WELCOME

Singapore-China Joint-Symposium on AI & Sustainability

28 to 30 September 2025
Nanyang Technological University, Singapore

28 Sep: Pre-Conference (*In-Person*)

(Registration)

29 Sep (Day 1): Symposium & Panel Discussion
(*In-Person & Online Available*)

(Featuring 12 Fellows & Members from Singapore & China)

30 Sep (Day 2): Young Scientists Forum (*In-Person*)

Organized by:
ACADEMY OF ENGINEERING SINGAPORE
CHINESE ACADEMY OF ENGINEERING

Hosted by:
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
Nanyang Environment and Water Research Institute

Supported by:
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
NTU Centre in Computational Technologies for Finance
Graduate College

secretariat@saeng.sg

About the Symposium

The inaugural China-Singapore Symposium on AI Frontiers & Governance, held on 28 October 2024, concluded with resounding success, marked by strong engagement and participation from both countries. Building on this momentum, we are pleased to announce that the second Singapore-China Symposium will take place in Singapore, with the theme “AI & Sustainability.”

This year’s symposium will be jointly organized by the Academy of Engineering, Singapore (SAEng) and the Chinese Academy of Engineering (CAE), and will be hosted by the Nanyang Environment & Water Research Institute (NEWRI) at Nanyang Technological University (NTU), Singapore.

Recognized globally for its leadership in environmental and water research, NEWRI combines deep scientific expertise with a strong track record in translating innovations into impactful, scalable technologies. It offers a key platform for knowledge exchange and collaboration, and we are confident that NEWRI will be an outstanding host for this important event.

On behalf of the Organizing Committee, I am pleased to extend a cordial invitation for you to attend the Second Singapore-China Symposium on AI & Sustainability, to be held from 28 to 30 September 2025, at NTU, Singapore.

Should you have any questions regarding the symposium, please do not hesitate to contact the Secretariat of SAEng at secretariat@saeng.sg

We look forward to welcoming you to Singapore this September.

Professor Wang Rong
Secretary, SAEng
Executive Director, NEWRI, NTU

Day 1 Programme

Plenary Lectures & Panel Discussions

(Venue: LT 1A)

Morning Session

8:00 – 9:00	**Registration & Welcome Reception**
	Opening Ceremony
9:00 – 9:05	**Welcome Remarks** **LIU** Bin Deputy President (Research & Technology), National University of Singapore, Fellow of the Academy of Engineering, Singapore
9:05 – 9:10	**Welcome Remarks** **CHEN** Jianfeng Secretary-General of the Chinese Academy of Engineering, China
9:10 – 9:15	**Opening Remarks by Guest-of-Honour** His Excellency **CAO** Zhongming Ambassador Extraordinary & Plenipotentiary of the People's Republic of China to the Republic of Singapore
9:15 – 9:30	**Gift Exchange & Group Photo**
	Session 1
	Session Chair: **WEN** Yonggang (NTU)
9:30 – 9:50	**Pushing AI from Research to Application and Impact** **SUN** Sumei Agency for Science, Technology and Research (A*STAR), Singapore
9:50 – 10:10	**Security in Developing Next-Generation Artificial Intelligence—Preserving Computing Sovereignty and Ensuring Trusted Data Sharing** **GAO** Wen Peking University, China
	Session Chair: **CHU** Jian (NTU)
10:10 – 10:30	**AI-Assisted Infrared Photodetection, Thermal Emission and Spectrum Engineering for Sustainability** **QIU** Cheng-Wei National University of Singapore, Singapore
10:30 – 10:50	**Development and Practice of Sustainable Urban Water Systems** **MA** Jun Harbin Institute of Technology, China
	Session Chair: **MIAO** Chunyan (NTU)
10:50 – 11:10	**Physically Grounded AI for Scientific Discovery: From Prediction to Generative Design** **ONG** Yew-Soon Nanyang Technological University, Singapore
11:10 – 11:30	**From Theory to Practice in 6G AI-Native Network** Tony **QUEK** Quee Seng Singapore University of Technology and Design, Singapore
11:30 – 12:10	**Panel Discussion** moderated by **GUO** Yongxin City University of Hong Kong, China
12:10 – 14:00	**Lunch**

Day 1 Programme

Plenary Lectures & Panel Discussions

(Venue: LT 1A)

Afternoon Session

	Session 2
14:00 14:20	Session Chair: **WANG** Rong (NTU) **Large-Scale and Low-Cost Carbon Capture and Utilization** **CHEN** Jianfeng Beijing University of Chemical Technology, China
14:20 14:40	**Achieving Sustainability by Additive Manufacturing** **CHUA** Chee Kai Singapore University of Technology and Design, Singapore
14:40 15:00	Session Chair: **LI** Erping (ZJU) **Powering the AI Revolution: The Role of University Pilot Line in the AI Era** **WU** Hanming Zhejiang University, China
15:00 15:20	**On Autonomy, Robotics and Control** **GE** Shuzhi Sam National University of Singapore, Singapore
15:20 15:40	Session Chair: **CHEN** Xiaodong (NTU) **AI Empowering Urban Vitality: Exploring the Innovative Paradigm of Human-AI Integration (HAI)** **WU** Zhiqiang Tongji University, China
15:40 16:00	**Green Fuels for Maritime** **XU** Zhichuan Jason Nanyang Technological University, Singapore
16:00 16:40	**Panel Discussion** moderated by **ER** Meng Hwa Nanyang Technological University, Singapore
16:40 16:45	**Closing Remarks**
16:45 17:15	**Networking Session over Tea**
17:15 18:30	Transfer to Dinner Venue (by Invitation only)
18:30	**Private Dinner (by Invitation only)**

Day 1 Distinguished Speakers from SAEng

Professor Chua Chee Kai

Title: Achieving Sustainability by Additive Manufacturing

Abstract:

Additive Manufacturing (AM), commonly known as 3D printing, is increasingly recognized as a transformative technology for achieving sustainability in manufacturing. This presentation explores the multifaceted role of AM in advancing environmental goals across three key stages: design, fabrication, and application. At the design stage, Design for Additive Manufacturing (DfAM) enables material efficiency, part consolidation, and reduced energy consumption. During fabrication, in-situ process monitoring, closed-loop control, and novel material utilization—including recycled metals, biodegradable polymers, and sustainable bioinks—significantly lower waste and environmental impact. In the application stage, AM supports lightweight structures, on-demand production, and product longevity. Emerging trends such as AI-driven generative design, digital twins, and circular economy frameworks further amplify AM's potential to meet sustainability targets. However, challenges remain in standardization, regulatory alignment, and life cycle assessments. This study advocates for a balanced, systemic integration of sustainability principles into AM practices, underpinned by collaborative research, regulatory incentives, and education.

Biography:

Professor Chua Chee Kai joined SUTD in 2019 as Head of the Pillar for Engineering Product Development and is now the Associate Provost of Research since 2022. Previously, he had a distinguished career at NTU spanning nearly three decades, holding key positions including Head of Division and Chair at the School of Mechanical and Aerospace Engineering, and serving as Executive Director of the Singapore Centre for 3D Printing. Recognized for his services, he received the Public Administration Medal (Silver) in 2014. A leader in Additive Manufacturing for over 35 years, he won the International FAME Award in 2018 and was honoured with the Award of Excellence (Education) by ASTM International Additive Manufacturing Center of Excellence (AM CoE) in 2024 for his continuous and outstanding contributions to the field of additive manufacturing. He has contributed more than 500 journal and conference papers, books, book chapters, and patents. He was a Highly Cited Researcher™ for 2022, 2023 & 2024 according to Clarivate.

Day 1 Distinguished Speakers from SAEng

Professor Sam Ge Shuzhi

Title: On Autonomy, Robotics and Control

Abstract:

This lecture delves into the AI and sustainability research along with the intelligent robotics research, from its inception to the present day, highlighting key developments and methodologies that have shaped the landscape of autonomous robotics. By showcasing key technologies, industry applications, and ground-breaking projects in intelligent robotics control that are powered by AI-driven methodologies and sustainability principles, we demonstrate our tangible and impactful works, including physics-driven adaptive neural network control, learning-based control with safety guarantees, secure and efficient multi-agent collaborative control, physics-enhanced modelling, and energy-efficient optimization. These works illustrate the depth of research and sustained efforts required to advance autonomous robotics. We aim to collaborate with young and energetic researchers in pursuing excellence and innovation in this dynamic and impactful field, where AI and Sustainability are seamlessly fused in robotics to address complex challenges for a better humanity.

Biography:

Shuzhi Sam Ge is a Professor with the Department of Electrical and Computer Engineering, National University of Singapore and a Fellow of SAEng, IEEE, IFAC, IET, CAA, and ACA. He received his Ph.D. from Imperial College London in 1993 and B.Sc. from the Beijing University of Aeronautics and Astronautics in 1986. He serves as President (2024–2026) of the Asian Control Association, Member of the IEEE Roger W. Brockett Control Systems Award Committee (2024–2026), and Council Member of IFAC (2023–2026). He is Senior Editor of IEEE SMC-Systems and has served or is serving as Associate Editor for top journals including IEEE TAC, Automatica, IEEE TCST, IEEE TNN, and CAAI Transactions on Intelligent Technology. At IEEE CSS, he served as Vice President for Technical Activities (2009–2010) and Membership Activities (2011–2012). He is a Top 1% Highly Cited Researcher by Clarivate Analytics (2016–2024). He has received numerous national and international awards, including the National Technology Award (Singapore), AI Singapore Grand Challenge Award, and the Inaugural Temasek Young Investigator Award. He serves as Singapore Lead of INPACE, Horizon Europe program (2024–2027). His research interests include robotics, intelligent systems, artificial intelligence, and research translation.

Day 1 Distinguished Speakers from SAEng

Professor Ong Yew Soon

Title: Physically Grounded AI for Scientific Discovery: From Prediction to Generative Design

Abstract:

This talk presents the role of AI in science and engineering, from learning for prediction to optimization for precision, and onward to generative models that potentially reshape solution spaces. It highlights the possible shift from purely data-driven abstraction to physically grounded intelligence, where AI systems are increasingly aligned with the laws of nature. Advances in generalizable physics-informed neural networks, guided diffusion model generation, and prompt evolution are empowering AI to simulate, predict, plan, and design within real-world constraints. As language models become engines of scientific exploration, navigating complex design spaces and abstract knowledge landscapes, they converge with physics-based signals and evolutionary principles such as multifactorial optimization to achieve high-fidelity modeling and creative physical design. The talk ends with a vision of AI not merely as a tool but as a co-explorer, fusing data, theory, and imagination to uncover latent structures, accelerate discovery, and deliver real-world impact.

Biography:

Professor Yew-Soon Ong, Fellow of IEEE and the National Academy of Engineering, Singapore, is President's Chair Professor of Computer Science at Nanyang Technological University (NTU) and Chief Artificial Intelligence Scientist at A*STAR. He earned his Ph.D. in Artificial Intelligence from the University of Southampton in 2003. His research focuses on artificial intelligence, machine learning, and optimization. A former Chair of NTU's School of Computer Science and Engineering, he has led major AI conferences, including serving as General Co-Chair of the 2024 IEEE Conference on Artificial Intelligence. Professor Ong is the founding Editor-in-Chief of IEEE Transactions on Emerging Topics in Computational Intelligence and serves on the editorial boards of several leading IEEE journals. He has received five IEEE Outstanding Paper Awards and was recognized by Thomson Reuters in 2016 as a Highly Cited Researcher and one of the World's Most Influential Scientific Minds. He currently chairs the IEEE CIS Fellow Evaluation Committee.

Day 1 Distinguished Speakers from SAEng

Professor Qiu Cheng-Wei

Title: AI-assisted infrared photodetection, thermal emission and spectrum engineering for sustainability

Abstract:

This talk will report on the recent research progress in our lab on AI-enabled optical spectrum optimization, engineering, detection and emission. We emphasize a lot on infrared regime, because infrared light contains huge thermal energy that may cause urban heating and infrared light on-chip detections usually needs cryogenic cooling. We establish a photonic paradigm assisted with AI algorithms, enabling to detect high-dimensional (intensity, polarization, and wavelength) infrared light, at a chip scale and at room temperature. Furthermore, we develop a passive cooling technology that is empowered by multiscale machine learning algorithms to co-design with materials/pattern/geometry, without any energy consumption. The prototype is further scaled up for cooling uniform, cooling paints for end-users in China and Singapore. Smart materials are further deployed to make the spectrum engineering tunable.

Biography:

Prof. Cheng-Wei Qiu, Provost's Chair Professor and Fellow of the Academy of Engineering, Singapore, is internationally recognized for his research in structured light, metasurfaces, and thermal photonics. He is Fellow of APS, Optica, SPIE, The Electromagnetics Academy (US), Chinese Optical Society (Foreign Fellow), and ASEAN Academy of Engineering and Technology. Prof. Qiu has published over 600 peer-reviewed papers, including as corresponding author in Science (4), Nature (9), Physical Review Letters (30+), PNAS (10), Nature Photonics (8), Nature Materials (6), Nature Nanotechnology (5), Nature Electronics (4), Nature Physics (2), Nature Communications (30+), Science Advances (11), Nature Reviews Physics (1), Nature Reviews Materials (2), Chemical Reviews (4), etc. His honors include the SUMMA Graduate Fellowship (2005), IEEE AP-S Graduate Research Award (2006), URSI Young Scientist Award (2008), MIT TR35@Singapore (2012), Singapore Young Scientist Award (2013), SPIE Rising Researcher Award (2018), NUS Engineering Researcher Award (2021), World Scientific Medal (2021), IEEE Photonics Society Distinguished Lecturer (2023), and President's Science Award (2023), the highest science accolade in Singapore.

Day 1 Distinguished Speakers from SAEng

Professor Tony Quek Quee Seng

Title: From Theory to Practice in 6G AI-Native Network

Abstract:

With the advances in big data computing technology, AI already shows promising potentials in wireless industry, and we expect it will play an even more crucial role in 6G wireless networks. On the other hand, there is a future trend to explore the concurrent use of converged computer-and-communications infrastructure to run RAN and AI and Generative AI workloads, enhancing platform utilization and creating new monetization opportunities. Lastly, it is crucial to understand the radio interface requirements for running AI and Generative AI applications across consumer, enterprise, and government sectors. In this talk, we will first look at the theory aspect of an AI-native network through distributed learning and semantic communications. Next, we proceed to explore the practice aspect in implementing an Ai-native network through the concept of AI-RAN and explains how it can transform future networks with AI. In conclusion, we will also share some of our work through Singapore's Future Communications Research and Development Programme (FCP).

Biography

Tony Q.S. Quek received the B.E. and M.E. degrees in Electrical and Electronics Engineering from Tokyo Institute of Technology, respectively. At Massachusetts Institute of Technology, he earned the Ph.D. in Electrical Engineering and Computer Science. Currently, he is the Associate Provost (AI & Digital Innovation) and Cheng Tsang Man Chair Professor with Singapore University of Technology and Design (SUTD). He also serves as the Director of the Future Communications R&D Programme, and the ST Engineering Distinguished Professor. His current research topics include wireless communications and networking, AI-RAN, non-terrestrial networks, open radio access network, and 6G.

Dr. Quek received the 2008 Philip Yeo Prize for Outstanding Achievement in Research, the 2012 IEEE William R. Bennett Prize, the 2016 IEEE Signal Processing Society Young Author Best Paper Award, the 2017 CTTC Early Achievement Award, the 2017 IEEE ComSoc AP Outstanding Paper Award, the 2020 IEEE Communications Society Young Author Best Paper Award, the 2020 IEEE Stephen O. Rice Prize, the 2020 Nokia Visiting Professorship, the 2022 IEEE Signal Processing Society Best Paper Award, the 2024 IIT Bombay International Award For Excellence in Research in Engineering and Technology, the IEEE Communications Society WTC Recognition Award 2024, and the Public Administration Medal (Bronze). He is an IEEE Fellow, a WWRF Fellow, an AIAA Fellow, and a Fellow of the Academy of Engineering Singapore.

Day 1 Distinguished Speakers from SAEng

Professor Sun Sumei

Title: Pushing AI from Research to Application and Impact

Abstract:

Singapore's National AI Strategy 2.0 highlighted AI as strategically important for Singapore to unlock the next frontier of economic growth and to overcome our labour and productivity challenge. As a national research institute focusing on multi-disciplinary digital technologies research, A*STAR Institute for Infocomm Research (I^2R) has been working with eco-system partners and developing frontier AI technologies and solutions to support the digital transformation in key sectors. In this talk, we will share our endeavour in this pursuit, and report some of our latest results in multimodal foundation models and applications. We will also discuss challenges and efforts in AI model compression and tiny-AI development.

Biography:

Dr Sumei Sun is the Executive Director of Institute for Infocomm Research (I2R), A*STAR, Singapore. A*STAR I2R focuses on multi-disciplinary digital technologies research including artificial intelligence (AI), communications and connectivity, and cyber security. Sumei's current research interests include next-generation wireless communications, sensing-communications-computing-control integrative design, applied AI, and industrial internet of things. She's a Fellow of the IEEE and Fellow of the Academy of Engineering Singapore (SAEng). She's recipient of the IEEE ComSoc Donald W. McLellan Meritorious Service Award 2024, IEEE ComSoc Inaugural Asia Pacific Women in Communications Engineering Outstanding Achievement Award (2024), 2023 IEEE VTS Women's Distinguished Career Award, and Singapore National Day 2022 Public Administration Medal (Bronze). She holds a joint appointment with the Singapore Institute of Technology, and an adjunct appointment with the National University of Singapore, both as a full professor.

Day 1 Distinguished Speakers from SAEng

Professor Xu Zhichuan Jason

Title: Green Fuels for Maritime

Abstract:

The transportation sector is one of major contributors to global greenhouse gas emissions, driving the urgent need for sustainable energy solutions. Green fuel catalysis presents a promising pathway to reduce the environmental footprint of transportation by enabling the efficient production and utilization of renewable fuels. In recent years, some electrocatalysis approaches have been emerging as techniques for green fuel catalysis. This presentation explores the latest advancements in maritime sector for generating and utilizing green fuels, such as hydrogen, green ammonia, methanol, etc. Key topics include the development of novel catalysts with enhanced activity and selectivity, strategies for integrating renewable energy inputs, and the potential for scaling these technologies to meet the demands of the transportation industry. The presentation will also mention briefly the economic and policy implications of adopting green fuel technologies with the example of international shipping.

Biography:

Zhichuan is the President's Chair Professor and Associate Chair (Faculty)in the School of Materials Science and Engineering, Nanyang Technological University (NTU) and a Fellow of the Academy of Engineering, Singapore. He serves as the director of Maritime Energy & Sustainable Development Centre of Excellence, and the director of the Centre of Advanced Catalysis Science and Technology in NTU. He received his PhD degree in Electroanalytical Chemistry and B.S. degree in Chemistry from Lanzhou University, China. His PhD training was received at Lanzhou University, Institute of Physics, CAS, and Brown University. He worked at the SUNY Binghamton as a Research Associate and then in MIT as a Postdoctoral Researcher. He has received several awards such as 2024 TÜBA Academy Prize and the Zhaowu Tian Prize for Energy Electrochemistry by International Society of Electrochemistry (ISE) in 2019. Dr. Xu is a Highly Cited Researcher by Clarivate Analytics, Web of Science since 2018.

Day 1 Distinguished Speakers from CAE

Professor Chen Jianfeng

Title: Large-Scale and Low-Cost Carbon Capture and Utilization

Abstract:

Excessive human-caused CO_2 emissions are the main driver of global warming. Carbon Capture, Utilization, and Storage (CCUS) technology is regarded as an important strategy for mitigating climate change. This talk mainly consists of two parts on CCUS. Firstly, the situation and challenge of global CCUS were introduced, including CCUS demonstration project, industrial chain and technology development level. China's CCUS development plan is gradually being implemented. China has developed a clear roadmap for peaking carbon dioxide emissions and carbon neutrality and there are approximately 100 CCUS demonstration projects either in operation or under planning. Secondly, CCUS innovation by our BUCT Higee Center was introduced. We developed a novel technology for producing inorganic nanomaterials through carbon dioxide mineralization in the laboratory in 1994 and commercialized at 10,000 tons/a in 2001. Since then, We has been collaborating with enterprises for CCUS engineering technology in the past 30 years for CO_2 sourced from power plant or chemical plant. Large-scale demonstration devices (100 t/a to 10 kt/a level) for carbon dioxide capture have been developed using Higee technology, which can achieve more than 90% capture efficiency and less than 2.1 GJ/t energy cost. The captured carbon dioxide could be used in the field of agricultural to enhance crop yield and carbon sequestration, achieving a significant increase in yield of 20%~40% for crops in our field trials. This agricultural application route of CO_2 shows positive economic benefit and promising future for large scale carbon sequestration.

Biography:

Prof. Chen Jianfeng is a Member and Secretary General of the Chinese Academy of Engineering and an executive member of the World Chemical Engineering Council (representing China). He is an expert in the field of chemical engineering. As one of the pioneers of high-gravity technology in the world, he has taken the lead in proposing the engineering concept of high-gravity reactors and achieved industrialization, making important contributions to making China a leading country in the international high-gravity chemical industry. He has published over 400 academic papers in mainstream international chemical journals, as well as two monographs. He has been recognized as ESI highly cited Chinese researchers for many years, obtaining over 220 Chinese invention patent authorizations and over 20 foreign invention patent authorizations. He received 2 second prizes for national technological invention and 1 second prize for national scientific and technological progress as the first person to complete the project.

Day 1 Distinguished Speakers from CAE

Professor Gao Wen

Title: Security in Developing Next-Generation Artificial Intelligence — Preserving Computing Sovereignty and Ensuring Trusted Data Sharing

Abstract:

The rapid growth of artificial intelligence has introduced new security challenges. Firstly, establishing Computing Sovereignty involves maintaining a country's ownership and control over the computing resources critical for artificial intelligence research and industrial development. Second, while AI applications leverage the value of big data, it is vital to protect users' privacy and security. This report introduces the C2NET, the "China Computing NET" special project led by Pengcheng Laboratory. The C2NET aims to improve the overall efficiency of China's large computing infrastructures. It also discusses the use of data program interface (DPI) and "Waterproof Fortress Technology" on the C2NET platform to enhance data security and privacy protection in AI computing.

Biography:

Prof. Gao Wen is a member of Chinese Academy of Engineering, ACM Fellow and IEEE Fellow. He is the founding director of Pengcheng Laboratory (Shenzhen, China). He is also a Boya Chair Professor at Peking University. He is currently a deputy to the 14th National People's Congress. He used to be a member of the 10th, 11th and 12th CPPCC National Committee, the vice president of National Natural Science Foundation of China, the chairman of China Computer Federation and the chief editor of Chinese Journal of Computers.

He earned seven State Awards in Science and Technology Achievements as the first accomplisher. He received the IEEE Innovation in Societal Infrastructure Award (2025), National May 1 Labor Medal (2023), Wu Wenjun AI Highest Achievement Award (2023), the Special Prize on Scientific and Technological Progress of the Guangdong Province Science and Technology Award (2023), the Prize for Scientific and Technological Progress of Ho Leung Ho Lee Foundation (2022), the Outstanding Contribution Award of Guangdong Province (2021), the CCF Wang Xuan Award and the title of "2005 China's Top Ten Educational Talents".

Prof. Gao Wen has engaged in the research of artificial intelligence, multimedia, computer vision, pattern recognition, image processing, and virtual reality. He published six books and over 300 papers in international journals in the above areas.

Day 1 Distinguished Speakers from CAE

Professor Ma Jun

Title: Development and Practice of Sustainable Urban Water Systems

Abstract:

Over the past century, sanitary engineering has greatly reduced biological safety risks, yet wastewater systems remain a significant source of greenhouse gas (GHG) emissions, contributing about 2–5% of the total. Urban drainage and treatment processes release methane, nitrous oxide, and carbon dioxide, while nutrient loss from agricultural products to urban wastewater disrupts rural nutrient cycles, leading to soil degradation and hidden hunger.

This work identifies major challenges for urban water systems, including extreme rainfall driven by the urban heat island effect, material and virtual water imbalances between urban and rural areas, and disrupted nutrient recycling. A green and low-carbon urban water system framework is proposed, integrating source separation and carbon reduction, nutrient recovery for ecological agriculture, production of soil amendments from organic waste for saline-alkali land improvement, desert reclamation, and carbon sink expansion. Further, artificial intelligence is incorporated into wastewater treatment to optimize operations, reduce energy use, and enhance treatment performance. Case studies of key technologies demonstrate practical pathways for system implementation, offering both theoretical and technical foundations for future urban–rural water system transformation. This approach supports China's carbon peaking and carbon neutrality targets while promoting environmental sustainability, resource circularity, and public health.

Biography:

Professor Jun Ma is internationally recognized for his contributions in combatting water pollution and advancing sustainable urban water treatment systems. As an esteemed Academician of the Chinese Academy of Engineering, Fellow of the Royal Society of Chemistry and IWA Fellow, he has pioneered cost-effective and high-efficiency water treatment technologies. His innovations have addressed several water crises and safeguarded public health for millions worldwide. He received the prestigious Outstanding Achievements Award in Environmental Science & Technology (2024) and Honor Award for Scientific Excellence (2017) by the American Chemical Society, and received Sustainable Water Award (2016) by the Royal Society of Chemistry.

Day 1 Distinguished Speakers from CAE

Professor Wu Hanming

Title: Powering the AI Revolution: The Role of University Pilot Line in the AI Era

Abstract:

In recent years, artificial intelligence (AI) has been increasingly adopted in integrated circuit (IC) manufacturing and design, making technology development more efficient, accurate, and autonomous. In China, growing efforts have been dedicated to exploring AI applications within the IC industry, particularly to address key manufacturing challenges associated with mainstream technologies. In this process, the 12-inch CMOS public pilot line platform at Zhejiang University has played an important role by establishing essential manufacturing datasets and the unified database for AI training, supporting virtual fabrication development and enabling AI-enhanced EDA tools such as FabGPT and LLM-based design-technology co-optimization (DTCO).

Leveraging this unified data platform as a cornerstone, several AI-driven applications have emerged in our pilot line platform. These include virtual fabrication agents for process optimization and yield enhancement, AI-powered digital twins for power device validation, and intelligent systems for real-time metrology and fab control. On the hardware front, innovations such as fully analog neural-network chips based on CMOS synapses, low-temperature CMOS technologies for higher performance AI accelerators and application-specific AI processors for biomedical and smart grid systems further illustrate the expanding synergy between IC and AI.

These achievements highlight the dual trajectory of AI—both as a tool to advance IC manufacturing and as a target for specialized hardware acceleration—while underscoring the critical role of open pilot lines in bridging academic research with industrial adoption, ultimately empowering the broader AI revolution.

Biography:

He obtained a Ph.D. from the Institute of Mechanics, Chinese Academy of Sciences in 1987. He conducted postdoctoral research at the University of Texas and the University of California in the United States, and later worked at Intel and SMIC (Semiconductor Manufacturing International Corporation) on the research and development of integrated circuit manufacturing processes. He previously served as R&D Director and Vice President at SMIC.

In 2020, he established the Zhejiang University School of Micro-Nano Electronics (now the School of Integrated Circuits). Under his leadership, the team built China's first university-based 12-inch public pilot line with complete CMOS process capabilities, supporting industry-academia collaboration in the development of large-scale production technologies.

He was honored as one of the Top Ten Outstanding National Science and Technology Workers in 2013. He has received five provincial and ministerial awards, three Second Prizes of the National Scientific and Technological Progress Award, and the First Prize of the National Teaching Achievement Award in 2023.

Day 1 Distinguished Speakers from CAE

Professor Wu Zhiqiang

Title: AI Empowering Urban Vitality: Exploring the Innovative Paradigm of Human-AI Integration (HAI)

Abstract:

This talk explores the innovative paradigm of Human-AI Integration (HAI) as a driving force for urban vitality in the digital age. HAI is conceptualized not as simple human–machine collaboration, but as a dynamic structure of multiple human intervention nodes—such as policy, scenario, and creative plug-ins—through which urban will is mapped and guided within intelligent systems. The presentation demonstrates how generative AI, including ChatGPT-like tools, can enhance urban planning processes by improving decision-making transparency, facilitating cross-sector collaboration, and increasing public participation.

Drawing upon case studies such as the post-disaster reconstruction of Dujiangyan and the application of AI-based urban simulation platforms, the lecture highlights how data-driven methods—ranging from image segmentation and color analysis of global historic cities to strategic planning frameworks—enable cities to balance efficiency, sustainability, and cultural continuity. At the same time, it emphasizes the ethical and governance challenges of integrating AI into urban systems, including issues of decision authority, data privacy, and social responsibility.

By advancing an "AI4Planning" framework that spans strategic, spatial, ecological, and operational dimensions, the talk argues for a co-creative process in which human planners and AI systems jointly shape resilient, adaptive, and innovative urban futures.

Biography:

Prof. WU Zhiqiang is a Member of the Chinese Academy of Engineering, German Academy of Science and Engineering (Acatech), Royal Swedish Academy of Engineering Science, and Honorary Fellow of the American Institute of Architects (Hon. FAIA).

He is the Chief Scientist of the China Intelligent Urban Planning Co-creation Center for Yangtze River Delta Agglomeration (CIUC), Councilor of Shanghai Government, Member of the Shanghai Artificial Intelligence Development Experts' Committee, Vice President of the Urban Planning Society of China and China Association of Building Energy Efficiency, and Chief Editor of the journals Urban Planning Forum and Frontier of Urban & Rural Planning (FRUP).

Day 2 Programme
Session A: Resource Recovery (Venue: LT5)

SESSION 1
Venue: LT5
Session A: Resource Recovery Session Chair and Co-Chair: Xunchang FEI
Keynote Lecture A1 (09:00 to 09:20) *Reclaim, Restore, Reimagine: Circular Waste Solutions in Action* **Grzegorz LISAK** Nanyang Technological University, SG
Keynote Lecture A2 (09:20 to 09:40) *Valorising Waste for Aquaculture Feed in Singapore* **Yu De CHAO** Singapore Food Agency, SG
Oral A3 (09:40 to 09:55) *Turning Waste into Resource: Biochar Solutions for Sustainable Agriculture* **Xin YANG** Nanyang Technological University, SG
Oral A4 (09:55 to 10:10) *Chicken Manure Ash as a Bioresource-based Material for Efficient Carbon Dioxide Capture* **Jiahui BU** Nanyang Technological University, SG
Oral A5 (10:10 to 10:25) *Circular manufacturing implementation, planning and control* **Marvin Carl MAY** Nanyang Technological University, SG
MORNING TEA BREAK (10:20 to 10:40)
SESSION 2
Venue: LT5
Session A: Resource Recovery Session Chair and Co-Chair: Grzegorz LISAK
Keynote Lecture A6 (10:40 to 11:00) *AI Technology for Smart Waste-to-Energy System* **Qunxing HUANG** Zhejiang University, CN
Keynote Lecture A7 (11:00 to 11:20) *Sustainable Engineering of Functional Carbon Nanotubes from Waste Using an Energy-Efficient Dual-Stage Reactor* **Wen Da OH** Universiti Sains Malaysia, MY
Oral A8 (11:20 to 11:35) *Catalytic Conversion of Municipal Sewage Sludge and Animal Manure into Biogenic Multi-Walled Carbon Nanotubes and Hydrogen via Pyrolysis-CVD: Analysis of Catalyst Performance* **Jintao LU** Nanyang Technological University, SG
Oral A9 (11:35 to 11:50) *Resource recovery of Al and P from gasification sewage sludge slag via a multi-step wet-extraction system* **MZBM. AMRAD** Nanyang Technological University, SG
Oral A10 (11:50 to 12:05) *Reclaimed seawater discharge: An electrolytic approach to brine utilization and treatment* **Wei Han TU** Nanyang Technological University, SG
LUNCH & POSTER SESSION (12:00 to 14:00)

Day 2 Programme
Session A: Resource Recovery (Venue: LT5)

SESSION 3
Venue: LT5
Session A: Resource Recovery Session Chair and Co-Chair: Qunxing HUANG
Keynote Lecture A11 (14:00 to 14:20) *Status, Global Trends and Perspectives for Chemical Recycling* **M. GRAEBNER** TU Bergakademie Freiberg, Fraunhofer Institute for Ceramic Technologies and System IKTS, DE
Oral A12 (14:20 to 14:35) *Development and Application of High-Performance Biochar Catalysts for Waste Pyrolysis–Steam Reforming* **Jiali GUO** Nanyang Technological University, SG
Oral A13 (14:35 to 14:50) *Incorporating CO2 capture-utilization with municipal solid waste upcycling through isothermal sorbent looping-reforming* **Guicai LIU** Nanyang Technological University, SG
Oral A14 (14:50 to 15:05) *Carbon black dispersions in conductive cementitious composites: Mechanistic insights into the interrelationship between dispersion behaviour, electrical properties and microstructures* **Kevin Matthew MANURUNG** Nanyang Technological University, SG
Oral A15 (15:05 to 15:20) *Utilizing Polyethylene Terephthalate (PET) as a Sustainable Additive in Cementitious Mortar Composites: Plastic Modification and binary additive-cement system* **Zijian WANG** Nanyang Technological University, SG
AFTERNOON TEA BREAK (15:20 to 15:40)
SESSION 4
Venue: LT5
Session A: Resource Recovery Session Chair and Co-Chair: Wen Da OH
Keynote Lecture A16 (15:40 to 16:00) *"Waste-to-Products" for the Sustainability Transformation of Megacities: Impacts of Public Knowledge & Perception on Chemical Recycling Deployments in Singapore* **Roh Pin LEE** Brandenburg University of Technology, DE
Oral A17 (16:00 to 16:15) *Inequality in Air Pollution-Attributable Mortality by Income Level between and within Countries* **Hongliang ZHANG** University of Shanghai for Science and Technology, CN
Oral A18 (16:15 to 16:30) *Green Synthesis of Binder-Free Waste-Derived adsorbent for H2S Removal at Ambient Temperature* **Wenying LI** Shanghai University CN, Nanyang Technological University SG
Oral A19 (16:30 to 16:45) *Innovative MOF-Based Membrane Technologies for Metal Recovery from E-Waste* **Bo HAN** Nanyang Technological University, SG
Oral A20 (16:45 to 17:00) *AI-Enhanced Sorting and Tailored Processing for High-Yield Recovery of Critical Metals from Complex E-Waste* **Dong XIA** Nanyang Technological University, SG
TRANSFER TO CONFERENCE DINNER (17:00 to 18:00)
CONFERENCE DINNER & AWARD CEREMONY (18:00 onwards)

Day 2 Programme
Session B: Membrane Technology (Venue: LT6)

Session 1
Venue: LT6
Session B: Membrane Technology Session Chair and Co-Chair: Tzyy Haur CHONG & Tian LI
Keynote Lecture B1 (09:00 to 09:20) *Improving Efficiency in Seawater Reverse Osmosis Desalination (SWRO) Process* **Tzyy Haur CHONG** Nanyang Technological University, SG
Invited Lecture B2 (09:20 to 09:35) *Enhanced Ammonium Rejection in Thin-Film Composite Osmotic Membranes: Performance and Mechanisms* **Xian BAO** Harbin Institute of Technology, CN
Oral B3 (09:35 to 09:50) *Membrane Structure-dependent Water and Ion Transport in Osmotic Electrodialysis* **Hong LIU** Nanyang Technological University, SG
Invited Lecture B4 (09:50 to 10:05) *Modeling Dynamics of NF/RO Membrane Fouling with Collision Attachment Approach* **Tian LI** Tongji University, CN
Oral B5 (10:05 to 10:20) *Double-Macrocycles Based COF Membranes for Seawater Lithium Extraction* **Xinkun MA** Nanyang Technological University, SG
MORNING TEA BREAK (10:20 to 10:40)
SESSION 2
Venue: LT6
Session B: Membrane Technology Session Chair and Co-Chair: Gongping LIU & Miao TIAN
Keynote Lecture B6 (10:40 to 11:00) *Machine Learning Accelerates High Throughput Design of MOF-Based Membranes for Molecular Separation* **Gongping LIU** Nanjing Tech University, CN
Invited Lecture B7 (11:00 to 11:15) *Precise Construction of Hydrogel Interlayers for Enhanced Thin-Film Composite Forward Osmosis Membranes* **Miao TIAN** Northwestern Polytechnical Universtiy, Xi'an, CN
Oral B8 (11:15 to 11:30) *Rotary-actuated Hollow Fiber Membrane Contactor for Bubble-free Bioreactor Aeration* **Daniel NG Yee Fan** Nanyang Technological University, SG
Oral B9 (11:30 to 11:45) *Machine learning in GO membrane design: stability mechanisms and water ballistic transport* **Quan LIU** Anhui University of Science and Technology, CN
Oral B10 (11:45 to 12:00) *2-inch PAN/HMO Nanofibrous Membrane Scaffold Module for Lithium Recovery from Simulate SWRO Brine* **Yejing LIANG** Nanyang Technological University, SG
LUNCH & POSTER SESSION (12:00 to 14:00)

Day 2 Programme
Session B: Membrane Technology (Venue: LT6)

SESSION 3
Venue: LT6
Session B: Membrane Technology Session Chair and Co-Chair: Haiqing LIN & Yumeng ZHAO
Keynote Lecture B11 (14:00 to 14:20) *Sabatier principle on highly CO_2-philic yet rejective membranes for hydrogen purification* **Haiqing LIN** University at Buffalo, USA
Invited Lecture B12 (14:20 to 14:35) *Biomimetic Catalytic Membrane Enables Sustainable Water Purification through Direct-Electron-Transfer Pathway* **Yumeng ZHAO** Harbin Institute of Technology, CN
Oral B13 (14:35 to 14:50) *Lithium recovery from seawater desalination brines using ion-sieve electrospun nanofibrus membranes: the role of nanofiber design* **Naeem NADZRI** Nanyang Technological University, SG
Oral B14 (14:50 to 15:05) *Polyphenylsulfone-Based Membranes for Gas Separation* **Fan FENG** National University of Singapore, SG
Oral B15 (15:05 to 15:20) *Chemically Robust Hollow Fiber Thin-film Composite Membranes Based on Polyurea Selective Layers for Nanofiltration under Extreme pH Conditions* **Qiang XUE** Nanyang Technological University, SG
AFTERNOON TEA BREAK (15:20 to 15:40)
SESSION 4
Venue: LT6
Session B: Membrane Technology Session Chair and Co-Chair: Xiaoying ZHU & Lei YAO
Keynote Lecture B16 (15:40 to 16:00) *Interface-Engineered Functional Membranes for Emerging Pollutant Removal* **Xiaoying ZHU** Zhejiang University, CN
Invited Lecture B17 (16:00 to 16:15) *Machine-learning-guided design and performance prediction of membrane processes for PFAS removal* **Lei YAO** Wuhan Institute of Technology,CN
Oral B18 (16:15 to 16:30) *Quantifying the potential of high-performance RO membranes for seawater and hypersaline brine desalination: from module-scale modelling to experimental evaluation* **Yu Jie LIM** Nanyang Technological University, SG
Oral B19 (16:30 to 16:45) *Effects of 3D Printed Support Pore Size, Porosity and Geometry on Performance Efficiency of Vacuum Membrane Distillation* **Bao Lam NGUYEN** Nanyang Technological University, SG
Oral B20 (16:45 to 17:00) *Centrifugal Reverse Osmosis (CRO) for energy-efficient desalination: Modelling and Validation* **Vinh Hien TRUONG** Nanyang Technological University, SG
TRANSFER TO CONFERENCE DINNER (17:00 to 18:00)
CONFERENCE DINNER & AWARD CEREMONY (18:00 onwards)

Day 2 Programme
Session C: Computing, Data Science & AI (Venue: LT7)

SESSION 1
Venue: LT7
Session C: Computing, Data Science & AI Session Chair and Co-Chair: Rui TAN
Keynote Lecture C1 (09:00 to 09:35) *Optimization and Acceleration of Large Generative Model Development* **Tianwei ZHANG** Nanyang Technological University, SG Oral C2 (09:35 to 09:50) *Generative AI for Health* **Hung Manh PHAM** Singapore Management University, SG
Oral C3 (09:50 to 10:05) *Decentralized GPU Banks: Web3-Orchestrated AI Systems for Sustainability* **Linshan JIANG** National University of Singapore, SG
Oral C4 (10:05 to 10:20) *GreenIntelliCPN: AI-Enabled Spatiotemporal Scheduling for Energy-Efficient Computing Power Networks* **Wen WEN** Beijing University of Posts and Telecommunications, CN
MORNING TEA BREAK (10:20 to 10:40)
SESSION 2
Venue: LT7
Session C: Computing, Data Science & AI Session Chair and Co-Chair: Rui TAN
Keynote Lecture C5 (10:40 to 11:15) *AI-Powered Robotic Systems for Sustainable Marine Ecosystem Monitoring* **Malika MEGHJANI** Singapore University of Technology & Design, SG Oral C6 (11:15 to 11:30) *Physics and Knowledge-based Cognitive Digital Twin for Advanced Battery Analytics* **Wei ZHANG** Singapore Institute of Technology, SG
Oral C7 (11:30 to 11:45) *Adversarially Trained Dynamic Ensemble: A Moving Target Defense Strategy for Robust Semantic Segmentation in Autonomous Vehicles* **Yanghui MO** Singapore Institute of Technology, SG
Oral C8 (11:45 to 12:00) *Data-Driven Control for Three-Phase AC-DC Power Converters Modeled by Switched Affine Systems* **Xiaozeng XU** Shandong University of Science and Technology, CN
LUNCH & POSTER SESSION (12:00 to 14:00)

Day 2 Programme
Session C: Computing, Data Science & AI (Venue: LT7)

SESSION 3
Venue: LT7
Session C: Computing, Data Science & AI Session Chair and Co-Chair: Rui TAN
Keynote Lecture C9 (14:00 to 14:35) *Efficient Multi-agent Path Planning via Graph Potential Field* **Ivor W. TSANG** A*STAR Centre for Frontier AI Research, SG Oral C10 (14:35 to 14:50) *Towards Fair Concurrent Training of Privacy Preserving AI* **Marie SIEW** Singapore University of Technology & Design, SG
Oral C11 (14:50 to 15:05) *Certified Robustness against Sensor Heterogeneity in Acoustic Sensing* **Phuc Duc NGUYEN** Nanyang Technological University, SG
Oral C12 (15:05 to 15:20) *Slim-SC: Thought Pruning for Efficient Scaling with Self-Consistency* **Colin HONG** Nanyang Technological University, SG
AFTERNOON TEA BREAK (15:20 to 15:40)
SESSION 4
Venue: LT7
Session C: Computing, Data Science & AI Session Chair and Co-Chair: Rui TAN
Keynote Lecture C13 (15:40 to 16:15) *Being Small in the Era of Large Models* **Anthony K. H. TUNG** National University of Singapore, SG Oral C14 (16:15 to 16:30) *DiTMoS: Delving into Diverse Tiny-Model Selection on Microcontrollers* **Xiao MA** Singapore Management University, SG
Oral C15 (16:30 to 16:45) *Efficient Continuous-Time Neural Networks Sustainable Edge AI* **Yimin DAI** Nanyang Technological University, SG
Oral C16 (16:45 to 17:00) *LR-Auth: Towards Practical Implementation of Implicit User Authentication on Earbuds* **Changshuo HU** Singapore Management University, SG
TRANSFER TO CONFERENCE DINNER (17:00 to 18:00)
CONFERENCE DINNER & AWARD CEREMONY (18:00 onwards)

Day 2 Programme
Session D: Biotechnology & Bioprocesses (Venue: LT8)

SESSION 1
Venue: LT8
Session D: Biotechnology & Bioprocesses Session Chair and Co-Chair: TBC
Keynote Lecture D1 (09:00 to 09:20) *A Sustainable Bio-platform for High Quality Microbial Protein Production* **Yan ZHOU** Nanyang Technological University, SG
Oral D2 (09:20 to 09:35) *Food Waste Valorisation via Fermentation* **Huang MIAO** Temasek Polytechnic, SG
Oral D3 (09:35 to 09:50) *Medium-chain fatty acid biosynthesis under high ammonia stress: Mechanisms and process optimization* **Liang ZHANG** Sun Yat-Sen University, CN
Oral D4 (09:50 to 10:05) *Revealing Cryptic Microbial Carbon/Nitrogen Pathways: A Novel Strategy for Sustainable Greenhouse Gas Mitigation and Resource Recovery* **Chen CAI** University of Science and Technology of China, CN
Oral D5 (10:05 to 10:20) *Carbon Emission of Straw-combined Heat and Power Generation* **Tingting QIAN** Shandong Normal University, CN
MORNING TEA BREAK (10:20 to 10:40)
SESSION 2
Venue: LT8
Session D: Biotechnology & Bioprocesses Session Chair and Co-Chair: TBC
Keynote Lecture D6 (10:40 to 11:00) *Biological sulfur disproportionation enlighthens new technology development for sustainable wastewater treatment* **Feng JIANG** Sun Yat-Sen University, CN
Oral D7 (11:00 to 11:15) *Sustainable synthetic biology for carbon-negative applications* **Weiming TU** Nanyang Technological University, SG
Oral D8 (11:15 to 11:30) *Harnessing Methanotroph–Microalgae Synergy for Carbon-Neutral Biogas Purification and High-Value Biomass Production* **Yuanxu SONG** University of Science and Technology of China, CN
Oral D9 (11:30 to 11:45) *Mining high-value bioproducts from sludge: Potential for MCFAs production without exogenous electron donors* **Lei LI** Nanyang Technological University, SG
Oral D10 (11:45 to 12:00) *Reduction of refractory Maillard reaction products by Fe3+ during thermal hydrolysis pretreatment and enhanced sludge biodegradability* **Yikun GENG** Nanyang Technological University, SG
LUNCH & POSTER SESSION (12:00 to 14:00)

Day 2 Programme
Session D: Biotechnology & Bioprocesses (Venue: LT8)

SESSION 3
Venue: LT8
Session D: Biotechnology & Bioprocesses Session Chair and Co-Chair: TBC
Keynote Lecture D11 (14:00 to 14:20) *AI for Toxicology - An Case Study on Deep Learning-enabled Morphometric Analysis (DLMA) for High Throughput Toxicity Screening* **Sijie LIN** Tongji University, CN
Oral D12 (14:20 to 14:35) *TBC* **Le Boucher RICHARD** Temasek Life Sciences Laboratory, SG
Oral D13 (14:35 to 14:50) *Elucidating the EPS-Biofouling Nexus in Electrochemical Anaerobic Membrane Bioreactor via Explainable AI Approaches* **Chengxin NIU** Nanyang Technological University, SG
Oral D14 (14:50 to 15:05) *Machine Learning Optimization of Waste Salt Pyrolysis: Predicting Organic Pollutant Removal and Mass Loss* **Run ZHOU** Nanyang Technological University, SG
Oral D15 (15:05 to 15:20) *Towards Explainable Hybrid Model for Multi-Hour Ahead Wastewater Effluent Prediction* **Yijie WANG** Nanyang Technological University, SG
AFTERNOON TEA BREAK (15:20 to 15:40)
SESSION 4
Venue: LT8
Session D: Biotechnology & Bioprocesses Session Chair and Co-Chair: TBC
Keynote Lecture D16 (15:40 to 16:00) *Emerging Pollutants: Antibiotic Resistance Genes -- Transmission in the Environment* **Xiaole YIN** Nanyang Technological University, SG
Oral D17 (16:00 to 16:15) *Simultaneous Vanadium(V) Removal and Toxicity Response Mechanisms in Settleable Algae Systems* **Siling REN** Nanyang Technological University, SG
Oral D18 (16:15 to 16:30) *The plastisphere: A hazard or solution?* **Sakcham BAIROLIYA** Nanyang Technological University, SG
Oral D19 (16:30 to 16:45) *A Synergistic Strategy of NH3 Stripping and HNAD Pathway for Enhanced Nitrogen Removal and Resource Recovery from Anaerobically Treated Leachate* **Facai AN** Beijing Forest University, CN
Oral D20 (16:45 to 17:00) *Artificial electron snorkels for reducing methane emission decrease microbial community complexity but increase its stability in lake sediment* **Nan SHEN** Nanjing Normal University, CN
TRANSFER TO CONFERENCE DINNER (17:00 to 18:00)
CONFERENCE DINNER & AWARD CEREMONY (18:00 onwards)

Organized by: Academy of Engineering Singapore; Chinese Academy of Engineering

Hosted by: Nanyang Technological University Singapore; Nanyang Environment and Water Research Institute

Supported by: Nanyang Technological University Singapore; NTU Centre in Computational Technologies for Finance, Graduate College; MEMSIS

secretariat@saeng.sg

Day 2 Programme
Session E: Environmental AI & Modelling (Venue: LT14)

SESSION 1
Venue: LT14
Session E: Environmental AI & Modelling Session Chair and Co-Chair: Xunyuan YIN & Zhe WU
Keynote Lecture E1 (09:00 to 09:20) *Spatial-temporal Adaptive Planning of Flood Managed Aquifer Recharge Guided by Deep Reinforcement Learning* **Xiaogang HE** National University of Singapore, SG
Oral E2 (09:20 to 09:35) *A mechanism-data co-driven hybrid modeling framework for WWTPs to achieve reliable simulation at system-level* **Yi PAN** Zhejiang University, CN
Oral E3 (09:35 to 09:50) *Spatiotemporal Patterns of Urban Flooding in Singapore and Detection via AI-Based Image Analysis* **Jingyu WANG** National Institute of Education, SG
Oral E4 (09:50 to 10:05) *Transfer learning in modeling and predictive control of chemical processes* **Ming XIAO** National University of Singapore, SG
Oral E5 (10:05 to 10:20) *A Novel Perspective on Process Monitoring: Nonlinear Causal Mapping Aggregation for Key Performance Indicator* **Haoqian WANG** Beijing University of Chemical Technology, CN
MORNING TEA BREAK (10:20 to 10:40)
SESSION 2
Venue: LT14
Session E: Environmental AI & Modelling Session Chair and Co-Chair: Xunyuan YIN and Zhe WU
Keynote Lecture E6 (10:40 to 11:00) *Machine learning-enabled Koopman modeling and convex optimization-based predictive control of nonlinear systems* **Xunyuan YIN** Nanyang Technological University, SG
Oral E7 (11:00 to 11:15) *Quantitative Analysis of Electrostatic Interactions in Nanofiltration for Trace Organic Contaminants Removal* **Zhiyi XIA** Zhejiang University, CN
Oral E8 (11:15 to 11:30) *Machine learning forecasts of global daily CO2 emissions in near-real-time* **Zhu DENG** The University of Hong Kong, CN
Oral E9 (11:30 to 11:45) *Fast Machine Learning-based Model Predictive Control of Nonlinear Processes* **Wenlong WANG** National University of Singapore, SG
Oral E10 (11:45 to 12:00) *Data-Driven Moving Horizon Estimation Using Machine Learning: Application to Membrane Bioreactor Processes* **Xiaojie LI** Nanyang Technological University, SG
LUNCH & POSTER SESSION (12:00 to 14:00)

Day 2 Programme
Session E: Environmental AI & Modelling (Venue: LT14)

SESSION 3
Venue: LT14
Session E: Environmental AI & Modelling Session Chair and Co-Chair: Xunyuan YIN and Zhe WU
Keynote Lecture E11 (14:00 to 14:20) *Robust BFMHE and Robust Data-driven MHE for Lithium-ion Battery* **Xiaodong XU** Central South University, CN
Keynote Lecture E12 (14:20 to 14:40) *Machine Learning in Model Predictive Control of Chemical Processes* **Zhe WU** National University of Singapore, SG
Oral E13 (14:40 to 14:55) *Large Language Model–Assisted Machine Learning for the Design and Validation of Deep Eutectic Solvent–Porous Organic Cage Membranes in CO_2N_2 Separation* **Jie ZHAO** Kunming University of Science and Technology, CN
Oral E14 (14:55 to 15:10) *Distributed Fault-Tolerant Game-Theoretic Control for Sustainable Multi-Agent Systems with Actuator Faults* **Wenjing HOU** Beijing University of Chemical Technology, CN
Oral E15 (15:10 to 15:25) *Evaluating and Advancing Large Language Models for Nanofiltration Membrane Knowledge Tasks* **Xinchen XIANG** Zhejiang University, CN
AFTERNOON TEA BREAK (15:20 to 15:40)
SESSION 4
Venue: LT14
Session E: Environmental AI & Modelling Session Chair and Co-Chair: Xunyuan YIN and Zhe WU
Keynote Lecture E16 (15:40 to 16:00) *AI4S for Sustainable Innovation: Building High-Quality Datasets for Coal-Based New Materials* **Yang DONG** National Institute of Clean-and-Low-Carbon Energy, CN
Oral E17 (16:00 to 16:15) *Mamba-neural ordinary equation Koopman approach for modeling and optimal control of membrane water treatment system* **Zhaoyang LI** Nanyang Technological University, SG
Oral E18 (16:15 to 16:30) *Data-Efficient Modelling of Integrated Chemical Plants with Recycles using a Graph Convolutional LSTM Approach* **Wanlu WU** National University of Singapore, SG
Oral E19 (16:30 to 16:45) *Mechanism-Informed Machine Learning for Predicting Water Treatment Performance: Application to Membrane Fouling* **Matteo TAGLIAVINI** Nanyang Technological University, SG
Oral E20 (16:45 to 17:00) *Event-Triggered Data-Driven Control of Multi-Agent Systems under Sequential Scaling Attacks* **Haixin MA** Beijing University of Chemical Technology, CN
TRANSFER TO CONFERENCE DINNER (17:00 to 18:00)
CONFERENCE DINNER & AWARD CEREMONY (18:00 onwards)

Day 2 Programme
Session F: Environmental Chemistry & Materials (Venue: LT15)

SESSION 1
Venue: LT15
Session F: Environmental Chemistry & Materials Session Chair and Co-Chair: TBC
Keynote Lecture F1 (09:00 to 09:20) *Intercalation in 2D TMDs and Membranes Fabrication for Water Purification* **Zhiyuan ZENG** City University of Hong Kong, CN
Invited Lecture F2 (09:20 to 09:35) *Developing high-pressure pressure-retarded osmosis membranes for renewable osmotic energy harvesting: the critical role of membrane material design and structure optimization* **Qianhong SHE** Nanyang Technological University, SG
Invited Lecture F3 (09:35 to 09:50) *Sustainable Membranes for a Circular Membrane Industry* **Bofan LI** Agency for Science, Technology, and Research (A*STAR), SG
Invited Lecture F4 (09:50 to 10:05) *Distributed direct air capture by carbon nanofiber air filters* **Ronghui WU** Nanyang Technological University, SG
Invited Lecture F5 (10:05 to 10:20) *Smart imaging for smart separation: electron microscopy and machine learning in membrane design* **Prashant KUMAR** Nanyang Technological University, SG
MORNING TEA BREAK (10:20 to 10:40)
SESSION 2
Venue: LT15
Session F: Environmental Chemistry & Materials Session Chair and Co-Chair: TBC
Keynote Lecture F6 (10:40 to 11:00) *Membranes for Carbon Capture: From Dense Polymers to Microporous Structures* **Sui ZHANG** National University of Singapore, SG
Invited Lecture F7 (11:00 to 11:15) *Aligned macrocycle pores in ultrathin films for accurate molecular sieving* **Zhiwei JIANG** Nanyang Technological University, SG
Invited Lecture F8 (11:15 to 11:30) *Membrane Solutions for Low-Energy and Sustainable Resource Recovery* **Zhe YANG** The University of Queensland, AU
Oral F9 (11:30 to 11:45) *Lactic-Acid-based Deep Eutectic Solvent for Sustainable Recovery of Critical Metals from Spent Lithium-ion Batteries under Mild Conditions* **Ziwen YUAN** Nanyang Technological University, SG
Oral F10 (11:45 to 12:00) *High-Performance Lithium Extraction from Salt Lakes with designing nano-materials and device* **Guangqiang MA** Xi'an University of Architecture and Technology, CN
LUNCH & POSTER SESSION (12:00 to 14:00)

Day 2 Programme
Session F: Environmental Chemistry & Materials (Venue: LT15)

SESSION 3
Venue: LT15
Session F: Environmental Chemistry & Materials Session Chair and Co-Chair: TBC
Keynote Lecture F11 (14:00 to 14:20) *Food as a source of disinfection byproducts: Detection, formation, and control in processing and cooking* **Yang PAN** Nanjing University, CN
Invited Lecture F12 (14:20 to 14:35) *Powering chemicals production with renewable electricity* **Wan Ru LEOW** Nanyang Technological University, SG
Invited Lecture F13 (14:35 to 14:50) *Hydrogen embrittlement in steels – a roadblock against sustainable hydrogen economy* **Eason CHEN** Nanyang Technological University, SG
Oral F14 (14:50 to 15:05) *Artificial Intelligence-Assisted Online Sensor for Environmental Monitoring* **Xuanhao LIN** National University of Singapore, SG
Oral F15 (15:05 to 15:20) *Temperature effects on ozonation: Impacts on kinetics of organic amines abatement, bromate formation and disinfection* **Zhuangsong HUANG** Harbin Institute of Technology, CN
AFTERNOON TEA BREAK (15:20 to 15:40)
SESSION 4
Venue: LT15
Session F: Environmental Chemistry & Materials Session Chair and Co-Chair: TBC
Keynote Lecture F16 (15:40 to 16:00) *Artificially Confined Sub-Nanoscale Channels for Molecular Separation* **Jie SHEN** Nanyang Technological University, SG
Oral F17 (16:00 to 16:15) *Noncovalent Complex Modulated Fabrication of COF Membrane for Organic Solvent Nanofiltration* **Baoyu WANG** Joint School of NUS and TJU, CN
Oral F18 (16:15 to 16:30) *When polymers meet 2D materials: Innovations in nanochannel membrane design* **Hao ZHANG** The University of Queensland, AU
Oral F19 (16:30 to 16:45) *Cellular toxicities of disinfection byproducts of 6PPD – a comparison between UV-NH2Cl disinfection and conventional disinfection methods* **Caixia LI** Nanyang Technological University, SG
Oral F20 (16:45 to 17:00) *Robust and Ordered Ultra-Thin MXene Composite Film for Electromagnetic Shielding and Thermal Camouflage* **Changan LU** South China University of Technology, CN
TRANSFER TO CONFERENCE DINNER (17:00 to 18:00)
CONFERENCE DINNER & AWARD CEREMONY (18:00 onwards)

Young Scientists Forum
Poster Programme (30 Sep 2025, 12:00 to 2:00 PM)

@ Pavillion outside Tan Chin Tuan (TCT) LT

S/N	Session	Details
A01	Resource Recovery	**Finding The Gaps Between Climate Change Experts and General Audiences Using AI-driven Approaches** Cuc Duong, Erik Cambria, Charles Yang Chun Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore
B02	Membrane Technology	**Dual resistance Janus PDA/PVDF membrane for removal of short- and long-chain perfluoroalkyl substances by membrane distillation** Siyoung Byun, Sanghyun Jeong Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore
B03	Membrane Technology	**Influences of substrate properties and liposome integration on high-flux thin-film composite desalination membranes** Clover Yong Le Lim, Daniel Yee Fan Ng, Can Li, Jaume Torres, Rong Wang Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore 637141, Singapore
B04	Membrane Technology	**Resource Recovery from Seawater Reverse Osmosis (SWRO) Desalination Brine** Wen Yi Chia, Wei Liang Tan, Truong Vinh Hien, Tzyy Haur Chong Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore 637141, Singapore
B05	Membrane Technology	**Visible-Light-Responsive TiO_2@Polydopamine–PVDF Membranes: Influence of Integration Strategy on Photocatalytic Performance** Thi My Hanh Le, Yi-Ning Wang, Can Li, Rong Wang, Sermpong Sairiam Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore 637141, Singapore
B06	Membrane Technology	**Engineering Hollow Fiber Thin-Film Composite Membranes with Enhanced CO_2 Separation Performance** Shan Xu, Kunli Goh, Rong Wang Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore 637141, Singapore
B07	Membrane Technology	**Catalyst-assisted secondary polymerization for fabricating positively charged polysulfonamide hollow fiber nanofiltration membrane with robust acid resistance** Yifei Wei, Can Li, Daniel Yee Fan Ng, Choon-Hong Tan, Rong Wang Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore 637141, Singapore
B08	Membrane Technology	**Pilot-scale harvesting of purple phototrophic bacteria during food waste valorization** Huijuan Xu, Daniel Yee Fan Ng, Rong Wang Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore 637141, Singapore
B09	Membrane Technology	**Tailoring PVDF Membrane Piezoelectricity via Incorporation of Polydopamine-Modified $BaTiO_3$ Nanoparticles** N. Misdan, Y. P. Su, T. H. Chong Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore 637141, Singapore
B10	Membrane Technology	**Fabrication of High-performance Hollow Fiber Membrane for CO_2/N_2 Separation** Yuxuan Dai, Kunli Goh, Rong Wang Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore 637141, Singapore
D11	Bio-technology & Bio-processes	**Microbial Interactions in Marine Plastisphere** Saesha Verma School of Civil and Environmental Engineering, Nanyang Technological University, Singapore
D12	Bio-technology & Bio-processes	**Establishment of Plastic-associated Microbial Community from Superworm Gut Microbiome** Yi-Nan Liu School of Civil and Environmental Engineering, Nanyang Technological University, Singapore
D13	Bio-technology & Bio-processes	**The Impact of Big Data on Precision Medicine: Prospective and Challenge** Ziheng Zhang School of Data Science, the Chinese University of Hongkong (Shenzhen), Shenzhen, China
E14	Environ-mental AI & Modelling	**Model Predictive Control of Batch Crystallization using Physics-Informed Machine Learning** Guoquan Wu, Zhe Wu National University of Singapore, Singapore
E15	Environ-mental AI & Modelling	**Adaptive robust nonlinear model predictive control for wastewater treatment process with previewed disturbances** Jialin Qi, Xunyuan Yin Nanyang Technological University, Singapore
E16	Environ-mental AI & Modelling	**Data-Enabled Economic Predictive control of Wastewater Treatment Processes** Mingxue Yan, Xunyuan Yin Nanyang Technological University, Singapore
E17	Environ-mental AI & Modelling	**Real-time optimization of membrane bioreactor process via meta-trained adaptive Koopman modeling and economic predictive control** M. T. Hoang, X. Li, R. Tan, M. Han, A. W.-K. Law, X. Yin Nanyang Technological University, Singapore
E18	Environ-mental AI & Modelling	**Robust Moving Horizon Estimation via Kernel Methods for Nonlinear Systems** Zenghong Huang, Xunyuan Yin Nanyang Technological University, Singapore
E19	Environ-mental AI & Modelling	**Distributed state estimation for dynamical systems subject to unknown inputs** Ganghui Cao, Xunyuan Yin Nanyang Technological University, Singapore
E20	Environ-mental AI & Modelling	**Enhancing Data-Driven Method with Neural RPCA: Outlier Removal in Hankel Matrices** Jingshi Yao, Xunyuan Yin Nanyang Technological University, Singapore
E21	Environ-mental AI & Modelling	**Deep Koopman-Based Reinforcement Learning for Control of industrial processes** Minghao Han, Mingxue Yan, Xunyuan Yin Nanyang Technological University, Singapore
E22	Environ-mental AI & Modelling	**Process Design of Power-to-Methanol Based on Long-Term Renewable Energy Forecast Uncertainty** Ziqing Guo, Dat-Nguyen Vo, Xunyuan Yin Nanyang Technological University, Singapore
E23	Environ-mental AI & Modelling	**Generalizable modeling for process systems via in-context learning** Xiaoqiao Chen, Xunyuan Yin Nanyang Technological University, Singapore
E24	Environ-mental AI & Modelling	**Efficient operation strategy for the thermal plants via hierarchical MPC based on reduced-order Koopman modeling** Zihang Xu, Xiaodong Xu Central South University, Changsha, China
E25	Environ-mental AI & Modelling	**Deep bilinear Koopman model predictive control with smart tuning based on dream optimization algorithm: application on load frequency control system** Zijia Meng, Xiaodong Xu Central South University, Changsha, China
E26	Environ-mental AI & Modelling	**A Reinforcement Learning Approach to System Identification for HVAC Control** Jiajun Chen, Zhantao Liang, Yuan Yuan, Xiaodong Xu, and Stevan Dubljevic Central South University, Changsha, China
E27	Environ-mental AI & Modelling	**Robust Bidirectional Moving Horizon Estimation with Finite-Time Convergence for Linear Discrete-Time Systems** Zhihao Liu, Xiaodong Xu Central South University, Changsha, China
E28	Environ-mental AI & Modelling	**Sim-to-Real Reinforcement Learning for Membrane System Control** Yujie Shi, Xunyuan Yin Nanyang Technological University, Singapore
E29	Environ-mental AI & Modelling	**Identifying the Threshold Effect of Female Executives on Firm Performance in China's Listed Companies** Deyang Jing, Yan Li, Linting Gu, Nazimah Hussin Universiti Teknologi Malaysia, Kuala Lumpur, Malaysia
E30	Environ-mental AI & Modelling	**Bayesian Natural Actor-Critic Primal-Dual Method for Probabilistic-Constrained MDPs** Zhantao Liang, Yuan Yuan, Xiaodong Xu, Stevan Dubljevic Central South University, Changsha, China
F31	Environmental Chemistry & Materials	**CoO_x clusters-decorated IrO_2 electrocatalyst activates NO_3^- mediator for benzylic C-H activation** Ziyu Mi, Wan Ru Leow School of Chemistry, Chemical Engineering and Biotechnology, Nanyang Technological University, Singapore; Institute of Sustainability for Chemicals Energy and Environment (ISCE2), Agency for Science, Technology and Research (A*STAR), Singapore 627833
F32	Environmental Chemistry & Materials	**Bromide ions removal in seawater reverse osmosis (SWRO) desalination process** Pooi Ling Koo, Lee Nuang Sim, Tzyy Haur Chong Singapore Membrane Technology Centre, Nanyang Environmental and Water Research Institute, Nanyang Technological University, Singapore; School of Civil and Environmental Engineering, Nanyang Technological University, Singapore
F33	Environmental Chemistry & Materials	**Tailoring the Pore Surface of Covalent Organic Frameworks for Efficient Carbon Dioxide Capture** Jingjing Guo, Yanli Zhao, Rong Wang Singapore Membrane Technology Center, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore; School of Chemistry, Chemical Engineering and Biotechnology, Nanyang Technological University, Singapore
F34	Environmental Chemistry & Materials	**Pyrrole-bearing porous network polymers synthesized via halogen-bond-assisted radical solid-phase polymerization for highly efficient and selective adsorption of lithium ion** Hong Tho Le School of Chemistry, Chemical Engineering and Biotechnology, Nanyang Technological University, Singapore
F35	Environmental Chemistry & Materials	**Electrodialysis Extraction of Lithium from Seawater Using Solid-State Electrolyte-on-Ceramic Membrane with High Arial Capacity** Kun Zhang, Hongtian Liu, Changan Lu, Kian Ping Loh Department of Chemistry, National University of Singapore, Singapore 117543, Singapore

Organized by: Academy of Engineering Singapore; Chinese Academy of Engineering

Hosted by: Nanyang Technological University Singapore; Nanyang Environment and Water Research Institute

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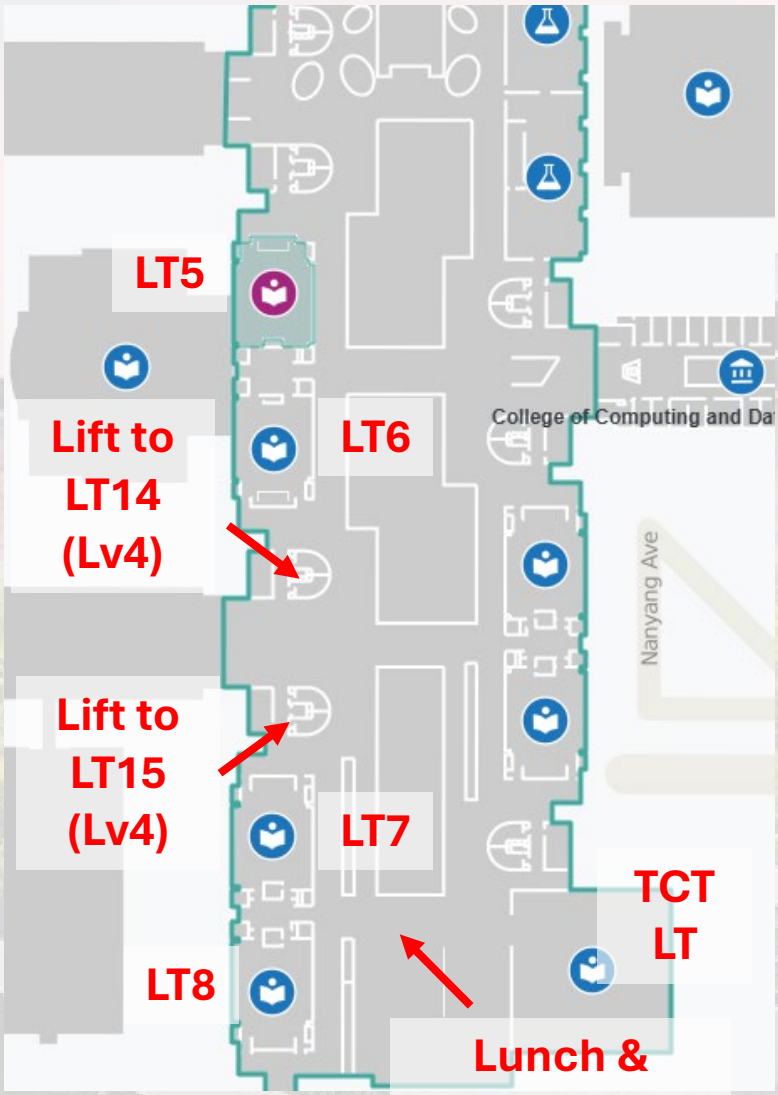
Symposium Venues

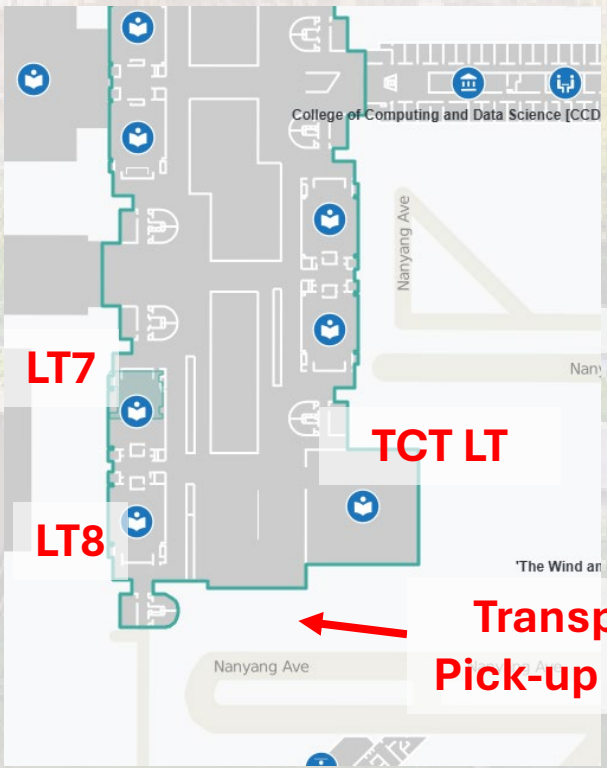
Day 2: Lecture Theatres 5, 6, 7, 8, 14 & 15 NTU



Conference Dinner

For Full-Event Participants Only

Transport to conference dinner is provided



Waiting point

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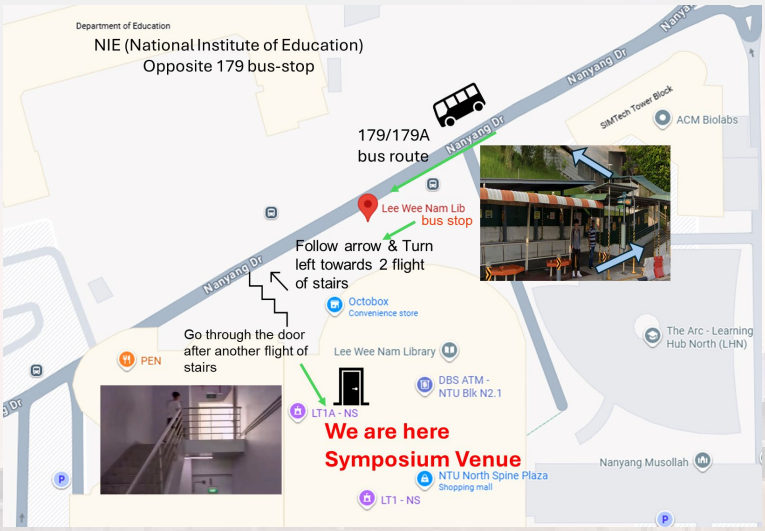
Directions

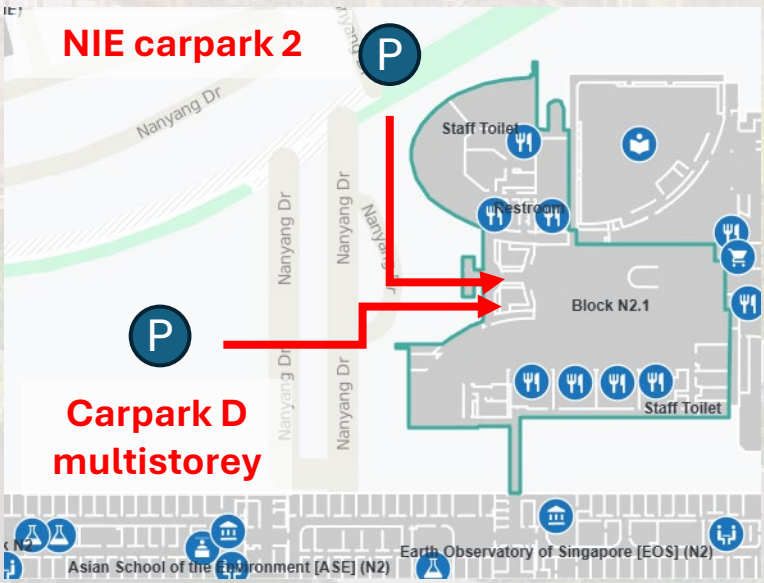
Day 1: Lecture Theatre 1A, NTU

NTU, North Spine Plaza, Level 01, 76 Nanyang Drive, 637331

By Bus:



Driving:



- **Park either at NIE carpark 2 or multistorey carpark at carpark D**
- **Take lift at Blk N2.1 to level 1**
- **Exit & walk to McDonalds**
- **LT1A is on your left**

By Taxi/Private Hire:

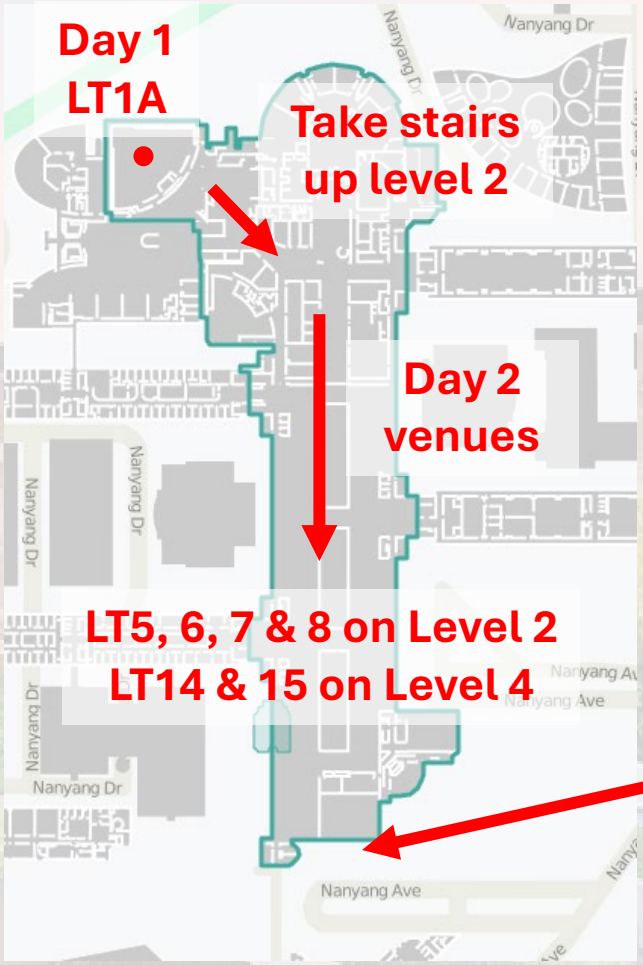
Drop off at N2.1: 76 Nanyang Drive, Singapore 637331 and follow the above instruction

Directions

Day 2: Lecture Theatres 5, 6, 7, 8, 14 & 15

NTU, Near TCT LT, Level 02, 50 Nanyang Avenue, 639798

From LT1A to Young Scientists Forum:



Drop-off point

By Taxi/Private Hire:

Drop off at Tan Chin Tuan LT: 50 Nanyang Avenue, Singapore 639798