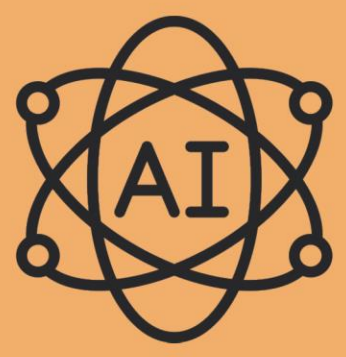
ASPIRE

An SUTD Publication : Impacful Research Endeavors

Future Communications

Robotics Cluster



Human-AI Cluster

Future Computing Cluster

SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

2021 | Vol. 5

Content

Talent :: **O**pportunities :: **P**artnerships

Building a Natural Home for Artificial Intelligence

As artificial intelligence becomes more integrated into our daily lives, the increasing number of researchers building Singapore's smart future will have a home at the SUTD AI mega-centre.

65 years ago this month, computer scientist John McCarthy coined the term 'artificial intelligence' (AI) during the celebrated Dartmouth workshop. Considered as the field's foundational event, the workshop firmly established AI as an academic discipline. Since then, AI has become part of our everyday life, from face and voice recognition to recommendation algorithms that predict what we want to click, watch or buy.

With self-driving cars and smart cities on the horizon, AI will only grow more widespread across industries. Recognising the importance of cross-disciplinary work in AI, the Singapore University of Technology and Design (SUTD) is creating an AI mega-centre to serve as a hub for research, teaching and collaboration, with SUTD AI Programme sector lead Professor Tony Quek as the mega-centre's director.

As the world marks the 65th anniversary of the establishment of the field of AI, we look into the exciting plans of SUTD researchers for the AI mega-centre.

Prof Tony Quek

Assoc Prof Georgios Piliouras

A One-Stop Centre for AI Work

Despite the growing number of Singapore-based researchers using AI in their work, infrastructure remains largely decentralised. Because of this, having a centre where all AI-related work is done will increase efficiency and equipment availability, said SUTD Associate Professor Georgios Piliouras, deputy director of the upcoming AI mega-centre.

By grouping different labs and providing common testbeds, the mega-centre should foster collaboration between AI researchers and practitioners from other fields. Reflecting the variety of work that will be done in the space, the centre will have clusters specialising on everything from future communications and robotics to human-AI interaction and future computing. Aside from allowing infrastructure sharing, the mega-centre will also house high powered computing infrastructure which will be made available to the SUTD community for education and research. Labs have been set up to facilitate data collection, dataset development and big data management, which will be key for collaboration with external partners.

"One of the major reasons for creating this centre is to strengthen existing ties with external stakeholders," explained Assoc Prof Piliouras. This includes private companies, government agencies, local start-ups and even students who might be inspired to pursue an AI-related discipline after a visit to the centre's prototype gallery.

Playing Serious Games with AI

Beyond prototypes, SUTD researchers are set to tackle a host of real-world problems through the AI mega-centre.

In the robotics cluster, a team is already looking into applications like self-driving cars and robots that monitor coral reefs. “What we do is take approaches from a theoretical perspective, see where the guarantees and boundaries lie and then we translate it in the real world,” explained team leader Malika Meghjani, assistant professor at SUTD.

In line with this, researchers like Asst Prof Meghjani apply their expertise in multi-robot coordination, vision and learning to address specific problems. Within the context of self-driving cars, this involves identifying other vehicles and predicting their behaviour based on past experiences in relation to other self-driving cars. The same vision and learning systems can then be repurposed to build a swarm of aerial or underwater robots that work together to efficiently scan an area.

Asst Prof Meghjani’s team also combines game theory with AI to solve problems ranging from pursuit evasion to capturing marine trash. By incorporating game theory into their algorithms, they can predict the action of other agents based on the available options, just like in a game. As a result, their AI drones are better at predicting where an evader will go next based on available routes.

Smart Machines for a Smart Nation

Because of AI’s translatability, SUTD is placing it at the forefront for its growth plans, focussing on vital economic sectors including Healthcare, Aviation and Cities. Besides AI, another mega-centre in healthcare is currently in the pipeline. These mega-centres are envisioned to further promote and engage in cross-disciplinary efforts addressing real world needs. In the aviation sector, for example, scheduling is a highly complex problem that naturally lends itself to AI solutions. Similarly, complex problems arise in the management of cities and healthcare, where public policy must respond to both the needs of people as well as the challenge of allocating shared resources.

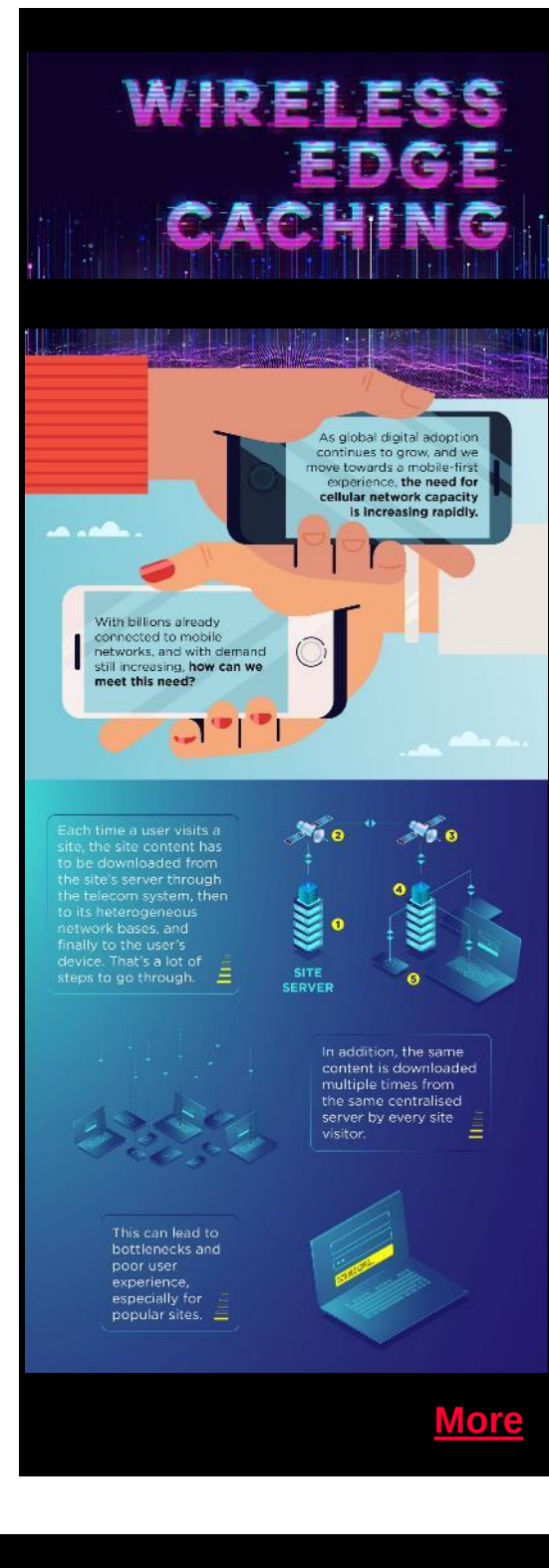
Asst Prof Malika Meghjani

This puts the aims of the mega-centre in line with the recently released Research, Innovation and Enterprise 2025’s Smart Nation and Digital Economy thrust, which recognises AI as one of the crucial tech areas for national development.

Given how closely intertwined AI is with future communications technologies like 5G and even 6G, the centre will also support SUTD as the institution leads the Future Communications Research and Development Programme -- which will be also helmed by Prof Quek as director. Consequently, the AI mega-centre will feature a control hub for 5G-powered drones and even a testbed for beyond-5G technologies.

As AI is further integrated into the modern world, more citizens will need to be included in the R&D process, which is why education and outreach are also goals of the mega-centre.

“There's already an increasing number of data out there that may give us some insights on how can we design public policies that actually improve the quality of life of people around us,” said Assoc Prof Piliouras. With the help of AI, Assoc Prof Piliouras and the researchers at SUTD hope to make Singapore and its residents ready for the smart future to come.



More

Future Communications Research & Development Programme

As part of the Research, Innovation and Enterprise plan, the Infocomm Media Development Authority and the National Research Foundation Singapore invested close to S$70 million to support "cutting-edge" communications and connectivity research. SUTD will be the host institution for the newly launched national Future Communications Research & Development Programme (FCP).

In line with Singapore's Smart Nation strategy, the programme is pivotal for Singapore as 5G and beyond wireless systems will serve as the traffic backbone for a vast number of vertical services and industries. The programme will support artificial intelligence (AI) and cybersecurity research for next-generation communications infrastructures, support testbeds for innovative pilots, and provide scholarships for those seeking to pursue research in communications.

Led by Prof Tony Quek, Head of ISTD pillar, the programme will draw together Institutes of Higher Learning and A*STAR research institutes to collaboratively conduct research and development to meet Singapore's requirements.

SUTD, being the host institution of this R&D programme, will play a leading role and work together with the wider research community to build up a strong pipeline of talent trained in 5G and beyond wireless systems. It will lead collaboration across the Singapore ecosystem, which comprises the Agency for Science, Technology and Research, Nanyang Technological University, Singapore, National University of Singapore and Singapore Institute of Technology. The programme also aims to develop a strong pool of talent in security, connectivity, hardware, and edge intelligence for different industry sectors in Singapore. It further reinforces SUTD as an engine of growth for economic development.

A Memorandum of Understanding was established between FCP and 6G Flagship, the world's first and leading 6G research, development and innovation programme. The partnership with FCP is implemented by the SUTD, which will launch research and development collaboration on 6G technology. Their goal is also to notably contribute to global standardisation and regulatory development of 6G technology. 6G Flagship is funded by the Academy of Finland and the University of Oulu for 2018−2026. Cooperation with Singapore is a part of the expansion of 6G Flagship's international ecosystem such as Japan, Korea and Hexa-X.

More information can be found here.

6G and Beyond: The Journey Starts Now

At the **International Workshop on Future Communications**, leading scientists across the industry and academe discussed 6G networks and the possibilities offered by emerging technologies. Aside from 6G, speakers also delved into topics ranging from blockchain empowered Internet of Things networks to optimal design frameworks for machine-to-machine communications. The workshop was organised by SUTD's Office of Research, on 23 and 24 June 2021.

Beyond ultra-fast streaming, there are several reasons driving the need for 6G, highlighted SUTD's Prof Tony Quek, Head of ISTD, in his talk. While current mobile networks engage two senses—sight and sound 6G could lay the foundation for the "Internet of Senses", which will rely on virtual / augmented reality and artificial intelligence to expand the spectrum of digital sensory experiences. For instance, 6G's extremely low latency may realistically recreate tactile sensations that take our bodies milliseconds to register.

Prof Quek says that there is much work to be done before 6G becomes a reality. "6G will be commercially available in 2030, but we do not yet have a clear picture of the technology—this is the biggest challenge that all researchers are facing now," he explained.

As the **fifth-most influential research institution in telecommunications globally**, SUTD is set to play a key role in driving future communications research.

"In our next phase of growth, SUTD will be actively seeking out partners to identify and seize opportunities, leveraging upon our unique value proposition in twinning technology and entrepreneurship in co-advancing innovation," explained Prof Yeo Kiat Seng, SUTD Assoc Provost for Research and International Relations during his opening address at the workshop.

"The future communications workshop will enable SUTD to build new networks to facilitate innovation going forward".

Read the full article and view event recordings.

Prof Yeo Kiat Seng delivering the opening address.

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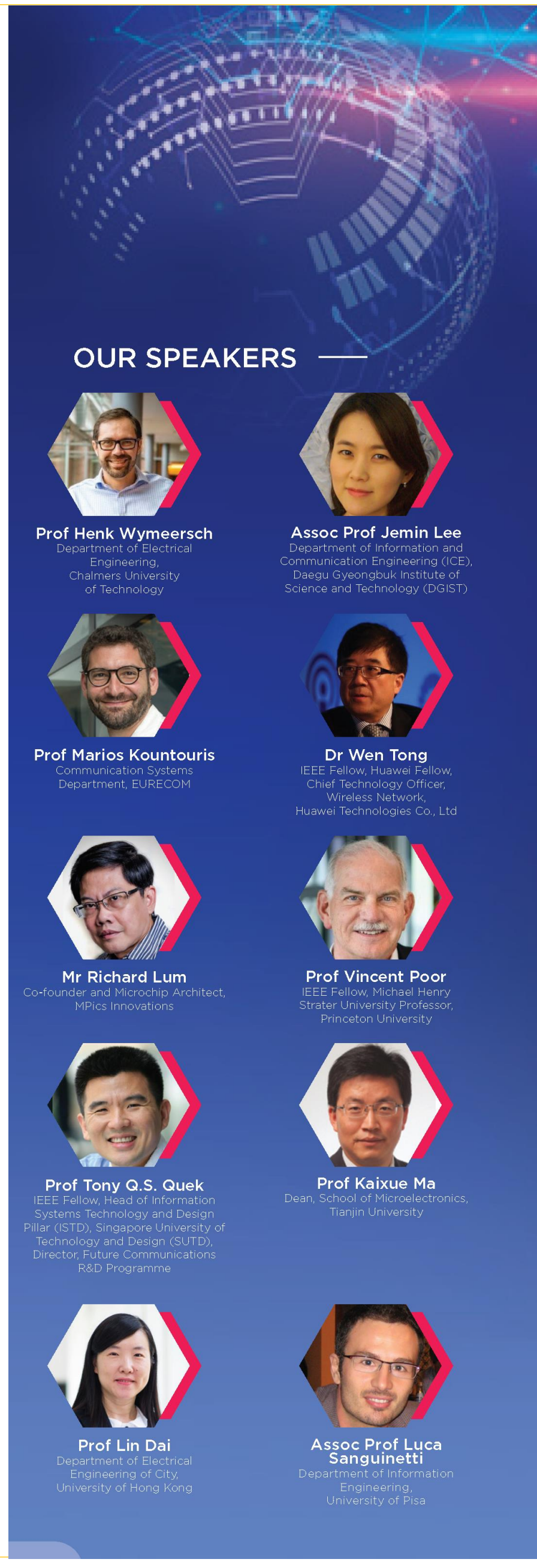


Building Innovative and Enterprising Industry-Academic Partnerships

Entrepreneurs, academics and industry experts who convened at SUTD's FIRST Industry Workshop 2021 recognised that the pandemic had not only pushed the frontiers of entrepreneurship to its limits, but also propelled us to create new realities that were previously unthinkable and impossible.

The annual flagship event, which took place virtually on 28 July 2021, was aimed at fostering collaborative research through the development and deepening of industry-academia ties. More than 1000 registrants from 32 countries joined in to hear industry and academic experts share insights into successful entrepreneurship and innovation arising from industry-university collaborations.

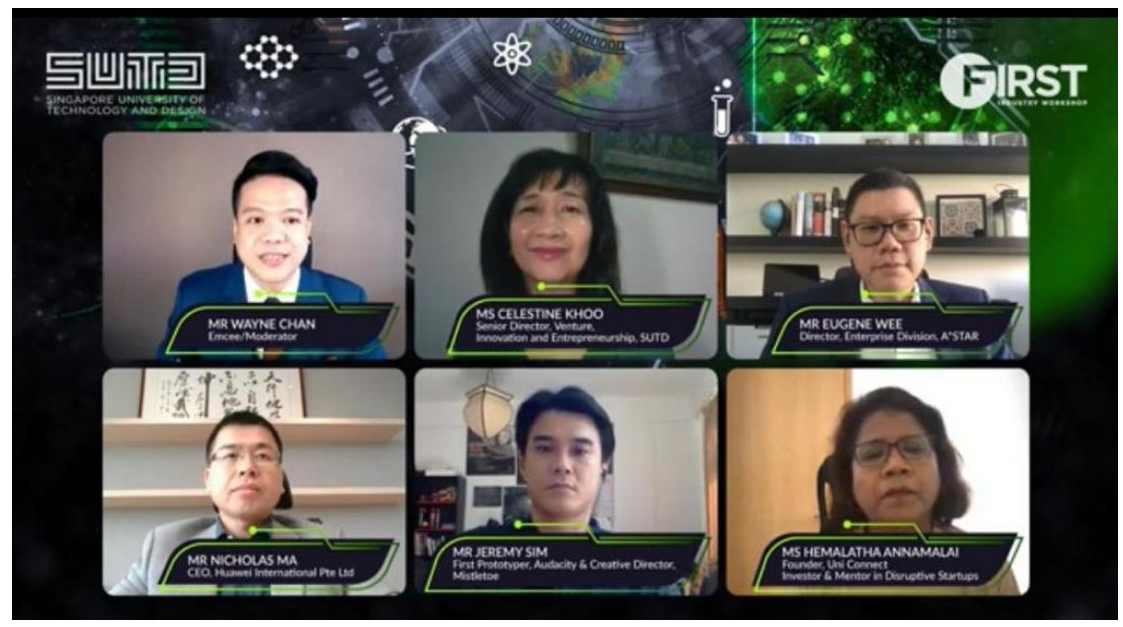
"The pandemic has reset the world's economy and this is the best time to start a new business. When academia and the industry work closely to fuse their complementary skills, knowledge and expertise, it will bring about a multiplier effect at a speed, scale and scope unlike anything that we have experienced before," said **Prof Yeo Kiat Seng**, Assoc Provost for Research and International Relations at SUTD during the opening address at the workshop.

Opening address and distinguished keynote speakers

Alongside **Asst Prof Mohan Rajesh Elara** from SUTD's Engineering Product Development (EPD) pillar who shared his journey as both an academic researcher and entrepreneur**,** two other impactful keynote addresses were delivered by industry experts. **Mr Chaney Ho**, Co-founder & Executive Director of Board of Advantech Co., Ltd. and the Advisor for the Singapore Mentorship Committee (SMC), spoke about 'Building Supply Chain Management Resilience in the De-Globalisation Age' while **Dr David Ong**, Senior Partner, Naef Group Spiele AG and Chairman of SMC shared his insights on 'Reimagining Unicorns of the Future'.

Attendees were also engaged in a thought-provoking forum panel discussion among industry experts on the topic 'University-Industry Collaboration: Entrepreneurship and Innovation'.

Ms Celestine Khoo (Senior Director, Venture, Innovation, and Entrepreneurship, SUTD), **Mr Eugene Wee** (Director, Enterprise Division, A*STAR), **Mr Nicholas Ma** (President of Huawei, Asia Pacific Enterprise Business Group), **Mr Jeremy Sim** (First Prototyper, Audacity & Creative Director, Mistletoe) and **Ms Hemalatha Annamalai** (Founder, Uni Connect and Investor & Mentor in Disruptive Startups) provided inspiring and diverse perspectives on possible collaboration frameworks and modalities relating to the topic, which included a discussion on cultivating a resilient talent pipeline that will power the future economy. The event wrapped up with showcases on our industry partners and SUTD's research capabilities.



Industry experts at the forum panel discussion

The next FIRST Industry Workshop has been scheduled for 27 July 2022. For updates and recordings from the previous event, please visit https://www.sutd.edu.sg/FIRST.

Research News

Prof Chong Tow Chong Awarded Public Administration Medal (Gold)

Prof Chong Tow Chong, President of SUTD, received the Public Administration Medal (Gold) during the Singapore National Day Awards 2021. Prof Chong played a vital role in growing the University as founding Provost from 2009 till 2018. As he continues to lead as SUTD President today, he provides leadership and guidance in the next phase of the University's growth and development, as well as ensuring continuity in the pursuit of SUTD's vision, mission and strategic goals.

More information can be found here

Professor Tai Lee Siang joined SUTD as ASD Head of Pillar

Prof Tai Lee Siang (left), has joined SUTD as the Head of Pillar for Architecture and Sustainable Design (ASD) from 1 August 2021, having taken over the reins from previous Head of ASD, Prof Erwin Viray (right). A renowned architectural figure in Singapore and the region, Prof Tai brings along industry experience in managing and leading well-known architectural firms such as Ong & Ong and DP Architects. He was also a pioneer trustee member on the board of SUTD from 2009 till July 2021.

More information can be found here

NUS and SUTD to Collaborate on Innovation and Enterprise

The National University of Singapore (NUS) and SUTD signed a Memorandum of Understanding (MOU) on 14 July 2021 to collaborate in the areas of innovation and enterprise. The MOU underscores the two universities' shared efforts to cultivate new ideas; nurture entrepreneurial, research translation and innovation talents; and create opportunities for technology commercialisation and co-sharing of facilities and expertise. This is the first such partnership entered by both universities to collectively groom the next generation of talents to further build momentum in innovation and enterprise.

More information can be found here

Research News

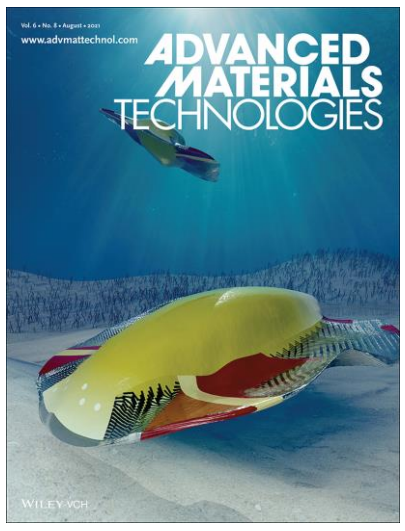
2nd Design Education Summit: Empowering the Future Workforce

The second edition of the Design Education Summit kicked off on 4 February 2021 with over 600 participants exchanging the latest in design education – from best practices to teaching tools – that will help nurture the next generation workforce with design sensibilities to meet the needs of the future.

Organised by the DesignSingapore Council (DSG), in partnership with the SUTD-MIT International Design Centre, the Summit is the first in Singapore to focus on design education. This year, the Summit is aimed at highlighting the importance of design as a strategic tool to help Singapore recover from the social and economic effects of the pandemic.

More information can be found here

A Universal Approach to Tailoring Soft Robots



Asst Prof Pablo Valdivia y Alvarado (EPD) and his team's work on soft robotics was featured on the front cover of Advanced Materials Technologies' August 2021 issue. They developed a novel automated process for designing and fabricating customised soft robots. The integrated design optimisation and fabrication workflow opens new opportunities for tailoring the mechanical properties of soft machines, including the optical, thermal, electrical, as well as other physico-chemical properties.

More information can be found here

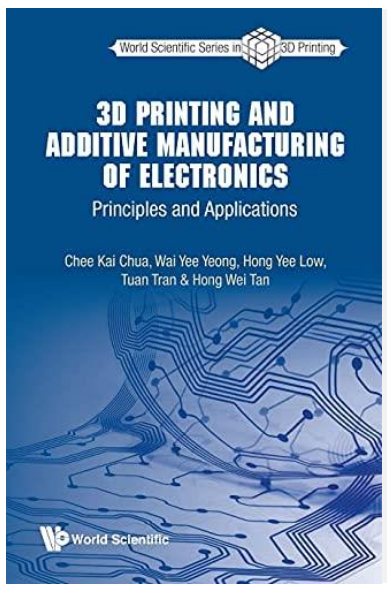
New Website for People Facing Online Harassment or Abuse

Researchers Holly Apsley and Catherine Chang from SUTD's Lee Kuan Yew Centre for Innovative Cities (LKYCIC) launched the Solid Ground website to guide people facing online harassment or abuse in Singapore. The website also provides users with suggested actions such as the adjusting of privacy settings, collecting evidence and applying for a protection order. Solid Ground was created in collaboration with AWARE Singapore, and also received support from the National Youth Council Singapore's Young Changemakers' Grant. Holly and Catherine were in the team for the larger project, 'Digital Societies', for which Mr Poon King Wang, Director of LKYCIC, led as the Principal Investigator.

More information can be found here

Research News

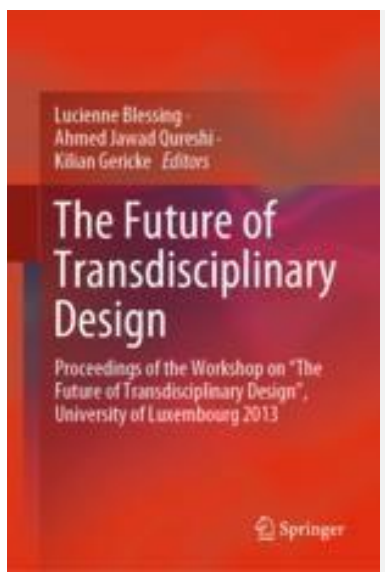
Transforming the World with 3D Printed Electronics



Prof Chua Chee Kai, Assoc Prof Low Hong Yee and Dr Tan Hong Wei (EPD) together with their NTU counterparts, published '3D Printing and Additive Manufacturing of Electronics: Principles and Applications' - a one-stop guide for anyone keen to learn more on the 3D printing of electronics. The book provides a comprehensive overview of the recent progress and fundamentals of 3D printed electronics technologies, their respective advantages, shortcomings and potential applications.

More information can be found here

The Future of Transdisciplinary Design

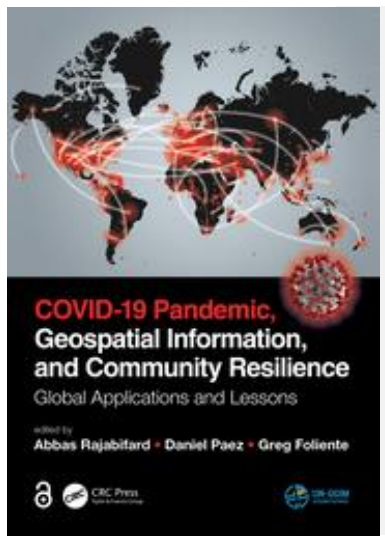


Prof Lucienne Blessing (EPD) has published her book on the state-of-the-art research in the field of transdisciplinary design, and highlights the challenges and issues from the perspectives of processes, people and products in transdisciplinary product design and development. It collates research papers resulting from the ‘Workshop on the Future of Transdisciplinary Design’ written by leading researchers in engineering design and product development.

The papers provide examples and case studies from existing practices, as well as future perspectives towards the development of the complex and ever-changing domains of engineering design and product development, with an emphasis on transdisciplinarity.

More information can be found here

Sensing Community Resilience Using Social Media

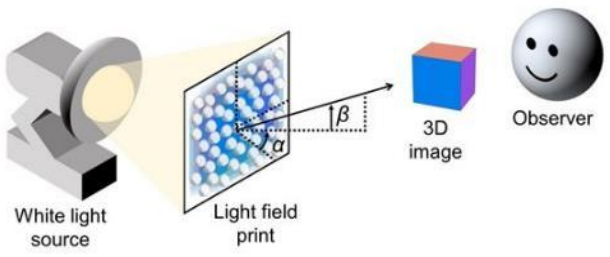


Research Director Dr Belinda Yuen and Research Fellow Dr Felicia N Huang (LKYCIC) worked with SUTD students Kelly Lim and Evan Sidhi to publish a chapter in ‘COVID-19 Pandemic, Geospatial Information, and Community Resilience: Global Applications and Lessons’, a book that provides interdisciplinary analysis and multi-sectoral expertise on the use of geospatial information and location intelligence to support community resilience and authorities to manage pandemics. The chapter focussed on Singaporean attitudes and sentiments and the roles that social media fulfils in supporting community resilience during a pandemic. The students worked on the chapter as part of their summer internship at LKYCIC.

More information can be found here

Research Publications

SUTD Researchers use Nanoscale 3D Printing to Create High-resolution Light Field Prints



Assoc Prof Joel Yang (EPD) and team used nanotechnology to create a unique print that displays a glasses-free 3D image under ordinary white light. The appearance of the image changes as the print is viewed from varying angles. The print is called a 'light field print' for its unique design and appearance as compared to conventional 2D images.

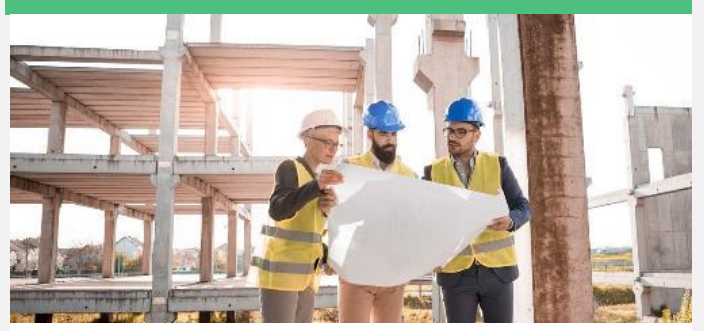
More information can be found here

Rethinking South East Asia's Energy Plans

Scientists are calling for revisions in planned hydropower expansions in light of the rapidly decreasing cost of solar photovoltaic systems. Building on high resolution mathematical models of the Thai, Laotian, and Cambodian power systems, the study, led by Assoc Prof Stefano Galelli (ESD), showed more sustainable pathways to a clean energy future.

More information can be found here

Computational Screening-LCA Tools for Early Design Stages



Asst Prof Michael Budig (ASD) and team presented a workflow for Life Cycle Assessment (LCA) based evaluations of different support and infill systems at early design stages of construction and building projects. By allowing users to select different choices of the construction systems and materials, alternative variants can be easily generated to compare the global warming potential impact and in turn avoid costly changes at later stages of the project.

More information can be found here

Assessing Programming Skills and Knowledge During the COVID-19 Pandemic

Faculty members Dr Norman Lee, Dr Oka Kurniawan and Dr Kenny Choo (ISTD) published a study that described their experiences on administering performance - based assessments and conducting oral exams online during the Covid-19 circuit breaker for a programming course. They provided insights into their experiences and the lessons learnt, drawing from both instructors' and students' perspectives of the programming task and the assessment format.

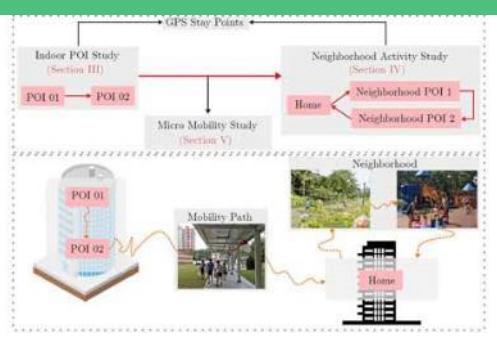
More information can be found here

Using the Environment to Control Quantum Devices

Assoc Prof Dario Poletti (SMT) led a study that uncovered how the environment can impact highly sensitive quantum behaviours like localisation. The team's findings could lead to future innovations in the design of superconducting materials and quantum devices, including super precise sensors.

More information can be found here

Wi-Fi Fingerprint Clustering for Urban Mobility Analysis



Assoc Prof Yuen Chau (EPD), Assoc Prof Yow Wei Quin (HASS) and Assoc Prof Chong Keng Hua (ASD) and team proposed a system architecture to scan surrounding WiFi AP, and perform unsupervised learning to demonstrate that it was possible to identify major insights with the fusion of both WiFi and GPS, which were previously not identifiable by GPS alone.

More information can be found here

Research Publications

Explorative Study on Children's Play Spaces

Dr Md Rashed Bhuyan, Research Fellow (LKYCIC), explored children's outdoor play in terms of location preference, usage pattern, and accessibility range of play spaces in three neighbourhoods in Dhaka, Bangladesh. The insights from the study provide evidence to the everyday geographies of children's outdoor play and inform urban planners in their efforts to create better play environments for and with children in high-density South Asian cities.

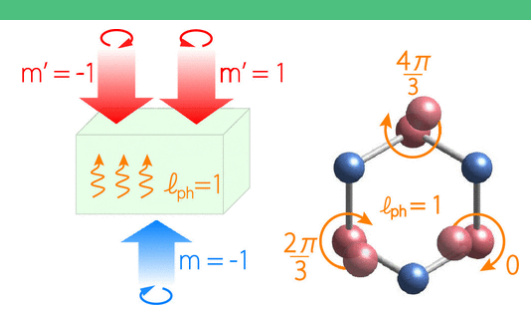
More information can be found here

Catering to the Various Appetites of Technology Adoption

Asst Prof Nilanjan Raghunath (HASS) examined the hawker work culture and the reasons behind the resistance in adopting technological advancements. Her study showed that involving hawkers and food stall owners early in the technology implementation process was key to quicker technology adoption at their workplaces.

More information can be found here

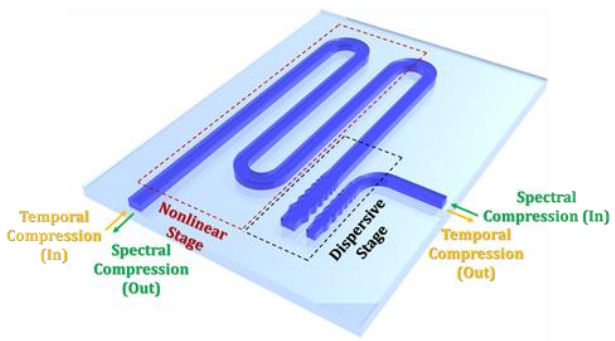
Propagating Chiral Phonons in Three-Dimensional Materials



Assoc Prof Yang Shengyuan (SMT) and team developed a novel concept of propagating 3D chiral phonons, which can transport the information on chirality and angular momentum. Their research work endows phonons with a crucial character—the ability to propagate and transport quantized information, which creates a new research direction and opens up the possibility to design novel phononic quantum devices.

More information can be found here

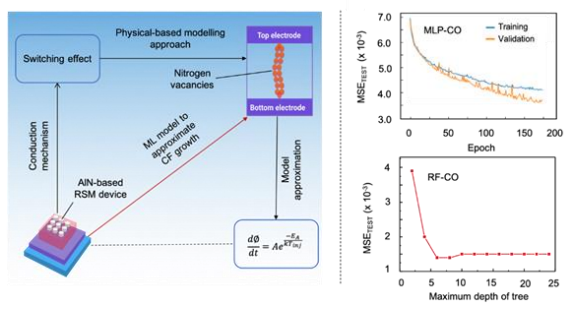
Ultra-strong Squeezing of Light Demonstrated for Ultrafast Optical Signal Processing



A team of photonics researchers led by Assoc Prof Dawn Tan (EPD) demonstrated a 11-fold compression of light in time, introducing an important paradigm for light generation in advanced metrology, imaging and high speed optical communications.

More information can be found here

New Modelling Toolkit to Predict New-type-of-memory Current



A significant challenge in the global research efforts towards better energy technologies – efficient and accurate device modelling – may be one step closer to being solved, based on a new technique developed by Asst Prof Desmond Loke (SMT) and team. The researchers created a new modelling toolkit which can predict the current of a new type of memory with excellent accuracy.

More information can be found here

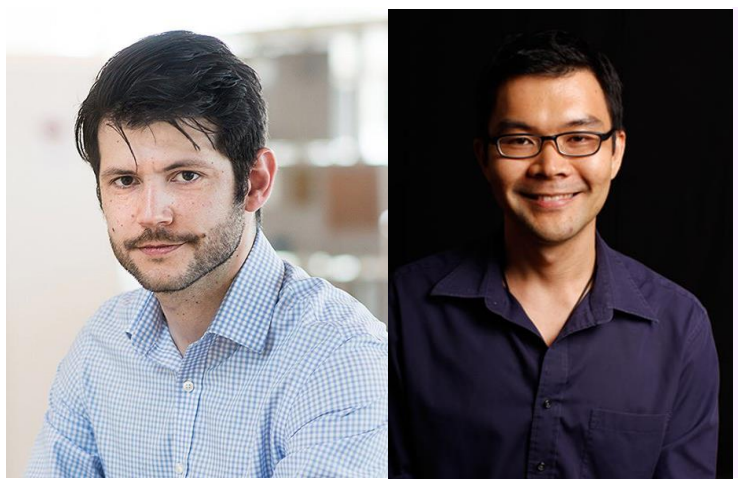
Using Microorganisms to Monitor Water Quality Within Minutes

Asst Prof Javier G. Fernandez (EPD) and his research group demonstrated a technology that allows users with camera phones to track the health of aquatic microorganisms and assess water quality and drinkability in the process. Their proof-of-concept does not require any chemicals, reagents or laboratory equipment.

More information can be found here

Research Achievements

SUTD Provost's Chair Professorship



Assoc Prof Georgios Piliouras (ESD), and Assoc Prof Joel Yang (EPD) have been appointed as Provost's Chair Professor with effect from 7 May 2021. The Provost's Chair Professorship recognises mid-career faculty members for their strong leadership and exceptional research contributions.

Papers Accepted at the Computer Vision and Pattern Recognition 2021

Assoc Prof Cheung Ngai-Man

Assoc Prof Cheung (ISTD) and his team's paper on deepFakes detection was accepted for an Oral Presentation (top 5%) at the IEEE Computer Vision and Pattern Recognition 2021, a premier AI conference that ranks top in the Engineering and Computer Science discipline. Their paper advances fundamental understanding in the detection of CNN-generated images, commonly referred to as deepFakes. It also shows the need for re-thinking of the use for high frequency Fourier spectrum decay attributes for CNN-generated image detection.

More information can be found here

Asst Prof Liu Jun

Asst Prof Liu Jun (ISTD) and his PhD students - Xu Li and Li Tianjiao published at the Computer Vision and Pattern Recognition, CVPR 2021. He had a total of five papers accepted to CVPR 2021. Two of the papers provided the benchmark for research on video analysis and human behaviour analysis, while the other three papers were about developing methods for handling video analysis and human behaviour analysis problems.

More information can be found here

iF DESIGN AWARD 2021

Prof Erwin Viray (ASD), together with an international team, designed the Food Shaping Kyoto, an exhibition that explores the origin of the city through the lens of food. The team won over the 98-member jury, made up of independent experts from all over the world. The competition was intense with almost 10,000 entry submissions from 52 countries in hopes of receiving the seal of quality and it resulted in only 22% of the entries being awarded.

The iF DESIGN AWARD, known as one of the most prestigious design prizes in the world is organised by the world's oldest independent design organisation, Hannover-based iF International Forum Design GmbH.

More information can be found here

Research Achievements

President*s Design Award 2020: Design of the Year Award

The AirMesh Pavilion was awarded Design of the Year at the President*s Design Award 2020. One of the world's first fully functional 3D printed space frame structures, the AirMesh Pavilion is designed by the Architectural Intelligence Research Lab (AirLab) at SUTD, led by Asst Prof Carlos Banon (ASD). Established in 2006, the President*s Design Award is Singapore's highest honour for designers and designs across all disciplines.

More information can be found here

Golden A' Design Award 2020 – 2021

The AI Table received the Golden A' Design Award in the 3D Printed Forms and Products Design Category. It was designed and created by AIRLAB co-directors Asst Prof Carlos Banon (ASD) and Assoc Prof Felix Raspall from the Adolfo Ibáñez University, together with three SUTD ASD alumni - Jonathan Ng Ming-En, Natalie Chen Mei Qing and Muhammad Syahid Bin Mustapa.

More information can be found here

Future of Us Pavilion Honoured with Multiple Accolades

Prof Thomas Schroepfer (ASD) and the Advanced Architecture Lab won the following awards for The Future of Us Pavilion.

- iF Design Award 2021 (Link)
- A' Design Platinum Award 2020-2021 (Link)
- DNA Paris Design Award 2021 (Link)
- Iconic Awards: Innovative Architecture 2021
- IDA International Design Award 2021
- Dezeen Awards 2021 (Link)

More information can be found here

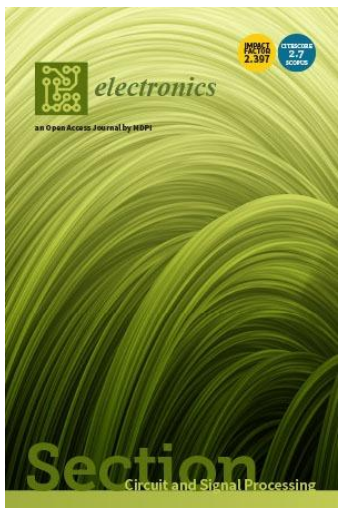
Best Paper Award 2020: Resources, Conservation & Recycling Journal

Co-authored by Assoc Prof Arlindo Silva (EPD), Assoc Prof Lynette Cheah (ESD), Dr Mohit Arora, SUTD PhD alumni, and Assoc Prof Felix Raspall from the Universidad Adolfo Ibanez, *'Buildings and the circular economy: Estimating urban mining, recovery and reuse potential of building components',* won the 2020 Best Paper Award for the Resources, Conservation & Recycling journal. Among the 501 papers published in 2020, three papers were selected for this award. The selection for the Award was based on criteria like rigour, novelty, importance and presentation.

More information can be found here

Research Achievements

Highly Cited Paper of Electronics Journal



Prof Yeo Kiat Seng (EPD) and team developed a novel Ka-band Marchand balun implemented in 0.13-μm SiGe bipolar complementary metal–oxide–semiconductor (BiCMOS) process. Their work was recognised as one of the highly cited papers published in *Electronics*. By combining both edge- and broadside-coupled structures, the new hybrid balun is able to increase the coupling and minimise the balun insertion loss. As compared with conventional edge-coupled or broadside-coupled structures, the proposed balun achieves the lowest insertion loss of 1.02 dB across a wide 1-dB bandwidth from 29.0 GHz to 46.0 GHz, with a core size of 270 μm × 280 μm.

More information can be found here

Journal of Mechanical Design 2020 Editors' Choice Paper Award

Assoc Prof Luo Jianxi and Prof Kristin Wood (EPD), together with their research team, were honoured with the Editors' Choice Award for developing and demonstrating an automated method for design concept assessment. This development could be useful in efficiently reviewing and identifying the most novel and valuable ideas amidst large numbers of design concepts for complex systems.

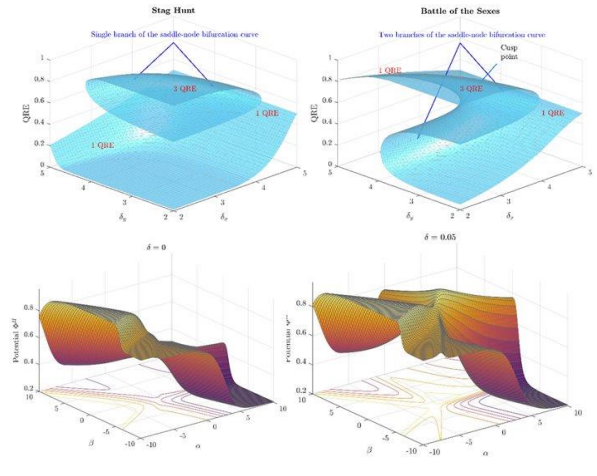
More information can be found here

IEEE Marconi Award 2021

Assoc Prof Yuen Chau (EPD) and his research group received the IEEE Marconi Paper Award, one of the most highly regarded academic awards in the global communications field with only one award selected each year. Their paper proposed new reconfigurable intelligent surface-based resource allocation methods which were able to provide up to 300% higher energy efficiency when compared to the use of regular multi-antenna amplify-and-forward relaying.

More information can be found here

Best Paper Award at 35th AAAI Conference on AI 2021



Assoc Prof Georgios Piliouras and Dr Stefanos Leonardos (ESD) developed a novel connection which can help in the design of more efficient multi-agent AI systems such as robotic space missions, healthcare management or automated financial investing algorithms. They were honoured with the Best Paper Award at the 35th AAAI Conference on Artificial Intelligence 2021.

More information can be found here

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