

Asian Smart Cities Network and Digital Twin 2023 Symposium: Hong Kong Future Urban Living

10/June/2023

Room LT-9, Yeung Kin Man
Academic Building,
City University of Hong Kong



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Foreword

The Asian Smart Cities Network and Digital Twin 2023 Symposium will be held in Hong Kong SAR on 10 June 2023. Co-organized by the China Green Building (Hong Kong) Council (CGBCHK) and City University of Hong Kong (CityU), this first-of-its-kind symposium in Hong Kong gathers world-leading experts from the City University of Hong Kong, Georgia Institute of Technology, the University of Tokyo, Imperial College London, and representatives of the public sector as keynote speakers. The event includes keynote lectures and round-table panel discussions centered on the latest developments and innovations in smart cities, digital twins, and the impact of these technologies on sustainable future living and net-zero transition, particularly for primate Asian cities.

Future urban living and development in the face of global climate change, resource stress, and radical urbanization are increasingly challenging. Many cities are facing these challenges and are experimenting with new models of smart city development to reduce urban carbon emissions to net zero before 2050. Locally, the Smart City Blueprint and impending mega urban development projects, such as the Northern Metropolis and Lantau Tomorrow, have presented a unique window of opportunity to use Hong Kong as a living laboratory of smart cities model for meeting the net-zero emission objective by 2050.

This symposium will address the following important guiding principles for addressing the challenges: 1. Key principles of future sustainable urban development based on the SDG; 2. Zero carbon city development strategies toward 2050; 3. Applications of emerging technologies and their systems integration, including the Internet of Things, data science, and urban automation for shaping quality urban living.

Lastly, on behalf of the organizing committee, we would like to express our sincerest thanks to all co-organizers, sponsors, supporting organizations, and participants. Hope you have a good time at the symposium!

Prof. Jin Yeu TSOU, Raymond Hu Professor of Architecture
Prof. Thomas NG, Chair Professor and Head
Department of Architecture and Civil Engineering
City University of Hong Kong

Schedule

| | |
|-------------------|---|
| 8:45am - 9:15am | Registration |
| 9:15am - 9:20am | Prof. Jin Yeu TSOU, City University of Hong Kong Welcoming speech |
| 9:20am - 10:00am | Prof. Dimitri MAVRIS, Georgia Institute of Technology Digital Twin Systems Design for Smart Cities |
| 10:00am - 10:15am | Ir. Mr. Harry MA, Civil Engineering and Development Department Building a Smart, Sustainable and Resilient Hong Kong |
| 10:15am - 10:30am | Mr. Wing-hing CHOI, Drainage Services Department Digitalization Journey and Roadmap Towards Digital Twin for Drainage Services Department (DSD) |
| 10:30am - 10:35am | Group photo |
| 10:35am - 10:45am | Tea break |
| 10:45am - 11:15am | Dr. Akito MURAYAMA, The University of Tokyo Planning Methodology for Climate Solutions in Smart Cities |
| 11:15am - 11:45am | Prof. Gulsah AKAR, Georgia Institute of Technology Determinants of Sustainability Mobility Patterns for Aging Population |
| 11:45am - 12:15pm | Dr. Ricky TSUI, ARUP Latest Examples to Embrace Digital in our Future Smart City |
| 12:15pm - 12:45pm | Panel discussion Chair: Prof. Thomas NG, City University of Hong Kong |
| 12:45pm - 2:00pm | Lunch break |

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| 2:00pm - 2:30pm | Dr. John KOO, Hong Kong Applied Science and Technology Research Institute Digital Twins for Smart City |
| 2:30pm - 3:00pm | Dr. Takahiro YOSHIDA, The University of Tokyo Data-driven Urban Computing for Climate Change Mitigation and Adaptation |
| 3:00pm - 3:20pm | Dr. Amy TAN & Dr. Hao ZHENG, City University of Hong Kong Sewage Treatment Digital Twin for Safe and Smart Operation; & Creative Machine Learning Model(s) for Design |
| 3:20pm - 3:50pm | Prof. Perry PJ YANG, Georgia Institute of Technology Urban Systems Design for Smart Cities |
| 3:50pm - 4:20pm | Dr. Ana MIJIC, Imperial College London Towards Digital Twins for Water Neutral Urban Design |
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| 4:30pm - 5:00pm | Panel discussion Chair: Prof. Jin Yeu TSOU, City University of Hong Kong |

Chair & Organizer



Prof. Jin Yeu TSOU

Raymond Hu Professor of Architecture, Department of Architecture and Civil Engineering, City University of Hong Kong

Professor TSOU Jin Yeu is Raymond Hu Professor of Architecture, Department of Architecture and Civil Engineering, CityU. He is also Emeritus Professor, School of Architecture, CUHK. His current research interests cover Green Building Design and Technology, Low-carbon and Carbon Neutrality Development and Strategies, Sustainable Building Design and Urban Planning, Building Performance Design and Simulation, Urban Data Analytics and Energy Model, AI and Intelligent Systems, Urban Housing. He is former Advisory Member of Committee of Science & Technology (MoHURD) and Founding Director of Center for Housing Innovations; Chairman of China Urban Housing Conference (CUHC); Senior Fellow of Architectural Society of China; Member of China Green Building Council; Founding Director and Chairman of China Green Building (Hong Kong) Council, and Director of Board of Certification; Expert of Professional Advisory Committee of The Greater Bay Area Carbon Neutrality Association (GBACNA); Board of Directors of International Society for Computing in Civil and Building Engineering (ISCCBE); Distinguished Fellow of International Forum on Urbanism (IFoU); and Distinguished Advisor of Computer Aided Architectural Design in Asia (CAADRIA).

Chair & Organizer



Prof. Thomas NG

Chair Professor and Head, Department of Architecture and Civil Engineering, City University of Hong Kong

Prof. Ng received his BSc(Hons) in Quantity Surveying (1st Class Honours) from the University of Greenwich in 1991, MSc in Information Technology in Property and Construction from the University of Salford in 1992, and PhD in Civil and Structural Engineering from the University of Manchester Institute of Science and Technology in 1996. Having embarked his academic career in the City University of Hong Kong as Assistant Professor in 1998. Prof. Ng then joined the University of Newcastle, Australia as Lecture in 1999 before returning to the University of Hong Kong as Assistant Professor in 2000 where he was subsequently promoted to Associate Professor and Professor in 2003 and 2012 respectively. In 2021, he has returned to the City University of Hong Kong and taken up the role of Head of Department of Architecture and Civil Engineering. As Chair Professor of Smart and Sustainable Construction, his research focuses are primarily on smart city, sustainable built environment, community resilience, infrastructure asset management, digital transformation, construction informatics, construction industry performance and productivity, project delivery systems, etc. Prof. Ng has secured more than HKD 100 million of research grants through 120 research projects. He has published over 400 scholarly items, with more than half being refereed journal papers.

Speaker



Prof. Dimitri MAVRIS

Regent Professor and Director of Aerospace Systems Design Laboratory, School of Aerospace Engineering, Georgia Institute of Technology

Topic: Digital Twin Systems Design for Smart Cities

Dimitri Mavris is a Regents' Professor, Boeing Professor of Advanced Aerospace Systems Analysis, and an S.P. Langley Distinguished Professor. He also serves as the director of the Aerospace Systems Design Laboratory (ASDL) and executive director of the Professional Master's in Applied Systems Engineering (PMASE). Dr. Mavris received his B.S., M.S., and Ph.D. in aerospace engineering from the Georgia Institute of Technology. His primary areas of research interest include: advanced design methods, aircraft conceptual and preliminary design, air-breathing propulsion design, multi-disciplinary analysis, design and optimization, system of systems, and non-deterministic design theory. Dr. Mavris has actively pursued closer ties between the academic and industrial communities in order to foster research opportunities and tailor the aerospace engineering curriculum towards meeting the future needs of the US aerospace industry. He has also co-authored with his students in excess of 700 publications. During his tenure at Georgia Tech, Dr. Mavris has chaired and served in several Technical and Program Committees for the American Institute of Aeronautics and Astronautics (AIAA) and served on the AIAA Board of Directors and Institute Development Committee.

Speaker



Prof. Perry PJ YANG

Director of Eco Urban Lab, School of City & Regional Planning and School of Architecture, Georgia Institute of Technology

Topic: Urban Systems Design for Smart Cities

Perry Yang is a Professor and Director of Eco Urban Lab of the School of City and Regional Planning and the School of Architecture at the Georgia Institute of Technology. He is also a Visiting Professor of the Department of Urban Engineering at the University of Tokyo from 2022. Perry's work focuses on incorporating data analytics into urban design to improve ecological and energy performance of cities. He has published more than fifty articles and book chapters in this area from 2009, including a new book *Urban Systems Design: Creating Sustainable Smart Cities in the Internet of Things Era* that he co-edited and co-authored six chapters in 2020 by Elsevier. He co-edited a 2019 theme issue *Urban Systems Design: From Science for Design to Design in Science in Environment and Planning B: Urban Analytics and City Science*, a prestigious journal in planning to explore new urban design research agenda and applications of emerging technologies, data analytics and urban automation to placemaking in the context of smart city movement.

Speaker



Prof. Gulsah AKAR

Chair, School of City & Regional Planning, Georgia Institute of Technology

Topic: Determinants of Sustainability Mobility Patterns for Aging Population

Gulsah Akar is the Chair of the School of City and Regional Planning. Professor Akar conducts research on sustainable urban mobility. Her work led to various research projects and publications, from investigating built environment and travel connections using state of the art data collection technologies, to measuring access and equity, demographic differences in travel outcomes, and adoption of new mobility technologies. Her research received grant support from various sponsors including Ohio Department of Transportation (ODOT) and National Science Foundation (NSF). Professor Akar co-authored over 35 peer-reviewed articles in top-tier journals. Akar joined Georgia Tech in 2021. Before joining Georgia Tech, she was a professor of City and Regional Planning at The Ohio State University (OSU). At OSU, she led the PhD Program of her unit from 2015 to 2021. She served as a Research Program Lead at OSU's Sustainability Institute, providing direction for research on Smart and Resilient Communities across the university from 2019 to 2021. She was the Editor of Journal of Planning Literature from 2015 to 2021. She served as the Transportation Track Co-Chair of the Association of Collegiate Schools of Planning, and currently acts on multiple Transportation Research Board Committees.

Speaker



Dr. Ana MIJIC

Centre for Systems Engineering and Innovation,
Imperial College London

Topic: Towards Digital Twins for Water Neutral Urban Design

Ana is a Reader in Water Systems Integration and Director of the Centre for Systems Engineering and Innovation. She is leading the development of novel systems tools focused on quantifying the interaction between the water cycle and sustainable development. The work has aim to inform regulatory bodies and water industry if and how we can support economic growth whilst ensuring sustainable water use and flood and water quality management under future uncertainties.

Through NERC Innovation Fellowship funding she worked with the UK Environment Agency to apply systems thinking and systemic approaches to understanding the catchment water system complexity. She has led the UK NERC CHANSE project on systems water management and irrigation water use in India. Currently, Ana is a PI on the EPSRC VENTURA project and Systems Analysis Lead for the NERC CAMELLIA impact programme, where her work is focused on the development of systems water management models that can represent the integrated water infrastructure planning system, and how grey and green infrastructure solutions and housing design can be integrated to contribute to the overall quality of life in cities.

Speaker



Dr. Akito MURAYAMA

Head of Urban Land Use Planning, Department of Urban Engineering (Tokyo smart city planning), The University of Tokyo

Topic: Planning Methodology for Climate Solutions in Smart Cities

Akito Murayama is Associate Professor of Urban Planning at Department of Urban Engineering, School of Engineering, The University of Tokyo. After graduating from Department of Urban Engineering, School of Engineering, The University of Tokyo in 2004, he has worked as Project Researcher at Center for Sustainable Urban Regeneration, The University of Tokyo for two and a half years. From October 2006 to March 2014, he has worked as Associate Professor at Graduate School of Environmental Studies, Nagoya University. From April 2014, he is working at the University of Tokyo. Current research focuses on zero-carbon and climate change adaptation planning methodology as well as a framework for district, urban and regional planning.

Speaker



Dr. Takahiro YOSHIDA

Center for Spatial Information Science and Department of Urban Engineering (data-driven urban computing), The University of Tokyo

Topic: Data-driven Urban Computing for Climate Change Mitigation and Adaptation

Takahiro Yoshida is an Assistant Professor at the Center for Spatial Information Science, the University of Tokyo, Japan. The foundation of all his research interests is the geographical information science (GIS or GISc). His more specific interests are:

1. spatial data analysis based on spatial statistics, spatial econometrics, and remote sensing, and its combination with compositional data analysis; and
2. climate change mitigation and adaptation in urban areas with complex systems of building environments, transport networks, and human behaviors.

Speaker



Ir. Mr. Harry MA
Civil Engineering and Development Department
Topic: Building a Smart, Sustainable and Resilient Hong Kong

Mr. Harry MA is an engineer by profession with over 30 years of experience in the civil engineering industry. Mr. MA joined the Hong Kong Government as an Assistant Engineer in 1992 and has served in various government offices including the Highways Department, the Civil Engineering and Development Department, the Transport Department and the Development Bureau. He is currently the Deputy Director of Civil Engineering and Development Department responsible for the overall management of the Department and the administration of the Headquarters.

Mr. MA has been working in different government offices and possesses experience in a wide range of infrastructure projects. He is now leading the development and adoption of innovation technology and construction digitalization in works projects of the department.

Speaker



Mr. Wing-hing CHOI
Assistant Director of Drainage Services, The Government of the Hong Kong Special Administrative Region
Topic: Digitalization Journey and Roadmap Towards Digital Twin for Drainage Services Department (DSD)

Mr. Brian Choi is the Assistant Director heading the Projects and Development Branch of Drainage Services Department (DSD) of the Government of Hong Kong Special Administrative Region. Before joining DSD, Mr. Choi has been working in various works departments and participated in infrastructural projects of different kinds. In DSD, Mr. Choi leads his teams to oversee the development and implementation of capital works projects, including design and construction of drainage and flood control works, sewerage and sewage treatment projects, many of which have adopted digitalization and smart technology to improve production efficiency and site safety.

Speaker



Dr. John KOO

Hong Kong Applied Science and Technology Research Institute

Topic: Digital Twins for Smart City

T. John Koo is Director of Cyber-Physical Systems (CPS), Hong Kong Applied Science and Technology Research Institute (ASTRI), Hong Kong. Koo received the US National Science Foundation (NSF) CAREER Award in 2005 and the Distinguished M.Phil. Thesis Award of the Faculty of Engineering, the Chinese University of Hong Kong, China, in 1994. He received the Ph.D. degree in Electrical Engineering from the University of California at Berkeley, USA, in 2000, and the M.Phil. degree in Information Engineering and the B.Eng. degree in Electronic Engineering from the Chinese University of Hong Kong, China, in 1994 and 1992, respectively. He is a Senior Member of IEEE and a Member of ACM and Sigma Xi. T. John Koo has been leading research projects in China funded by National Natural Science Foundation of China (NSFC), Ministry of Science and Technology (MoST), Chinese Academy of Sciences (CAS), INRIA of France, State Secretariat for Education and Research (SER) of Switzerland, Sino-Swiss Science and Technology Cooperation (SSSTC), Japan Science and Technology Agency (JST) of Japan and Li Ka Shing Foundation (LKSF) and Hutchison Whampoa Limited. When Koo was in US, he led and participated in research projects funded by Nation Science Foundation (NSF), Air Force Research Laboratory (AFRL), Army Research Office (ARO), Office of Naval Research (ONR), Defense Advanced Research Projects Agency (DARPA).

Speaker



Dr. Ricky TSUI

R&D Director at Arup & Director at Neuron Digital Group

Topic: Latest Examples to Embrace Digital in our Future Smart City

As the Arup R&D Director as well as the Arup University Leader in East Asia Region, Dr Ricky Tsui has been actively supporting the firm's business operation and development through foresight, research, innovation, learning, knowledge management and new capability incubation. He has led Arup to obtain numerous awards on knowledge management, innovation, and research. Recently, he is a member of the East Asia Digital Executive in Arup to drive the digital transformation of the company with the aim to steer the firm into a more competitive position in the new digital era. He also set up a Digital Acceleration Hub in Shenzhen in a co-working place with a team of digital experts and programmers to help accelerate the transformation process. He is the EA Ventures Leader in charge of venturing activities and to explore opportunities to work with technical partners and start-ups. As such, he is also the board director of the recent spin-off company, Neuron Digital Group.

Speaker & Ogranizer



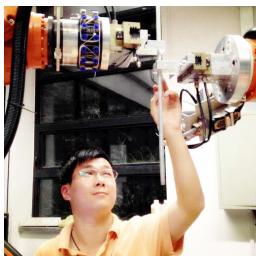
Dr. Amy TAN

Assistant Professor, Department of Architecture and Civil Engineering, City University of Hong Kong

Topic: Sewage Treatment Digital Twin for Safe and Smart Operation

Dr Amy Tan is an Assistant Professor at the Department of Architecture and Civil Engineering (ACE), The City University of Hong Kong (CityU). She holds a PhD degree in Civil and Environmental Engineering and a Bachelor degree in Biological Sciences from Nanyang Technological University (NTU), Singapore. Deeply passionate about the subject of environmental microbiology, Amy works at the interface of biology, engineering and data science to harness the knowledge and power of microbes for waste-to-energy and waste-to-bioresource applications. She is particularly interested in the underlying metabolic mechanisms and exploiting them to address existing environmental and industrial problems. Her team also focuses on the development of digital twin for sewage treatment and tools for legacy knowledge management. Amy's research has led to more than 25 research publications in peer-reviewed journals including Water Research, Nature Scientific Report and Waste Management. She has also received several awards including the Environmental Paper Award from The Hong Kong Institution of Engineers in 2019 and The Outstanding Mentor Award from The Ministry of Education, Singapore, in 2012.

Speaker & Ogranizer



Dr. Hao ZHENG

Assistant Professor, Department of Architecture and Civil Engineering, City University of Hong Kong

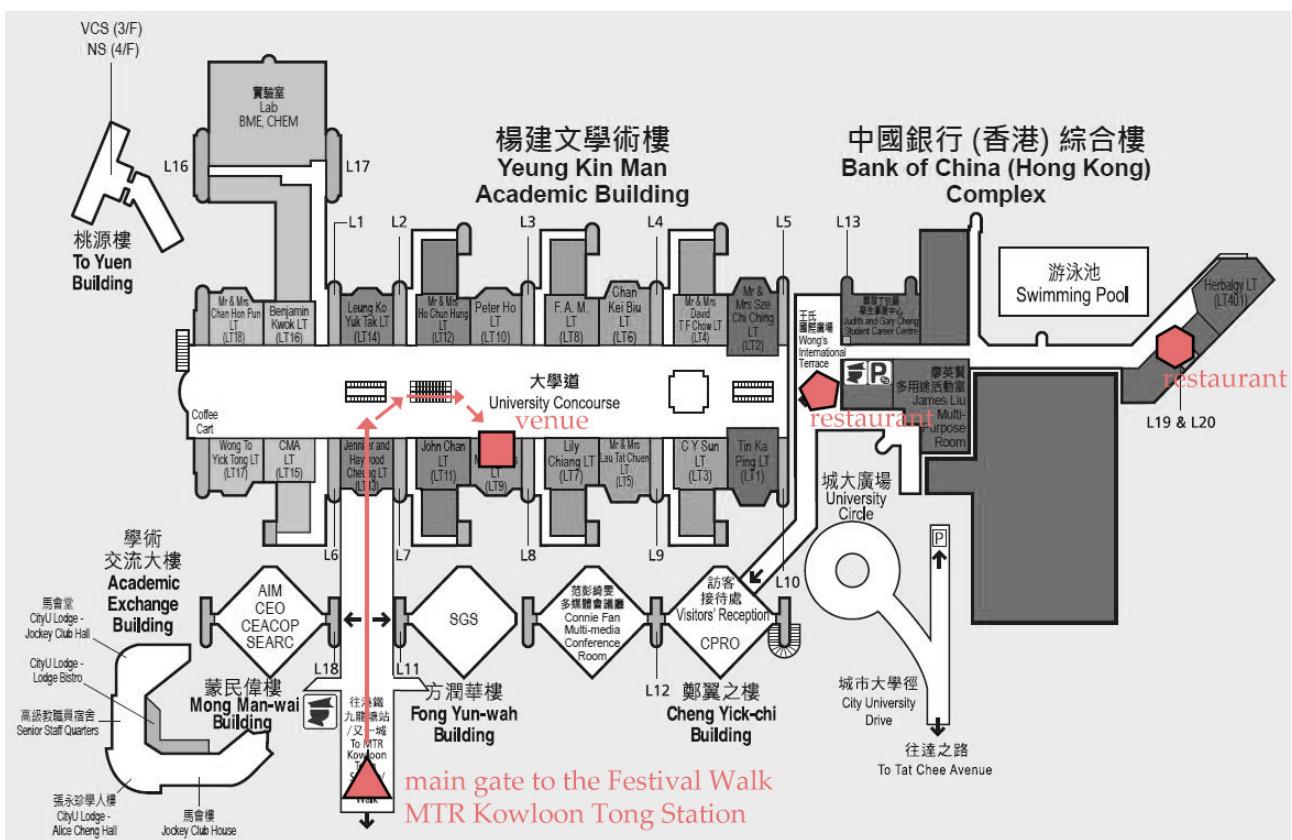
Topic: Creative Machine Learning Model(s) for Design

Dr. Hao Zheng currently serves as an Assistant Professor at the Department of Architecture and Civil Engineering, City University of Hong Kong. He graduated from the Ph.D. program at the University of Pennsylvania, specializing in machine learning, urban big data, data-driven design, digital fabrication, and mixed reality. He holds a Master of Architecture degree from the University of California, Berkeley, and Bachelor of Architecture and Arts degrees from Shanghai Jiao Tong University. Previously, Hao worked as a research assistant at Tsinghua University and UC Berkeley with a concentration on the robotic assembly, machine learning, and bio-inspired 3D printing. His teaching experience includes: workshop tutor at Tongji University; lecturer at the University of Pennsylvania; teaching fellow at Shanghai Jiao Tong University. Also, Hao serves as the co-organizer and reviewer for international conferences of ACADIA, CAADRIA, CDRF, and more than 10 SCI/SSCI/AHCI journals. His publication includes around 40 papers in top international conferences and SCI/AHCI journals.

Map

Notes:

- * Sandwiches will be provided for lunch. Participants may also consider having lunch in the Festival Walk shopping mall or other restaurants inside the campus.
- * The QR code of invitation is needed when entering and leaving the campus.



Restaurants Nearby

Festival Walk
CityU Entrance



City Express
(5th floor)



City Chinese Restaurant
(8th floor)



Faculty Lounge
(9th floor)



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Hong Kong Applied Science and Technology Research Institute



Civil Engineering and Development Department



Drainage Services Department



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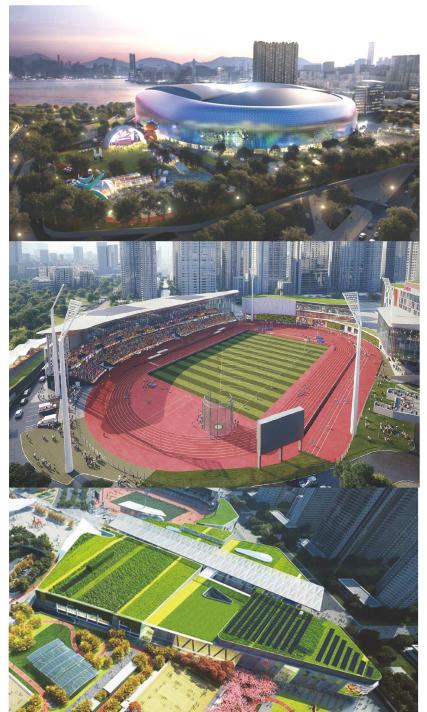


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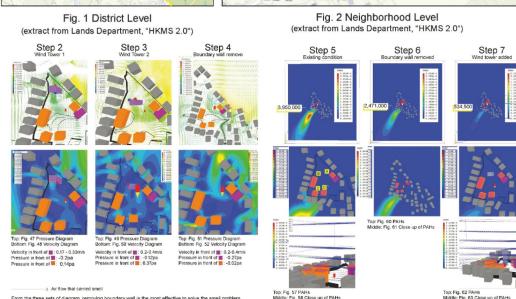
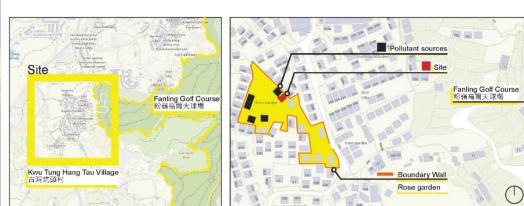
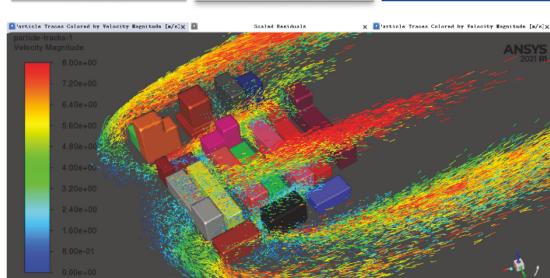
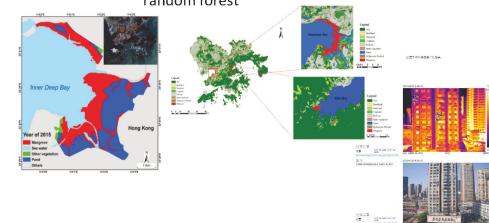
Reserach and Connection



Bridge and Collaboration



Surface information of the northern metropolis (mangroves, impervious surface, vegetation)
Object-oriented multi-scale segmentation combined with random forest



The recent green building projects,
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 - Kai Tak Sports Park Public Sports Ground
 - Kai Tak Sports Park Indoor Sports Centre

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Keywords: Digital Twin, Smart Cities, Sustainability



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Prof. Perry PJ YANG



Prof. Gulsah AKAR

The University of Tokyo

Keywords: Planning, Climate, Computing



Dr. Akito MURAYAMA



Dr. Takahiro YOSHIDA



Dr. Ana MIJIC

Hong Kong Governmental Departments

Keywords: Smart Cities, Systems



Ir. Mr. Harry MA
(CEDD)



Mr. Wing-hing CHOI
(DSD)



Dr. John KOO
(ASTRI)



Dr. Ricky TSUI

ARUP

Keywords: Smart Cities

City University of Hong Kong

Keywords: Digitalization, Digital Twin, Machine Learning



Prof. Jin Yeu TSOU



Prof. Thomas NG



Dr. Amy TAN



Dr. Hao ZHENG



Booklet & Posters

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