging and open problem in robotics. This project won the Mechanisms and Robotics Best Paper Award at the ASME 2018 IDETC.

SINGAPORE UNIVERSITY OF
TECHNOLOGY AND DESIGN

FUSION - THE POTENTIAL OF TECHNOLOGY AND DESIGN

Office of Marketing & Communications, SUTD
8 Somapah Road, #06-301
Building 3 Level 6, Singapore 487372
T: +65 6303 6600
W: www.sutd.edu.sg/newsletter

SUTDsingapore

SUTDsg