

Digital Twins with Artificial Intelligence



DigiTwin 2026

The 6th Digital Twin
International Conference

PROGRAMME

 4 - 8 August, 2026

 University of Oxford • UK



Welcome

Dear distinguished guests, colleagues, and friends,

On behalf of the Digital Twin International Advisory Committee and the Organising Committee, it is our great honor and pleasure to welcome you to the **6th Digital Twin International Conference (DigiTwin 2026)**.



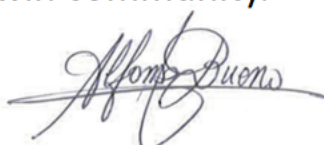
Digital twin technology continues to evolve as a foundational pillar of next-generation engineering, intelligent systems, and sustainable development. By bridging physical assets with high-fidelity digital representations, digital twins are enabling unprecedented advances in smart manufacturing, energy systems, aerospace, healthcare, infrastructure resilience, and urban intelligence. As the global demand for data-driven optimization and system-level integration intensifies, digital twin methodologies are becoming central to scientific innovation and industrial transformation.

DigiTwin 2026 serves as an international platform for researchers, engineers, industry leaders, and policymakers to exchange frontier knowledge, share emerging applications, and explore interdisciplinary collaborations. This year's programme highlights advances in modelling fidelity, real-time synchronization, AI-enabled digital twins, lifecycle management, and cross-domain integration. Through keynote speeches, technical sessions, and strategic dialogues, we aim to deepen both theoretical foundations and practical deployment pathways.

Since its inception in 2021, the DigiTwin conference series has steadily expanded its global influence, fostering an international community dedicated to advancing digital twin science and technology. Building upon the success of previous editions across Asia, Europe, and Oceania, DigiTwin 2026 continues this mission by strengthening global partnerships and encouraging multidisciplinary convergence.

We extend our sincere appreciation to the members of the advisory and programme committees, session chairs, keynote speakers, and organising teams whose dedication has shaped the high-quality scientific program of this year's conference. We are equally grateful to our academic partners, publishing collaborators, and industry sponsors for their continued support in promoting international cooperation and technological advancement.

We look forward to your active participation in DigiTwin 2026. May this conference inspire meaningful dialogue, innovative thinking, and lasting collaboration within the global digital twin community.



Alfonso Bueno-Orovio



Fei Tao

General Chairs of DigiTwin 2026 conference

Organising Committee

ORGANISER

- University of Oxford
- Digital Twin (Journal)
- Digital Engineering (Journal)
- Taylor & Francis Group
- Elsevier

CO-ORGANISER

- Digital Twin International Research Center, Beihang University
- Beijing Key Laboratory of Digital Twin Manufacturing and Industrial Intelligence
- BZS (Beijing) Technology Development Co., LTD
- SAIC-GM-Wuling Automobile

INTERNATIONAL ADVISORY COMMITTEE & SCIENTIFIC COMMITTEE

The conference is organised under the strategic guidance of the Digital Twin International Advisory Committee (DTIAC). The Committee consists of 97 experts from 20 countries, including 14 academicians from 8 countries across various disciplines and one Nobel Prize laureate.

<https://www.tandfonline.com/journals/tdtw20/about-this-journal#editorial-board>

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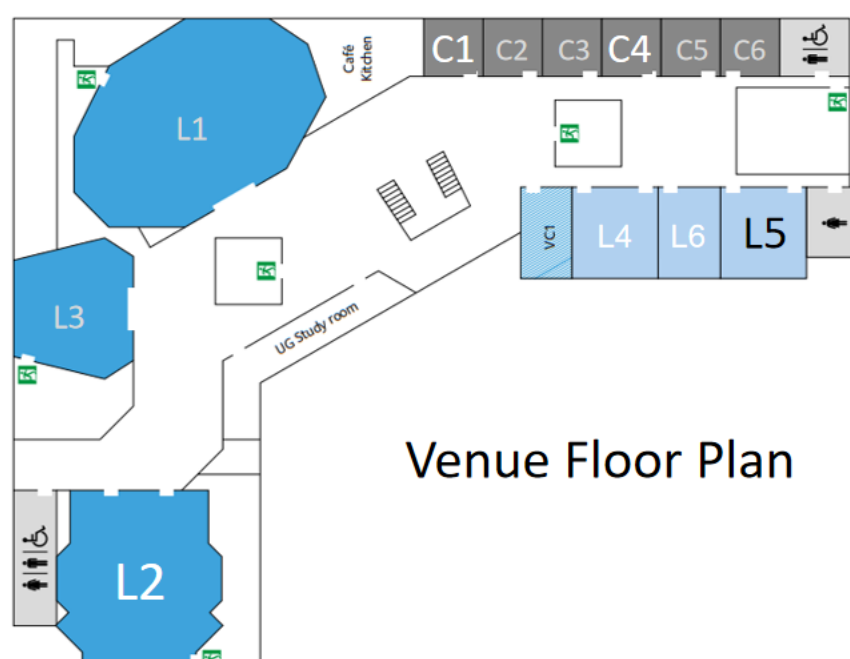
Kaiwen Jiang, Brunel University of London

General Programme

4 th August 2026 Tuesday				
14:00-17:00	Registration & Closed meeting			
5 th August 2026 Wednesday				
09:00-14:00	Registration & Free discussion			
14:00-14:30	L2	Opening Ceremony		
14:30-15:15		Keynote 1: Prof. Duc Truong Pham <i>(UK)</i>		
15:15-16:00		Keynote 2: Prof. Fei Tao <i>(China)</i>		
16:00-16:30		Group Photo / Coffee Break		
16:30-17:15		Keynote 3: Prof. Jan C. Aurich <i>(Germany)</i>		
17:15-18:00		Keynote 4: Prof. Michael Grieves <i>(US)</i>		
18:00-19:30	Welcome Dinner - Andrew Wiles Building			
6 th August 2026 Thursday				
09:00-09:45	Keynote 5: Prof. Stefan W. Pickl <i>(Germany)</i>			
09:45-10:30	Keynote 6: Prof. John Erkoyuncu <i>(UK)</i>			
10:30-10:50	Coffee Break			
10:50-12:30	L2 Digital Twin Modelling and AI Technologies	L5 Digital Twins for Sustainable and Green Manufacturing	C1 Digital Twin Adoption and Value Realisation	C4 Digital Experiment, Testing and Verification
12:30-13:30	Lunch			
13:30-15:10	L2 Engineering of Digital Twins	L5 Vertically Integrated Digital Twins for Manufacturing	C1 Digital Twin Adoption and Value Realisation	C4 Digital Experiment, Testing and Verification
15:10- 15:25	Coffee Break			
15:25-17:30	L2 Engineering of Digital Twins	L5 Digital Twins for Manufacturing and Machine Tools	C1 Digital Twin Modelling and AI	C4 Digital Twins for Energy Systems
18:30-21:15	Conference Dinner - Keble College			

General Programme

7 th August 2026 Friday				
09:00-10:30	L2 Engineering of Digital Twins	L5 Digital Twin Frameworks and Standards	C1 Digital Twins for Robotics and Autonomous Systems	C4 Physics-Informed Digital Twins and Predictive Modelling
10:30-10:50	Coffee Break			
10:50-12:30	L2 Digital Twins for Cities and Logistics	L5 Digital Twins for Industrial Applications	C1 Digital Twins for Smart Manufacturing	C4 Physics-Informed Digital Twins and Predictive Modelling
12:30-13:30	Lunch			
13:30-15:10	L2 Digital Twins for Healthcare and Medicine	L5 Digital Twins for Smart Engineering Systems I	C1 Digital Twins for Smart Manufacturing	C4 Digital Twins for Smart Engineering Systems II
15:10-15:25	Coffee Break			
15:25-16:40	L2 Digital Twins for Healthcare and Medicine	L5 Digital Twins for Smart Engineering Systems I	C1 Digital Twins for Smart Manufacturing	C4 Digital Twins for Smart Engineering Systems II
16:40-17:00				
17:00-18:00	L2	Awards and Closing Ceremony		
8 th August 2026 Saturday				
09:00-14:00	Closed Meeting / Social Event			



Venue Floor Plan

OPENING CEREMONY

 Wednesday, 5th August, 2026 Room - L2

Time	Agenda
14:00-14:05	Welcome Address by DigiTwin2026 General Chair Prof. Alfonso Bueno-Orovio
14:05-14:10	Welcome Address by DigiTwin2026 General Chair Prof. Fei Tao
14:10-14:15	Address by Honorary Advisor of Digital Twin International Advisory Committee (DTIAC) Prof. Duc-Truong Pham
14:15-14:20	Address by Taylor & Francis - Publisher of <i>Digital Twin</i> Mr. Richard Goodman, Taylor & Francis
14:20-14:25	Address by Elsevier - Publisher of <i>Digital Engineering</i> Dr. Monaz Mehta, Elsevier
14:25-14:30	Special Event of makeTwin Industrial Digital Twin Software Platform Prof. Fei Tao, Prof. Stefan W. Pickl, Prof. Duc-Truong Pham, Prof. Jan. C. Aurich, Prof. Alfonso Bueno-Orovio, etc.

AWARDS AND CLOSING CEREMONY

 Friday, 7th August, 2026 Room - L2

Time	Agenda
17:00-17:15	Introduction of IDEA & Announcement of 2026 IDEA Fellows Prof. Li Yi
17:15-17:20	Introduction of DigiTwin 2026 Award Prof. Xiaojun Liu / Prof. Jan C. Aurich
17:20-17:55	Announcement of DigiTwin 2026 Award Recipients Prof. Alfonso Bueno-Orovio
17:55-18:00	Acknowledgements & Introduction to DigiTwin 2027 (Spain) Prof. Alfonso Bueno-Orovio

Thursday, 6th August 2026

Room L2

Time	Presentation List
10:50	Enabling Fusion Digital Twins with a Multi-physics Platform for Fuel Cycle Technology Helen Brooks United Kingdom Atomic Energy Authority, UK
11:15	Design for Excellence (DFX) in the AI Era: Perspective and Practice Zhinan Zhang Shanghai Jiao Tong University, China
11:40	Building Visualizations of Fusion Digital Twins with OpenUSD and Omniverse Rui Costa United Kingdom Atomic Energy Authority, UK
12:05	Large Language Model Assisted Simulation Model Generation for Performance Digital Twin of Discrete Production System Junfeng Wang Huazhong University of Science & Technology, China
12:30	<i>Lunch</i>
13:30	Model-Driven Industrial Digital Twins and AI Andreas Wortmann University of Stuttgart, Germany
13:55	Digital Twin Based Embodied Robot Control Jun Xu Xi'an Jiaotong University, China
14:20	From Digital Masters to Cognitive Twins – An Assistive Ethical Decision Module for Autonomous Driving Ghita Mezzour Jaguar Land Rover, UK
14:45	Digital Twin Driven Four-Way Pallet Shuttle Storage and Retrieval System Optimization Ning Zhao University of Science and Technology Beijing, China
15:10	<i>Coffee Break</i>
15:25	Towards a Science of Digital Twin Engineering: The French EDT (Engineering Digital Twins) Programme Guy De Spiegeleer Inria, France
15:50	Rapid Development Platform for Digital Twin Systems of CNC Equipment and Its Applications Tianliang Hu Shandong University, China
16:15	Engineering Data-Driven Digital Twins: Project Delivery and Asset Lifecycles in Industrial and Built Environments Jaroslaw Szczepanek Fluor Corporation, Poland
16:40	Key Technologies of Digital Twin Shop-floor: Practices for New Energy Vehicles Smart Manufacturing Ying Cheng Beihang University, China
17:05	Considering Risk Analyses in Digital Twin Engineering Stephen Creff Institute of Research and Technology SystemX, France

Thursday, 6th August 2026

Room L5

Time	Presentation List
10:50	CampusDT-GDL: A Digital Twin for Campus Sustainability — Optimal Energy Dispatch, Dynamic LCA, and Sim-Opt Validation Jose Antonio Marmolejo Universidad Panamericana Mexico, Mexico
11:15	A DT-AI Hybrid Framework for Trustworthy Distributed Scheduling in Complex Energy Systems Xing He Shanghai Jiao Tong University, China
11:40	Product Carbon Footprint Acquisition, Modeling, and Optimization in Low-Carbon Mechatronic Product Development Liming Wang Shandong University, China
12:05	Digital Twin-Based Intelligent Operation and Maintenance for Green Manufacturing Yuchen Liang Jiangsu University, China
12:30	<i>Lunch</i>
13:30	Process Mining System Discovery for Synchronous Digital Twins in Manufacturing Erica Pastore Politecnico di Torino, Italy
13:55	Digital Twin-Based Information Modeling and Validation for Alumina Smart Plants Xiaoling Zhang Shenyang University of Technology, China
14:20	Digital Twins for Sustainable Manufacturing: A Proposed Conceptual Framework Ersilia Cozzolino University of Naples Federico II, Italy
14:45	A Data-Driven Digital Twin Framework for Smart Additive Manufacturing: Linking Process Parameters, Rheology, Mechanical Performance, and Structural Integrity HamidReza Vanaei De Vinci Research Center (DVRC), France
15:10	<i>Coffee Break</i>
15:25	Multi-axis additive-subtractive hybrid manufacturing using digital twin model Dong He Southeast University, China
15:50	Twinning Oldest and Newest Manufacturing Processes for the 21st Century - Metal Casting Meets Additive Manufacturing Guha Manogharan Pennsylvania State University, USA
16:15	Digital Twin-Driven Thermal Error Control and Virtual Sensing for CNC Machine Tools Hanbo Yang Xi'an Jiaotong University, China
16:40	From Digital Twin Research of Machine Tools to Implemented Business Value Jan Mertes :em engineering methods AG, Germany
17:05	Uncertainty-Aware Digital Twin for Trustworthy Thermal Error Compensation in Precision Machine Tools Jihui Han The University of Tokyo, Japan

Thursday, 6th August 2026

Room C1

Time	Presentation List
10:50	The Value of Digital Twins in the Pharmaceutical Industry Christian Kober ETH Zurich, Switzerland
11:15	Discoverability of Digital Twins Riku Ala-Laurinaho Aalto University, Finland
11:40	What Do You Do with a Digital Twin Once It Is Built? Connecting LLM Agents in a Production Logistics Lab Yongkuk Jeong KTH Royal Institute of Technology, Sweden
12:05	Integrating MBSE and Digital Twins for Maritime Design and Compliance Haitham Al-Shami Aalto University, Finland
12:30	<i>Lunch</i>
13:30	A4PS: Agentic AI-Assisted Advanced Planning and Scheduling with Large Language Models for Smart Manufacturing Mingxing Li Jinan University, China
13:55	A Multi-View Architectural Framework for Digital Twins in the Railway Sector Hibat Allah Babty Université de Technologie de Compiègne (UTC), France
14:20	AcKG-RAG: An LLM-Based Automatic Knowledge Graph Construction and Retrieval-Augmented Generation Approach for Maintenance Wanshan Li Jinan University, China
14:45	Surrogate Modeling for Real-Time Stress Prediction of Top-Drive Main Shafts in Digital Twin Systems Xingyu Ai China University of Petroleum, China
15:10	<i>Coffee Break</i>
15:25	A 5D Digital Twin Framework for Terrestrial Laser Scanners (TLS): Kinematic Misalignment Modelling and Calibration Sonia Garcia Université Paris-Saclay, France
15:50	Bulk Stockpile Volume Measurement Based on Stage-wise Functional Decoupling for Point Cloud-Image Collaborative Fusion WeiLong Niu Jinan University, China
16:15	Modeling the 5D Digital Twin Framework through Ontological Formalization Bouthayna EL Bouzaidi Tiali Institute of Research and Technology SystemX / LURPA, France
16:40	Engineering a Generic Digital Metrological Twin: A Framework for the Uncertainty Assessment of Geometric Terrestrial Laser Scanning Measurements Klara Grefe Physikalisch-Technische Bundesanstalt (PTB), Germany
17:05	Evolving Gaussian Fields for Digital Twins Junyang Chen The Hong Kong Polytechnic University, HK, China

Thursday, 6th August 2026

Room C4

Time	Presentation List
10:50	Human-Factor-Aware Digital Twins for Intelligent Ship Operations: Applications in Maritime Safety and Ship-Shore Collaboration Xiaolin Nie Wuhan Technical University, China
11:15	Dynamic Data-driven Test Verification of Intelligent Thermal Protection System Yuzheng Han Harbin Institute of Technology, China
11:40	Digital Twin on Aircraft Assembly Systems: Online Perception and Collaborative Regulation of Geometrical and Mechanical Information Chengyu Li Nanjing University of Aeronautics and Astronautics, China
12:05	Dynamic Data-Driven Real-Time Monitoring and Prediction of Thermal Protection Systems in Hypersonic Vehicles Songhong Yu Harbin Institute of Technology, China
12:30	<i>Lunch</i>
13:30	Machine Learning and Actuator Placement Optimization for Digital Twins of Fuselage Assembly Juan Du The Hong Kong University of Science and Technology (Guangzhou), China
13:55	Dynamic Data-Driven In-situ Residual Performance Prediction of 2D-C/SiC under High-Temperature Oxidation Zhi Wang Harbin Institute of Technology, China
14:20	Intelligent Operation and Maintenance of Aircraft Structures Based on Digital Twins Lei Huang Dalian University of Technology, China
14:45	Rapid Prediction of Residual Mechanical Properties of C/SiC Composites Based on Surrogate Model Rong Lv Harbin Institute of Technology, China
15:10	<i>Coffee Break</i>
15:25	Key Technologies and Applications of Artificial Intelligence in Electrical Distribution Systems Ji Qiao China Electric Power Research Institute, China
15:50	Framework Design and Application Prospect for Digital Twins System of Energy Internet Sheng Chen China Electric Power Research Institute, China
16:15	AI-Driven Power System Operations and Electricity Market Haiwang Zhong Tsinghua University, China
16:40	Digital Environmental Simulation Methodology Kunlun Wei China Electric Institute, China

Friday, 7th August 2026

Room L2

Time	Presentation List
09:00	Digital Twins as the Backbone of Digital Continuity in Space Systems Engineering Philipp Chrszon German Aerospace Center (DLR), Germany
09:25	Super Systems Digital Twin for Scenario-Based Smart PSS Design: Supporting Early-Stage Engineering Design and Decision Making across China and Europe Car Manufacturing Industry Yan Zhang University of Shanghai for Science and Technology, China
09:50	GreyCat: A Programmable Temporal-Graph Platform for Digital Twins Francois Fouquet DataThings S.A., Luxembourg
10:15	Digital Twin Method for High-Accuracy Structural Strength Assessment Kuo Tian Dalian University of Technology, China
10:40	<i>Coffee Break</i>
11:00	Digital Twin-enabled Cooperative Autonomous Trucks in Smart Construction Logistics Ray Y Zhong The University of Hong Kong, HK, China
11:25	Digital Twin for Inclusive Flood Disaster Response Stephan Onggo University of Southampton, UK
11:50	From Services to Capabilities: Structuring Digital Twin Engineering through Evidence from Logistics and Supply Chain Management Yu Liu Mines Paris - PSL University, France
12:15	Digital Twin-enabled Low-Carbon Transportation for Modular Integrated Construction in Hong Kong Shuaiming Su The University of Hong Kong, HK, China
12:40	<i>Lunch</i>
13:30	Cardiac Digital Twins for Mechanistic ECG Interpretation James A. Coleman University of Oxford, UK
13:55	Practical Application of Digital Twins in Aortic Endovascular Repair Mingyao Luo, Xiangyu Li Fuwai Hospital, China
14:20	Digital Twins for KPI-Driven Hospital Operations: A Methods Engineering Translation Framework from Automotive Manufacturing to Healthcare Hilâl Yilmaz Independent Researcher, Turkey
14:45	From Mechanisms to Digital Twins: Designing Brain Therapies through Multiscale Physics Tian Yuan Imperial College London, UK
15:10	A Cardiac Digital Twin of Hypertrophic Cardiomyopathy: From Disease Progression to Precision Therapy Abdallah Hasaballa University of Oxford, UK
15:35	Concurrent control of natural and robotic limbs through a tactile-encoded neural interface Tianyu Jia Imperial College London, UK
16:00	Systems of Digital Twins: A Systematic Literature Review and a formal framework Giulia Pellegrino University of Salento, Italy
16:25	Digital Twin Technology in Healthcare: From Predictive Modelling to Personalised Treatment and Rehabilitation David Olawade University of East London, UK

Friday, 7th August 2026

Room L5

Time	Presentation List
09:00	XRTwin4Industry: Empowering Industrial Digital Twins with XR and Instruction System - A Framework for Standardization and Interoperability Abdelhadi Belfadel IRT SystemX, France
09:25	When Digital Twins Travel: A Five-Level Taxonomy of Domain Gaps in Manufacturing Prediction Patrick Ruediger-Flore RPTU Kaiserslautern-Landau, Germany
09:50	Exploration of Digital Twin Standard Framework Xin Ma Beihang University, China
10:15	Dual Digital Twin for Early Development and Commissioning of Digital Triplets Zakka Ugih Rizqi Aalborg University, Denmark
10:40	<i>Coffee Break</i>
11:00	Key Technologies and Applications of Intelligent Hull Plate Forming Driven by Digital Twins Jinfeng Liu Jiangsu University of Science and Technology, China
11:25	Digital Twin Enabled Auto-Calibrated Real-Time Locating Service for Production Logistics Synchronization Zhiheng Zhao The Hong Kong Polytechnic University, HK, China
11:50	Digital Twin for the Thermal Analysis of Constant Velocity Joints Jon Garcia Urbieto Dauch Corporation, Spain
12:15	Investigation of the Complex-Structure Preform Equipment Management System and Yarn Tension Prediction Model Jingwen Mo Southeast University, China
12:40	<i>Lunch</i>
13:30	Exploring Dexterous Robotic Hands: From Manipulation Tasks to Digital Twins Kaiwen Jiang Brunel University of London, UK
13:55	Neural Operator Surrogates for Fast CFD Field Prediction in Biomass Boiler Digital Twins Przemysław Motyl Casimir Pulaski Radom University, Poland
14:20	The Research of Centroidal Dynamic Planning for Quadruped Robot Locomotion Control Yonggang Liu Chongqing University, China
14:45	Digital Twin Enabled Intelligent Structures: A Perspective Qiang Yang Harbin Institute of Technology, China
15:10	<i>Coffee Break</i>
15:25	An Integrated Framework for the Design of Trustworthy Industrial Digital Twins Achraf Kallel Institute of Research and Technology SystemX, France
15:50	Bioinspired Design of Flexible High-Precision Pressure/Strain Sensors Based on Biological Mechanosensory Systems Changchao Zhang University of Cambridge, UK
16:15	Occupants-Centered Digital Twin Model for Enhancing Indoor Environmental Quality Mohamed Marzouk Cairo University, Egypt

Friday, 7th August 2026

Room C1

Time	Presentation List
09:00	Digital Twin for Intelligent Excavators: Enhancing Autonomous Operation in Complex Environments Zhiwen Ma Guizhou University, China
09:25	Digital Twin-Enabled Embodied Intelligence for Autonomous Operations in Petrochemical Facilities Pengju Wang Beihang University, China
09:50	Welding Copilot: An LLM-Empowered Digital Twin for Human-Like Robotic Welding Yuda Cao The Hong Kong Polytechnic University, HK, China
10:15	PetroTwin: Digital Twin Modeling and Virtual-to-Real Training Framework for Embodied Intelligence Explosion-Proof Robots in Petrochemical Facilities Yang Meng Beihang University, China
10:40	<i>Coffee Break</i>
11:00	Generation Method of Generalized Remanufacturing Process Schemes Based on Retired Mechanical Product Genes Yuyao Guo Wuhan University of Science and Technology, China
11:25	Digital Twin-driven Manufacturing of Diamond-Reinforced Metal Matrix Composites Meng Ye Tsinghua University, China
11:50	Digital Twin-Driven Intelligent Shape Correction via Equivalent Deformation Transfer Coefficient: From Cold-Start to Mass Production Chenhao Yang Northeastern University, China
12:15	Digital Twin-Enabled Intelligent Quality Control in Automotive Manufacturing Xiangyu Ren Wuhan University of Science and Technology, China
12:40	<i>Lunch</i>
13:30	Digital twin-enabled end-to-end spatial-temporal traceability model for intralogistics operations Bin Huang The Hong Kong Polytechnic University, Hong Kong, China
13:55	Architecting Digital Twins: Interoperability Challenges, Standardization, and Model-Driven Engineering Opportunities Enxhi Ferko Jotne Connect AS, Norway
14:20	Research and Application of the Assembly Quality Test Method for Pilot Solenoid Valves Based on the Digital-Physical Fusion Jiankang Zhang Beihang University, China
14:45	A Multimodal task for Resistance Spot Welding Mechanical Performance Prediction via Metallographic Segmentation and Multi-Task Learning Zhongjie Yue Xi'an Jiaotong-Liverpool University, China
15:10	<i>Coffee Break</i>
15:25	Optimization of connection models in digital twin systems: Efficient merging and assembly strategy Chongxin Wang Southeast University, China
15:50	Construction and Deployment of Digital Twins for Industrial X-ray/CT Inspection Systems Zhiyu Gao Beihang University, China

Friday, 7th August 2026

Room C4

Time	Presentation List
09:00	Research on Reduced-Order Model of Heat Treatment Online Simulation for Digital Twin Application Daming Tong Shanghai Jiao Tong University, China
09:25	Digital Twin for Full-Field Deformation Monitoring Under Dynamic Load Tianhe Gao Dalian University of Technology, China
09:50	Routing-PIDON: Physics-Informed Operator Learning for Multiscale Multiphysics Xingpu Feng Xi'an Jiaotong-Liverpool University, China
10:15	Digital Twin for Full-Field Temperature Reconstruction Based on Multi-Source Data Fusion Zhiyong Sun Dalian University of Technology, China
10:40	<i>Coffee Break</i>
11:00	SAT-PINN: Spatial-Angle Tension Physics-Informed Neural Network for Carbon Fiber Yarn Monitoring Xiaotian Zheng Southeast University, China
11:25	A Multi-Twin Collaborative System for Human-Machine Collaborative Manufacturing Jingkai Li Shandong University, China
11:50	Digital-Twin Driven Thermo-Mechanical Coupled Modeling for Temperature-Prediction in Reheating Furnaces Lichang Liu Wuhan University of Science and Technology, China
12:15	Configurable Modeling and Simulation Method and Software for Digital Twin Production Logistics Based on makeTwin Mingyang Gao Beihang University, China
12:40	<i>Lunch</i>
13:30	Digital Twin-Assisted Optimization of Nonlinear Pulse Amplification via FROG-Based Feedback Jikun Yan University of Southampton, UK
13:55	Digital twin-enabled position error compensation for cable-driven parallel robots via PatchTST-enhanced prediction Jin Shi Southeast University, China
14:20	Dual-Stage CBF-QP-Guided Diffusion Policy for Transit Motion Planning in Robotic Welding Changjin Yan The Hong Kong Polytechnic University, Hong Kong, China
14:45	A Digital Twin-Oriented State Mapping Method for Metal-Sealed Flange Connections in Well-Control Equipment Zeyi Shang China University of Petroleum-Beijing, China
15:10	<i>Coffee Break</i>
15:25	Digital Twin-Based Carbon Footprint Modeling and Traceability Analysis for Complex Products Xingyuan Xiao Shandong University, China
15:50	Online Monitoring of Sealing Performance of BOP Flange Connection Structures Based on Digital Twins DongYang Huang China University of Petroleum-Beijing, China
16:15	Mechanism-driven Digital Twin for real-time force prediction in Incremental Sheet Forming Feixiang Wang Southeast University, China

KEYNOTE 1



Prof. Duc-Truong Pham

University of Birmingham

Fellow of the Royal Academy of Engineering

Honoary Advisor of Digital Twin (Journal)

Biography

Prof. Duc-Truong Pham is the Chance Professor of Engineering at the University of Birmingham. He has published over 700 papers and books on intelligent systems and advanced manufacturing and remanufacturing, and has graduated more than 100 PhD students. His awards include five prizes from the Institution of Mechanical Engineers, a Lifetime Achievement Award from the World Automation Congress and a Distinguished International Academic Contribution Award from the IEEE. He is a Fellow of the Royal Academy of Engineering, Learned Society of Wales, SME, IET and IMechE.

Title: A Stepping Stone to Digital Remanufacturing

Abstract

Remanufacturing plays a vital role in the circular economy, yet the disassembly stage remains labour-intensive and technically demanding due to the uncertain, variable condition of returned products. Over the past ten years, the Autonomous Remanufacturing Laboratory at the University of Birmingham has undertaken a focused research programme to understand these challenges and develop robotic systems capable of performing disassembly tasks autonomously or in collaboration with human operators. This presentation highlights advances in the application of digital engineering tools that help machines overcome the issues posed by uncertainty and perform operations previously dependent on skilled human judgment. Following an introduction to remanufacturing—its challenges and its benefits—the presentation will describe work undertaken on the use of digital technologies to facilitate robotic disassembly. These include visual and force sensing, machine learning, intelligent optimisation, collaborative robots and digital twins, which together provide the essential foundations for building a stepping stone to smart digital remanufacturing.

KEYNOTE 2



Prof. Fei Tao

Beihang University

Editor-in-Chief of Digital Twin

Editor-in-Chief of Digital Engineering

Biography

Dr. Fei Tao is a Professor at the Beihang University. 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 30 of them being ESI highly cited papers. His publications have over 50,000 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 the founding Editor-in-Chief of *Digital Twin* in Taylor & Francis Group and *Digital Engineering* in Elsevier; and he also founded the Digital Twin Global Forum and the Digital Twin International Conferences (DigiTwin).

Title: Five-Dimensional Digital Twin Model: From Theory to makeTwin Industrial software and Applications

Abstract

Digital twin has 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, is 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, aerospace, textile logistics, city management, and other sectors.

KEYNOTE 3



Prof. Jan C. Aurich

RPTU Kaiserslautern-Landau

acatech Fellow

Editorial Board Member of Digital Engineering

Biography

Prof. Jan C. Aurich received his Ph.D. degree from Leibniz University Hannover in 1995. From 1990 to 1995, he was a research assistant at the Institute for Production Engineering and Machine Tools, Leibniz University of Hanover, and led the "CAD/CAPP" team from 1993. From 1995 to 2002, he played a management role in both production and development departments at Daimler AG. In 2002, he became the chair professor of the Institute for Manufacturing Technology and Production Systems at TU Kaiserslautern. In 2013-2014, he was a Fulbright Visiting Professor at UC Davis, USA. Prof. Aurich is a member of the German National Academy of Science and Engineering (acatech) and the German Academic Association for Production Technology (WGP), and a fellow of the International Academy for Production Engineering (CIRP). His research interests include micro-manufacturing, product-service systems, sustainable manufacturing, and digital production.

Title: From Theory to the Shop Floor: Framework for Digital Twins in Manufacturing

Abstract

The concept of digital twins (DTs) revolutionizes modern manufacturing by enhancing the physical system with a digital system. However, a lack of consensus and uniform agreement on the definition of DT prevents the utilization of its full potential.

In a first step, various definitions of DTs, the different areas of application in manufacturing systems (factory, process, machine level), and different purposes (diagnosis, monitoring and control, prediction) are outlined. The benefits and challenges of DTs and the implementation in manufacturing systems are identified.

Afterwards, a review of current research regarding implemented applications of DTs in manufacturing scenarios is presented, resulting in an overview of recent advancements. Based on that, implications for future research directions are highlighted.

Finally, the paper proposes a novel framework designed for DTs in manufacturing. This framework serves as a foundation for further research and practical implementation within the industry.

KEYNOTE 4



Prof. Michael Grieves

University of Central Florida

Honoary Advisor of Digital Twin (Journal)

Biography

Prof. Michael Grieves is an internationally renowned expert on Digital Twins, a concept he originated and continues to publish on, and Product Lifecycle Management (PLM). Dr. Grieves has over five decades of executive (CEO, CTO, EVP, CFO) and board experience in global F1000, entrepreneurial, and non-profit organizations. His discipline expertise involves engineering, manufacturing, operations, research, and finance/accounting. He has consulted and done research at some of the top global organizations (NASA, Boeing, GM, Unilever, US Army). Dr. Grieves is an author of highly cited and seminal books, chapters, and papers and is a frequent keynote speaker on the global stage. Academically, Dr. Grieves has had appointments and done research and/or taught at the University of Michigan, Purdue University, Florida Institute of Technology, and the University of Iowa. He currently is at the University of Central Florida. His doctorate is from Case Western Reserve University.

Title: Digital Twins and the 3rd Millennium Discontinuity: From Physical Trial-and-Error to Goal-Directed Navigation

Abstract

Digital Twins have application across all domains of human life: engineering, manufacturing, healthcare, agriculture, resource management, etc. Human progress has long depended on physical trial-and-error—an approach constrained by time, cost, and wasted scarce resources. In this keynote, Dr. Grieves shows that Digital Twins mark a virtual discontinuity defining the 3rd Millennium. Combined with AI, Digital Twins enable time unconstrained goal-directed navigation in a virtual domain, where information replaces wasted scarce physical resources.

Through continuous replication, prediction, and navigation, Digital Twins enable Front Running Simulation—predicting and evaluating future states before they occur and guiding actions toward defined goals. This represents a shift from reacting to the physical world to proactively navigating it, reducing waste while increasing the probability of successful outcomes.

KEYNOTE 5



Prof. Stefan W. Pickl

Bundeswehr University of Munich
acatech Fellow

Conference Chair of DigiTwin 2025

Biography

Prof. Dr. Stefan W. Pickl received his Ph.D. degree from TU Darmstadt in 1998 and his Habilitation in 2004/2005. From 2000 to 2005, he was a research assistant and project manager at the Center for Applied Informatics Cologne, focusing on modeling, simulation, and optimization of resource conflicts. Since July 2005, he served as the Chair of Operations Research at the Bundeswehr University Munich. Currently, Prof. Pickl is Deputy Chairman of the German Committee for Disaster Risk Reduction (DKKV) and Chairman of the Advisory Board of the German Society for Operations Research (GOR). In 2023, he was elected as a member of the German National Academy of Science and Engineering (acatech). His research interests are IT-based decision-making and process optimization.

Title: Data-driven decision support in complex situations - IRIS Integrated Reachback Information System as hybrid optimization framework: Digital Twins for the Anomaly Detection of Complex Supply Chains

Abstract

The supply chains considered currently need special attention to be optimized on complex disruptions that affect the general security of supply. As part of the research project »OPERA - Future Operations« an interdisciplinary consortium develops a trend-setting interactive visualization tool to support decision makers politics, to adapt and to explore different strategies especially with the aid of digital twins. This talk gives an overview on that project. Furthermore it presents the special sector-based approach IDEA4C as part of the IRIS project:

I- Identification of critical regions, sectors and coupling principles **Cost-Benefit Analysis for critical sectors**

D- Data-driven constraint optimization **Coupled Sector-based Models**

E- Exploratory Strategies/ Recognition of critical pathways and sectors **Characterization of Pathways**

A- Adaptation and Quantifying Analysis **Coordination of Strategies**

This 4C-approach describes a new integrated modelling suite for developing and assessing relief distribution strategies. With the aid of a digital twin “IRIS” approach, anomaly detection should be supported. This hybrid optimization framework as example for IRIS has been conceptualized and is currently being developed with and for experts in the field of disaster and emergency management, in order to tackle the real issues arising during such this crisis.

KEYNOTE 6



Prof. John Erkoyuncu

Cranfield University

Head of the Centre for Digital Engineering and Manufacturing

Biography

John Erkoyuncu is a Professor of Digital Engineering and Head of the Centre for Digital and Design Engineering at Cranfield University. His research interests include: digital twins, augmented reality, and digitalisation of through-life engineering. He has a track record in leading cross Technology Readiness Levels in his research in manufacturing digitalisation with over £12M of funding secured from EPSRC (most recent – as PI: EP/R013950/1 and as Co-I: EP/R032718/1), Innovate UK, AMSCI, and KTP. He has published over 190 journal and conference papers. Prof. Erkoyuncu is currently co-supervising 9 PhD projects; 7 of which are co-funded by industry. He has supervised over 120 MSc projects. John is a Co-Chair of the Through-life Engineering Services Council, Member of the Team Defence Information - Digital Twin Working Group, Council Member of the Digital Twin Hub, Chartered Engineer with IET, Fellow of the Higher Education Association, Associate Member of CIRP, Former Chair of the CIRP Research Affiliates and a Member of IET. He is also the Programme Director for the MSc in Digital and Technology Solutions.

Title: Emerging Opportunities for Digital Twins in Manufacturing

Abstract

This presentation will provide an overview of digital twin applications across the manufacturing sector. The talk will be structured to cover the following topics. Firstly, an overview of the most prominent areas of interest for digital twins in manufacturing will be presented. The will cut across opportunities across design teams, manufacturing processes, and maintenance interventions. This will be followed with how to design and build digital twins considering alternative challenges around data, models, and interoperability. As part of this, the emerging methods and solutions will be discussed with some insights on future directions. The presentation will close with a reflection on the potential benefits from digital twins across manufacturing.



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