The 29th East Asia Round Table Meeting & International Symposium

Physical AI and Sustainability

DATE I July 23(Thu), 2026, 09:30~14:40

VENUE I Gold Hall(B1), EL Tower, Seoul

NAEK 한국공학한림원 The National Academy of Engineering of Korea

CHINESE ACADEMY OF ENGINEERING 中國工程院

公益社団法人 日本工学アカデミー THE ENGINEERING ACADEMY OF JAPAN

The 29th East Asia Round Table Meeting & International Symposium

Contents

Program at a Glance

DATE
July 23(Thu), 2026, 09:30~14:40

VENUE
Gold Hall(B1), EL Tower, Seoul

Co-Organizers
NAEK, National Academy of Engineering of Korea
CAE, Chinese Academy of Engineering
EAJ, Engineering Academy of Japan

Time	Program
09:30 ~14:40	**Physical AI and Sustainability** Session 1. Physical AI in Next-Generation Industrial Systems Session 2. Green Innovation for Sustainable Manufacturing Session 3. Policy, Regulation, and International Collaboration for Future Industrial Systems

The 29th East Asia Round Table Meeting & International Symposium

Time (KST)	Program	Moderators / Speakers
09:00~09:30	Registration	Registration
09:30~09:45	Opening Remarks	**Prof. Jae-Woo Park,** Chair, NAEK International Relations Committee
		Dr. Ning Ding, Deputy Director General (Acting Head), Department of International Cooperation, CAE
		Prof. Yuko Harayama, Advisor and Distinguished Fellow of EAJ
09:45~10:00	Photo Session	
Session 1	**Physical AI in Next-Generation Industrial Systems**	
Moderator	**Prof. Sung-Hoon Ahn,** Department Chair, Department of Mechanical Engineering Seoul National University	
10:00~11:10		**Prof. Young-Jae Jang,** Department of Industrial & Systems Engineering, KAIST *Physical AI for Manufacturing*
		Prof. Zuojun Shen, Dean of the Graduate School and Director of the Institute of Supply Chain Innovation, The University of Hong Kong *Logical AI: Bridging Language Models and Physical Reality*
		Prof. Nozomu Mishima, Akita University Graduate School of Engineering Science *Physical AI×Next Generation Venous Industries*
		Q&A, Discussion
Session 2	**Green Innovation for Sustainable Manufacturing**	
Moderator	**Prof Jai-ick Yoh,** Department of Aerospace Engineering, Seoul National University	
11:10~12:20		**Prof. Lixin Tang,** Vice President of Northeastern University *Data Analytics and Optimization for Manufacture-Circulation Industrial System*
		Dr. Akira Yabe, Sustainable Energy Unit, Technology and Innovation Strategy Center(TSC), New Energy and Industrial Technology Development Organization(NEDO) Japan *Necessity of Innovative Technologies for Realizing Sustainability and Carbon Neutrality*
		Dr. Sanghyup Lee, Principal Researcher, Climate Environmental Research Institute, Korea Institute of Science and Technology *C-Physical AI and Ko-Chi-Ja Sustainability*
		Q&A, Discussion
12:20~13:30	Lunch / Break Time	
Session 3	**Policy, Regulation, and International Collaboration for Future Industrial Systems**	
Moderator	**Dr. Youngsoon Um,** Principal Researcher, Clean energy research center, Korea Institute of Science and Technology	
13:30~14:40		**Prof. Yuko Harayama,** Advisor and Distinguished Fellow of EAJ *Policy, Regulation, and International Collaboration for Future Industrial Systems with AI-A Japanese Perspective*
		Prof. Young Lim, Professor, Seoul National University AI Policy Initiative *Platform Evolution and Competition Policy-Lessons for Northeast Asia*
		Prof. Fei Tao, Dean of International Institute for Interdisciplinary and Frontiers, Beihang University *Digital Twin: From Theory to Practice*
		Q&A, Discussion

The 29th East Asia Round Table Meeting & International Symposium

CV & Abstracts

Physical AI and Sustainability

Session 1

Physical AI in Next-Generation Industrial Systems

Speaker

Prof. Young-Jae Jang,
Department of Industrial & Systems Engineering, KAIST

Prof. Zuojun Shen,
Dean of the Graduate School and Director of the Institute of Supply Chain Innovation, The University of Hong Kong

Prof. Nozomu Mishima,
Akita University Graduate School of Engineering Science

Session 1

Young-Jae Jang

• Department of Industrial & Systems Engineering, KAIST

Young Jae Jang received his Ph.D. in Mechanical Engineering from the Massachusetts Institute of Technology(MIT) in 2007, and dual M.S. degrees in Mechanical Engineering and Operations Research from MIT in 2001. He earned his B.S. in Aerospace Engineering from Boston University in 1997.

He is currently a Professor in the Department of Industrial and Systems Engineering at the Korea Advanced Institute of Science and Technology (KAIST) and the Founding Director of the Center for KAIST Manufacturing Physical AI, where he leads research on next-generation autonomous manufacturing systems.

In parallel, he is the CEO and Co-founder of DAIM Research Corp., the leading startup commercializing AI-based manufacturing powered by Physical AI technology. DAIM's platforms have been successfully deployed by major global manufacturers, including Samsung Electronics, LG Electronics, SK On, and LG Energy Solution, demonstrating large-scale industrial adoption and real-world impact.

Physical AI for Manufacturing

Young-Jae Jang

Physical AI is turning factories from collections of independently programmed machines into a single, learning-driven robotic system that orchestrates robots, equipment, and human operators together. This talk introduces Manufacturing Physical AI as this shift, and argues its main barrier to sustainable scale-up is not algorithmic capability, but the lack of standardized, interoperable interfaces between AI orchestration layers and the diverse controllers, sensors, and hardware on real factory floors.

No single country can close this gap alone. The talk proposes a Korea–China–Japan framework: Korea leading AI orchestration and digital twins, China contributing large-scale robot and automation-hardware deployment, and Japan providing reliable controllers, sensors, and standardization leadership. Together they can build an open reference architecture instead of importing proprietary platforms.

Such interoperability also drives sustainability- reducing redundant integration engineering and the material/energy waste from proprietary retrofits - positioning Northeast Asia as a global reference model for autonomous, sustainable manufacturing.

Session 1

ZuoJun Max Shen

- International Member of the Chinese Academy of Engineering(CAE)
- Dean of the Graduate School and Director of the Institute of Supply Chain Innovation, The University of Hong

maxshen@hku.hk

Area

Supply Chain Optimization and Artificial Intelligence

Education

Ph.D., Industrial Engineering & Management Sciences, Northwestern University, 2000

M.S., Industrial Engineering & Management Sciences, Northwestern University, 1998

M.E., Mechanical Engineering, Tsinghua University, 1996

B.S., Manufacturing Systems, Shandong University, 1993

Academic Positions

2021-Current The University of Hong Kong
- Chair Professor in Logistics and Supply Chain Management
- Senior Advisor to the President
- Dean of Graduate School
- Director, Institute of Supply Chain Innovation
- Director, Research Institute for Civil Low-Altitude Aviation

2021-2025 Pro Vice-Chancellor and Vice-President (Research)
- Director, Technology Transfer Office
- Director, Knowledge Exchange Office

2010-2020 Chancellor's Professor, University of California, Berkeley
- Department of Industrial Engineering and Operations Research
- Department of Civil and Environmental Engineering

2007-2010 Associate Professor, University of California, Berkeley

2004-2007 Assistant Professor, University of California, Berkeley

2000-2004 Assistant Professor, University of Florida

Selected Awards & Honors

International Member, Chinese Academy of Engineering, 2025

Fellow, The Chartered Institute of Logistics and Transport in Hong Kong, 2025

Daniel H. Wagner Prize,2024

INFORMS Prize, 2024

Gartner Power of the Profession Supply Chain Award, 2024

Franz Edelman Laureate, 2023

Fellow, The Hong Kong Institution of Engineers, 2023

Fellow, Hong Kong Academy of Engineering, 2022

POMS Fellow, 2022

INFORMS Fellow, 2018

Franz Edelman Laureate, 2018

Logical AI: Bridging Language Models and Physical Reality

Zuojun Max Shen

Large language models have come a long way, but they still fall short when it comes to solving many real problems in industry and engineering. Traditional optimization methods are also hitting hard limits as industrial systems grow more complex. We believe a different approach is needed. Graphs and networks are good at representing logical relationships in the real world, so we built a large logical model, essentially a form of Logical AI, that learns from graph structures rather than just from text. The key idea is to replace the usual training logic of "word-paragraph-language" with a new one, "node -trajectory-logic." This moves the model closer to how the physical world actually works and helps bridge the gap between language AI and physical AI.

We have tried this approach in several areas. In transportation, one trained model can handle complex tasks like TSP and VRP. In semiconductor manufacturing, it works for overhead hoist transport dispatching, a good example of a physical AI problem. In music generation, the output sounds more natural and follows expected structure. In knowledge graphs, the model can bring out new knowledge. In drug discovery, it helps predict unseen links between chemical structures and target proteins. Taken together, these results suggest that large logical models offer a practical way forward, from AI that only deals with language to AI that understands physical and logical reality.

Session 1

Nozomu Mishima

• Professor, Graduate School of Engineering Science, Akita University

nmishima@gipc.akita-u.ac.jp

Current Position

Professor, Cooperative Major of Sustainable Engineering, Graduate School of Engineering Science, Akita University

Work Experience

1988-2001 Joined Mechanical Engineering Laboratory, Agency for Industrial Science and Technology, Ministry of International Trade and Industry

2001-2012 Belonged to National Institute of Advanced Industrial Science and Technology due to organization change

2012-Now Moved to Graduate School of Engineering Science, Akita University

Education

1986 Graduated from Faculty of Engineering, the University of Tokyo

1988 Graduated from Graduate School of Engineering, the University of Tokyo
Ph.D. in Mechanical Engineering

Research Topics

Visual impact assessment of onshore/offshore wind farms

Environmentally benign design methodology based on affective engineering approach

Application of AI on the end-of-life treatment of products

Physical AI × next generation venous industries

Nozomu Mishima

The development of generative AI is remarkable. However, there are some concerns about relaying too much on generative AI. Since the most beautiful and interesting things in human life are creative activities, it would be boring to leave such activities to AI. People can compose music by themselves, paint pictures by themselves, and write stories by themselves, even if they don't.

On the other hand, there are tasks that humans would like to delegate to AI or robots. For example, welding in manufacturing plants, removal of potentially flammable waste batteries in municipal waste facilities, and material sorting in recycling facilities are physically demanding tasks that require experience at the same time. While these tasks are considered as the essential works in modern societies, there is a serious labor shortage. This presentation will introduce some of the results of some studies into the fundamental technologies for applying Physical AI to so-called venous industries, that is, the end-of-life treatment of products.

First, brief overview of the development status of Physical AI for waste management, such as automatic dismantling robots or AI-based waste sorting systems, in Japan are to be mentioned. Then, as an example of fundamental technologies, the identification of fragments derived from printed circuit boards from shredded waste of electronic products, the identification of products that may contain lithium-ion batteries from used electronics, and the determination of the suitability of welding conditions as a fundamental technology for automated welding, are introduced. Finally, the presentation insists the significance of physical AI application to venous industries as the essential works in order to maintain modern and convenient daily lives.

Physical AI and Sustainability

Session 2

Green Innovation for Sustainable Manufacturing

Speaker

Prof. Lixin Tang,
Vice President of Northeastern University

Dr. Akira Yabe,
Sustainable Energy Unit, Technology and Innovation Strategy Center(TSC), New Energy and Industrial Technology Development Organization(NEDO) Japan

Dr. Sanghyup Lee,
Principal Researcher, Climate Environmental Research Institute, Korea Institute of Science and Technology

Session 2

Lixin Tang

• Vice President
Northeastern University, China

lixintang@mail.neu.edu.cn

Professor TANG Lixin is an IEEE Fellow, a member of Chinese Academy of Engineering, a Vice President of Northeastern University, China. He is the Dean of Institute of Artificial Intelligence and Big Data at Northeastern University, the Director of Key Laboratory of Data Analytics and Optimization for Smart Industry, Ministry of Education, China, and the Director and Chair Professor of the National Frontiers Science Center for Industrial Intelligence and Systems Optimization at Northeastern University. He is also the President of International Federation of Measurement and Control of Granular Materials, the Vice President of Chinese Society for Metals, the Vice President of Operations Research Society of China(ORSC), and the Founding Director of Data Analytics and Optimization Society for Smart Industry of ORSC.

His research interests are industrial intelligence and systems optimization theories and methods. He has published a total of 157 papers in international journals, of which focus on industrial intelligence and data analytics as well as systems optimization and industrial engineering. His paper published on IISE Transactions received the Best Applications Paper Award of 2017.

He currently serves as an Associate Editor of IISE Transactions, IEEE Transactions on Cybernetics, Journal of Scheduling, and International Journal of Production Research. Meanwhile, he is on the Editorial Board of Annals of Operations Research, and serves as an Area Editor of Asia-Pacific Journal of Operational Research.

Data Analytics and Optimization for Manufacture -Circulation Industrial System

Lixin Tang

Data analytics is the frontier basic research direction of industrial intelligence and one of the driving forces to promote scientific development. Systems optimization is the core basic theory of decision -making in smart industry, as well as the heart and engine of data analytics. This talk will discuss the fusion theory of data analytics and optimization(abbreviated as DAO) inspired by the structure of human brain, as well as the DAO-based octopus-topology solutions that we have been working on. Being related to industrial intelligence, the optimization part of DAO-based octopus-topology solutions include integer optimization, intelligent optimization, convex and sparse optimization, as well as topology and dynamic optimization; while the data analytics part consists of reinforcement learning, evolutionary learning, statistical physics-based learning and information theory-based learning. This talk will also explore applications of the DAO theory within the frontier technology spectrum(H) and the frontier sciences(VSEM), which constitute the H-VSEM pattern. First, the frontier technology spectrum is constructed based on a tripartite framework. The first component is a hierarchical structure which consists of four levels, including perception, discovery, decision-making and execution from bottom to top, abbreviated as PDDE. The second component is the industrial ontology technology, oriented from industrial scenarios such as manufacturing industry, logistics system and energy system. These two parts are well connected and integrated with each other by industrial intelligence technology. Second, the frontier sciences are explored. Specifically, the VSEM framework encompasses materials quality science based on multi-scale structure-property relationships(V), quantum holographic quality control based on wave-particle duality(S), manufacturing system management based on the “Triple Transfer and One Feedback” Framework(E), and resource circulation management for Manufacture -Circulation Industrial Systems(M).

Session 2

Akira Yabe

- Sustainable Energy Unit, Technology and Innovation Strategy Center(TSC)
- New Energy and Industrial Technology Development Organization(NEDO) Japan

yabeakr@nedo.go.jp

Organization

Fellow, Innovation & Technology Strategy Center(TSC), New Energy and Industrial Technology Development Organization(NEDO), Japan

Director, Field of Energy, Fukushima Institute for Research, Education and Innovation(F-REI), Japan

Researcher Emeritus, National Institute of Advanced Industrial Science and Technology(AIST), Japan

Personal Career

1970 University Student, Department of Mechanical Science and Engineering, Tokyo Institute of Technology(Currently, Institute of Science Tokyo)

1979 PhD in Mechanical Science and Engineering, Tokyo Institute of Technology

1979 Researcher, Mechanical Engineering Laboratory, Ministry of International Trade and Industry(MITI), Japan

2001 Director for Advanced Manufacturing Research Center on Micro and Nano Scale Science and Engineering, National Institute of Advanced Industrial Science and Technology(AIST)

2008 Vice-President, Director General for Environment and Energy Research Fields, AIST

2015 Director General, Technology Strategy Center, New Energy and Industrial Technology Development Organization(NEDO), National Research and Development Agency of Japan.

2020-Present: Fellow, Innovation & Technology Strategy Center, NEDO

2023-Present: Director, Field of Energy, Fikushima Institute for Research, Education and Innovation(F-REI), Japan

Concurrently

Researcher Emeritus of AIST(2015-)

Member of Science Council of Japan(2006-)

Convenor of ISO/TC281 Fine Bubble Technology /WG3(2013-)

Professor of Institute of Engineering Mechanics and Systems, University of Tsukuba(1992-2010)

Adjunctive Professor of Science University of Tokyo(1995-2009)

Russell Severance Springer Professor, Department of Mechanical Engineering, University of California, Berkeley(2001)

Professor(Cooperative Chair) of Tokyo Institute of Technology(2005-2013)

President of the Japan Society of Mechanical Engineers(JSME)(2013-2014)

Necessity of Innovative Technologies for Realizing Sustainability and Carbon Neutrality

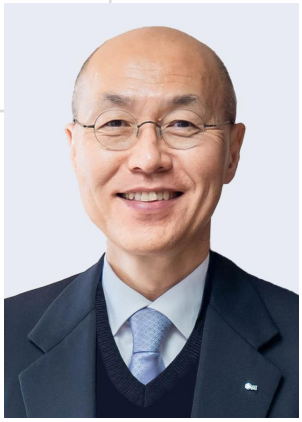
Akira Yabe

From the viewpoints of industrial manufacturing, heat demand for the industry has been analyzed. Especially, the industrial furnace has been systematically analyzed and overviewed. Then, for promoting the carbon neutrality from the viewpoints of energy resources, the replacement of city gas to hydrogen, ammonia, bio-fuel, e-methane and electricity will be necessary and promoted strongly.

Also from the viewpoints of mobility of mankind, the systematic overview has been conducted from the amount of energy storage and the output power. Electric vehicles based on batteries, Fuel Cell Vehicles utilizing hydrogen and the diesel engine vehicles using liquid bio-fuel have been shared the optimum output power area and the optimum energy storage area separately for not only the automobiles but also tracks, tractors, ships and airplanes.

For realizing and keeping the global carbon neutrality by introducing carbon-neutral technologies, the tremendous cost of 10 trillion$ would be necessary worldwide every year at about 2050. To decrease this tremendous cost, the usage of all kinds of excellent reduction technologies of CO2 emission and the innovative technologies should be created by collecting all kinds of global human wisdom.

Session 2



Sanghyup Lee

- Principal Researcher, Climate Environmental Research Institute, Korea Institute of Science and Technology
- Former President, National Institute of Green Technology Seoul, Republic of Korea

yisanghyup@nigt.re.kr

CAREER

National Academy of Engineering of Korea
Member | 2024.01-Present
Carbon Neutral Technology Special Commission
Commissioner Ministry of Science and ICT | 2023.08.-2025.08
National Institute of Green Technology
President | 2022.11-Present
Climate Environment Research & Development Commission
Commissioner Ministry of Science and ICT | 2022.04.-2024.04.
Korean Society of Environmental Engineers
Vice President | 2022.01-2023.12
National Research Foundation of Korea
Director National Strategic R&D Programs | 2018.03-2022.03
Korea Institute of Science and Technology
Principal Researcher Advanced Membrane Process | 2008.03-2022.11
Senior Researcher Advanced Water Treatment Process | 2004.01-2008.02
Gyung-gi Development Institute
Principal Researcher Environmental Policy Research | 1998.11-1999.10

EDUCATION

Seoul National University
Ph.D. in Civil Engineering, 1998
Master Degree in Civil Engineering, 1995
Korea University
Bachelor Degree in Material Engineering, 1987

OTHER HISTORY

Dr. Lee boasts a remarkable portfolio, featuring 152 papers, 122 patents, and accolades such as the Ministry of Environment Awards for Excellence in Environmental Technology, and 100 Excellent National Research and Development Awards by the Ministry of Science and ICT. Moreover, Dr. Lee received the Minister Commendation from the Ministry of Environment twice, and the Minister Commendation from the Ministry of Science and ICT. On January 2024, National Institute of Green Technology received the Prime Minister Commendation.

C-Physical AI and Ko-Chi-Ja Sustainability

Sanghyup Lee

Once celebrated as the “Three Dragons of Asia” for their miraculous economic growth, South Korea, China, and Japan now face a shared existential challenge: the climate crisis. Together, these three nations account for approximately 22.4% of the global GDP and generate about 30.2% of global greenhouse gas emissions. This significant footprint bestows upon them a heavy historical responsibility and a critical economic incentive to spearhead the global green transition, especially in response to emerging international trade barriers like the EU’s Carbon Border Adjustment Mechanism (CBAM).

This presentation argues that individual, isolated national responses are no longer sufficient to combat global climate urgency. Instead, it proposes a revolutionary transformation from “carbon competitors” into “climate allies” through a highly integrated, triangular climate technology value chain. By leveraging each country’s distinct industrial strengths, we can establish a complementary cycle: Japan serves as the provider of cutting-edge original technologies; South Korea acts as the agile, high-quality engineering and validation pipeline; and China utilizes its unparalleled manufacturing scale for cost-effective mass production.

Crucially, Physical AI serves as the ultimate accelerator for this green innovation. By bridging digital intelligence with material engineering, Physical AI can optimize multi-national R&D simulations, streamline advanced manufacturing processes, and intelligently manage green supply chains across borders. Ultimately, this collaborative framework aims to build a unified “KCJ (Korea-China-Japan) Carbon Economic Platform”. By integrating regional carbon markets and co-managing green technologies, the former Three Dragons can pioneer a new paradigm of sustainable development, transforming a shared environmental crisis into an unprecedented milestone for regional prosperity.

Physical AI and Sustainability

Session 3

Policy, Regulation, and International Collaboration for Future Industrial Systems

Speaker

Prof. Yuko Harayama,
Advisor and Distinguished Fellow of EAJ

Prof. Young Lim,
Professor, Seoul National University AI Policy Initiative

Prof. Fei Tao,
Dean of International Institute for Interdisciplinary and Frontiers, Beihang University

Session 3

Yuko Harayama

• Secretary General
Tokyo Centre of the
Global Partnership on AI
(GPAI) Expert Community

yukoharayama@gmail.com

Dr. Yuko Harayama is the Secretary General of the Tokyo Centre of the Global Partnership on AI(GPAI) Expert Community, where she leads international collaboration on AI governance and policy. She currently serves as a trustee of Yamaguchi University and as a board member of Toray Industries.

Dr. Harayama brings extensive experience in science policy and international affairs to her leadership roles. She previously served as Executive Director for International Affairs at RIKEN and held senior positions in the Japanese government as an Executive Member of the Council for Science, Technology and Innovation(CSTI) in the Cabinet Office. Her international expertise was further developed during her tenure as Deputy Director of the Directorate for Science, Technology and Industry(DSTI) at the OECD. She also spent a decade as a professor at Tohoku University's Graduate School of Engineering.

She has been awarded the Légion d'Honneur(Chevalier) and holds an honorary doctorate from the University of Neuchâtel. She is an International Fellow of the Royal Swedish Academy of Engineering Sciences and a Foundation Fellow of the International Science Council.

Dr. Harayama holds doctorates in both education and economics from the University of Geneva, reflecting her interdisciplinary approach to science policy and innovation.

Policy, Regulation, and International Collaboration for Future Industrial Systems with AI-A Japanese Perspective

Yuko Harayama

Japan introduced the concept of “Society 5.0” in 2016 to prepare the ground for its future society and the industrial systems beneath it. A decade on, we face a transformation of society as a whole, driven by AI, and with it a pressing need for a new approach to policy, regulation, and international collaboration. This talk offers a Japanese perspective on that endeavour.

It opens with the 7th Science, Technology and Innovation Basic Plan(2026–2030), which binds future national competitiveness to economic security and concentrates resources on six national strategic technology areas, AI and advanced robotics among them. It then turns to Japan’s AI Basic Plan and its emerging Phase II revision, shaped by a recent inflection, the rise of agentic AI. Finally, it presents Japan’s effort to create a framework for international exchange and collaboration through the Hiroshima AI Process(HAIP) and its Friends Group.

As trusted bridges between science, industry, and policy, our engineering academies have a vital role to play, and I warmly invite Korea, China, and Japan to take up this collaboration together.

Session 3

Young Lim

- Professor, Seoul National University AI Policy Initiative

Yong Lim is an Associate Professor at Seoul National University("SNU"), School of Law, where he also served as Associate Dean of Student Affairs until 2020. He is the co-founder and director of SNU AI Policy Initiative ("SAPI"). SAPI is one of the labs currently spearheading a project at SNU's Center for Trustworthy AI to establish normative and technical standards for AI. His areas of specialty include competition law, consumer protection, privacy and data governance. Yong graduated from Seoul National University, College of Law, and obtained his S.J.D. at Harvard Law School. Prior to joining academia, Yong practiced law at Kim & Chang in Seoul, Korea. Yong was a Bok International Professor at Penn Carey Law in 2023.

Platform Evolution and Competition Policy-Lessons for Northeast Asia

Young Lim

Digital platforms do not stand still. They evolve through feature integration, expansion into adjacent markets, and the reconfiguration of industries. This evolutionary process is a central mechanism of platform innovation, as evidenced by the transition from PC operating systems to mobile ecosystems, and now toward AI-enabled and spatial computing environments.

Competition policy should therefore avoid treating platform evolution itself as evidence of anticompetitive behavior per se. At the same time, competition authorities must remain vigilant when incumbent platforms use existing market power to obstruct the next wave of platform evolution by raising barriers to entry, foreclosing interoperability, or suppressing emerging rivals. The Microsoft antitrust saga offers an enduring lesson: enforcement may struggle to restore competition directly in a monopolized market, but it can still matter by constraining exclusionary conduct and preserving the conditions for future technological disruption.

For Northeast Asia, this lesson is especially relevant. China, Japan, and Korea each face the challenge of governing powerful digital ecosystems while preserving incentives for innovation and scale. The Microsoft experience, including Korea's own enforcement history, illustrates both the promise and difficulty of competition enforcement in rapidly evolving digital markets. This talk argues that competition policy in Northeast Asia should focus less on freezing platform power at a particular technological moment and more on ensuring that incumbents cannot prevent the emergence of the next competitive paradigm.

Session 3

Tao Fei

- Professor at the School of Automation Science and Electrical Engineering
- Dean of International Institute for Interdisciplinary and Frontiers Beihang University Beijing, China

ftao@buaa.edu.cn

Dr. TAO Fei is a Professor at the School of Automation Science and Electrical Engineering and the Dean of the International Institute for Interdisciplinary and Frontiers at Beihang University, Beijing, China. His research focuses on smart manufacturing and digital twins. He has served as PI for over 30 national research and industry projects. He has published seven books and over 100 peer-reviewed journal articles as the first/corresponding author in Nature, CIRP Annals, and IEEE/ASME Transactions, with over 40 of them being ESI highly cited papers. His publications have over 60,000 citations. He was elected as the Global Highly Cited Researcher(2019-2025) and one of the 20 Most Influential Academics in Smart Manufacturing by SME in 2021. He is currently the Associate Editor of Robotics and Computer -Integrated Manufacturing (RCIM), CIRP Associate Member and IEEE Senior Member. He is the founding Editor-in-Chief of Digital Twin in Taylor & Francis Group and Digital Engineering in Elsevier; and he also initiated the Digital Twin Global Forum (DTGF) and the Digital Twin International Conferences (DigiTwin).

Digital Twin: From Theory to Practice

Tao Fei

Digital twin, a crucial technology for integrating physical and virtual spaces, have gained significant attention from both academia and industry over the past few years. To further broaden the applications of digital twin, this talk will introduce a series of related works we have conducted. First, the five-dimensional digital twin model is presented, encapsulating five key dimensions: physical entity, digital twin model, digital twin data, service, and their connections. Second, based on this model, a series of theoretical methods (including theories of digital twin modelling, digital twin data, digital twin connection and interaction), along with enabling technologies, essential tools, and standard systems for digital twin, are discussed. Third, two international journals(Digital Twin and Digital Engineering) and one international conference(Digital Twin International Conference) have been initiated to promote global collaboration in this field. Moreover, a digital twin software platform, named makeTwin, has been developed to address the lack of related software and platforms for practical applications. Finally, several industrial applications enabled by makeTwin will be briefly presented, particularly in smart manufacturing, textile logistics, city management, and other sectors.

The 29th East Asia Round Table Meeting & International Symposium

NAEK 한국공학한림원 The National Academy of Engineering of Korea

CHINESE ACADEMY OF ENGINEERING 中国工程院

EAJ 公益社団法人 日本工学アカデミー THE ENGINEERING ACADEMY OF JAPAN