



Hong Kong Engineering Science and Technology (HKEST) 2023 Award Ceremony cum Distinguished Lectures

Date: 23 August 2024, Friday

Time: 9:30 – 17:30 (Registration at 9:00)

Venue: HJ305, 3/F, Core J, The Hong Kong Polytechnic University

Time	Programme
09:00	Registration
09:30 - 09:40	Welcome Address
09:40 - 09:50	Opening Remarks by Guest of Honour Mr Tim LUI, GBS, JP Chairman, University Grants Committee
09:50 - 10:20	Award Presentation with Citation
10:20 - 10:30	Group Photo
10:30 - 11:00	Break
11:00 - 11:30	Keynote Address 1: "The Development of Autonomous Vehicles at Hong Kong International Airport" Ir Ricky Wing-kee LEUNG Executive Director, Engineering & Technology, Airport Authority Hong Kong
11:30 - 12:00	Keynote Address 2: "Probabilistic Reduced-Dimensional Modeling of Multi-dimensional Time Series in Engineering and Science" Prof. Joe S. QIN President and Wai Kee Kau Chair Professor of Data Science, Lingnan University
12:00 - 14:00	Lunch
14:00 - 14:40	Lecture 1: "High-performance Metal Materials" Prof. Mingxin HUANG Chair Professor and Head of Department, Department of Mechanical Engineering, The University of Hong Kong
14:40 - 15:20	Lecture 2: "Safe and Sustainable Energy Storage Technologies and Their Applications" Ir Prof. Yi-Chun LU Professor, Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong; Co-founder, Luquos Energy Ltd.
15:20 - 16:00	Break
16:00 - 16:40	Lecture 3: "Better understanding of human visual system for creating delightful user experience" Prof. Tommy Minchen WEI Professor, Department of Building Environment and Energy Engineering; Director of Colour Imaging and Metaverse Research Centre, The Hong Kong Polytechnic University
16:40 - 17:20	Lecture 4: "Boosting Urban Renewable Energy Access Through Innovative Photovoltaic Technologies" Prof. Angus Hin-Lap YIP Professor, Department of Materials Science and Engineering, School of Energy and Environment; Assoc. Director, Hong Kong Institute for Clean Energy, City University of Hong Kong
17:20 - 17:30	Closing Remarks
18:00	Dinner Banquet (by invitation only)

Keynote Address 1

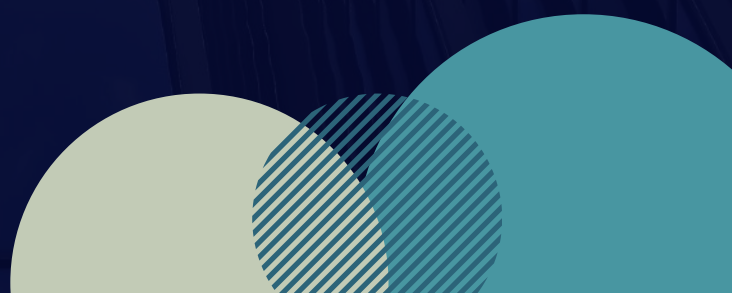


Ir Ricky Wing-kee LEUNG

Executive Director,
Engineering & Technology,
Airport Authority Hong Kong

Speech Topic: “The Development of Autonomous Vehicles at Hong Kong International Airport”

The Hong Kong International Airport (HKIA) started its first fully autonomous electric tractor service in 2019 to carry transit passenger bags to/from the SkyPier Terminal. Since then, the autonomous vehicles (AV) technology has been extended to autonomous perimeter security patrol cars, autonomous electric tractors for cargo dollies, and autonomous shuttle buses for airport staff. To date, the fleet of AVs at HKIA has grown to over 50, and there is a plan to further expand it to over 100 when the Terminal 2 Concourse is put into service. An Autonomous Airport Transportation System (AATS) to carry passengers between the Hong Kong Port of the Hong Kong Zhuhai Macau Bridge and SkyCity using AVs will also be completed in 2025, with plan to extend to Tung Chung in 2028. Ricky will analyze the key features of the AATS, supported by cellular vehicle-to-everything (C-V2X) technology and enabled by HKIA’s private 5G network.



Keynote Address 2



Prof. Joe S. QIN

President and Wai Kee Kau Chair
Professor of Data Science,
Lingnan University

Speech Topic: “Probabilistic Reduced-Dimensional Modeling of Multi-dimensional Time Series in Engineering and Science”

Multi-dimensional time series are ubiquitous in engineering, science, and economics. While the dimension of sensors increases with modern sensing technology and data acquisition, the dimension of dynamics is often relatively small. In this talk I will present a probabilistic latent vector autoregressive framework, where dimension reduction and dynamics prediction are simultaneously achieved. The dynamic latent variables are enforced with a reduced dimensional predictive model with maximized predictability. The solution requires an oblique projection to achieve uncorrelated realizations of noises in the dynamic and static subspaces. Counter intuitive insight is revealed in this reduced-dimensional formulation, which can shed light on deep learning extensions. An iterative solution is developed using a maximum likelihood framework. Data from a chaotic Lorenz oscillator and an industrial process are used to show the superiority of the proposed algorithm. The reduced-dimensional dynamic modeling framework has potentially wide applications in prediction, control, and diagnosis of anomalies.



Distinguished Lecture 1

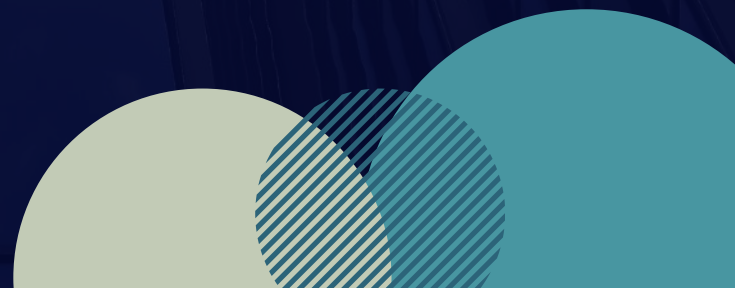


Prof. Mingxin HUANG

Chair Professor and Head of Department,
Department of Mechanical Engineering,
The University of Hong Kong

Speech Topic: “High-performance Metal Materials”

Metallic materials are widely used in various industries including construction, transportation, aerospace, medical, energy, microelectronics etc. This talk will introduce some latest development in high-performance metallic materials. The first metallic material to be introduced is the Super Steel that is ultra-strong yet very tough suitable for various applications. The second one is an innovative stainless steel that can be used for generating green hydrogen at low cost. The third one is the world's first anti-COVID stainless steel that can inactivate SARS-Cov-2 and H1N1 virus as well as E. coli bacteria on stainless steel surfaces. The last one is a new solid-state Cu material that solves the most critical packaging issue of the high power SiC chips.



Distinguished Lecture 2

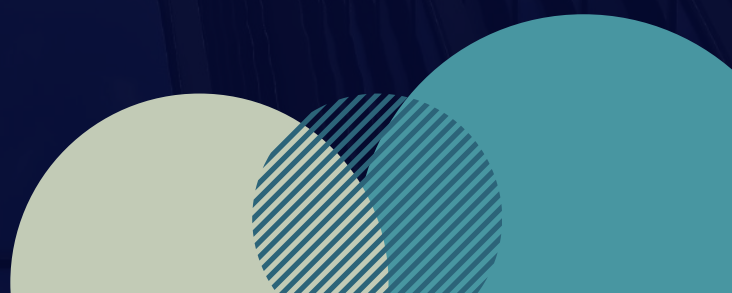


Ir Prof. Yi-Chun LU

Professor, Department of Mechanical and Automation Engineering, The Chinese University of Hong Kong; Co-founder, Luquos Energy Ltd

Speech Topic: “Safe and Sustainable Energy Storage Technologies and Their Applications”

Energy storage system is a critical enabling factor for deploying unstable and intermittent renewable power sources, such as solar and wind power sources. Commercial lithium-ion batteries dominate the battery markets owing to its high energy density. However, they are flammable, which could bring catastrophic damages in large-scale applications. Redox flow batteries are promising technologies for large-scale electricity storage. However, redox flow batteries have been suffering from low energy density, which significantly decreases its competitiveness for both stationary and transportation applications. In this presentation, we will discuss strategies to improve the safety, energy density, and cycle life of Li-ion batteries and redox flow batteries. Ultimately, we aim to enable stable and high-energy-density energy storage systems to address the intermittency of the renewable power sources. This will significantly increase the penetration of renewable energy and accelerate the transition to clean and renewable energy at a global scale.



Distinguished Lecture 3



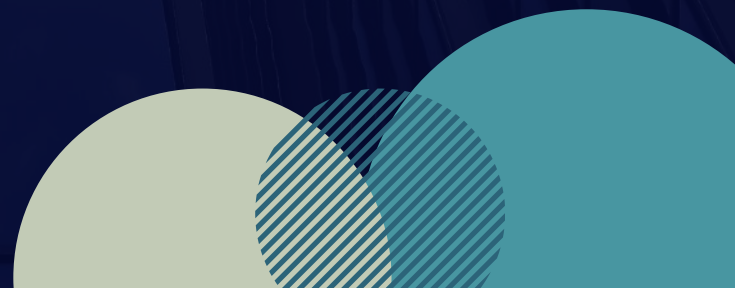
Prof. Tommy Minchen WEI

Professor, Department of Building Environment and Energy Engineering;
Director of Colour Imaging and Metaverse Research Centre,
The Hong Kong Polytechnic University

Speech Topic: “Better understanding of human visual system for creating delightful user experience”

EnHuman beings acquire about 80% of information from the visual system. The development of various technologies is bringing greater opportunities to provide better visual experience.

At the same time, they are also bringing greater challenges by creating completely new viewing conditions from various perspectives. These new technologies and conditions did not exist in the past, so we do not fully understand how our visual system responds to them. This talk will discuss how the new technologies are bringing opportunities and challenges at the same time, discuss our research efforts on understanding the mechanisms in the human visual system, and how these research findings are used to guide the product design, engineering, and manufacturing of a wide range of lighting and multimedia products.



Distinguished Lecture 4



Prof. Angus Hin-Lap YIP

Professor, Department of Materials Science and Engineering, School of Energy and Environment; Assoc. Director, Hong Kong Institute for Clean Energy, City University of Hong Kong

Speech Topic: “Boosting Urban Renewable Energy Access Through Innovative Photovoltaic Technologies”

In alignment with Hong Kong's ambition for carbon neutrality by 2050, our research advances the integration of advanced photovoltaic (PV) technologies into urban environments. Our team is pioneering the development of printable organic and perovskite solar cells to increase renewable energy adoption in dense urban areas. These solar cells are designed for versatility, enabling the creation of semi-transparent and color-tunable PV modules, ideal for building-integrated photovoltaics (BIPV) that merge energy efficiency with architectural aesthetics, turning buildings into urban solar farms. In addition, I will also present emergent PV innovations, including durable PV pavements and floating PV systems that utilize water bodies for energy generation without land use conflicts. Our endeavor sets a precedent for urban sustainability, positioning Hong Kong as a forerunner in solar energy innovation and offering a replicable blueprint for global urban centres.

