DigiTwin 2023 Program

The 3rd Digital Twin International Conference

📅 11th-13th October, 2023
📍 Gif-sur-Yvette, France
# Online Room ID List

Please check your registered email box for password. If you’ve registered for the conference but have not received Zoom and Tencent online room password, please contact: jiaolei@seu.edu.cn  ru.wang13@bit.edu.cn

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| Room 1 | 951 3395 7516 | 865-6014-8565 | Opening Ceremony  
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Keynote 1-6  
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Session AP1- AP9  
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Welcome
Acknowledgement
The Digital Twin International Advisory Committee (DTIAC)
Organizing Committee
Additional Information
General Program
Opening Ceremony
Awards and Closing Ceremony
Keynote
Session Program
The 3rd Digital Twin International Conference (DigiTwin 2023)

Welcome

Dear Distinguished Guests, Colleagues, and Friends,

On behalf of the Digital Twin International Scientific Committee (DTIAC) and the Conference Organizing Committee, we cordially welcome each of you to the 3rd Digital Twin International Conference (DigiTwin 2023).

The Digital Twin is a digital representation of an asset, with connections that allow convergence and synchronization between the asset and its digital counterpart at a specified frequency and fidelity. The significance of the digital twin in the digital economy and society has been increasingly acknowledged in various applications in recent years.

DigiTwin 2023 aims to provide an international platform for scientists, researchers, engineers, students, and beyond to exchange the latest developments, research findings, and industrial applications on digital twin. The theme of DigiTwin 2023 is “Making Digital Twins for a Changing World”. We believe that digital twins are instrumental in adapting to and shaping our evolving industrial, economic, and societal landscapes.

Prof. Fei Tao first envisioned this international conference in 2018. While our original intention was to host a face-to-face conference, the unpredictable repercussions of the post-COVID-19 landscape compelled us to transition to a fully virtual format. Interestingly, this shift mirrors the cyber-physical essence of the digital twin.

In the aftermath of the pandemic and the new world order, we eagerly anticipate the opportunity to convene with our colleagues in person at upcoming digital twin international conferences. We are committed to nurturing and sustaining this conference for many more decades ahead.

We are grateful to all our colleagues, especially the organizers and session chairs. Their collective efforts have resulted in a comprehensive conference program featuring 6 keynote speeches, 14 scientific sessions, 95 presentations, and multiple awards.

We are pleased to note that over 1500 participants from 20 different countries and regions have registered for the conference, and we hope that this conference will build an international platform for fostering international collaboration on digital twins.

To conclude, we expect a resounding success for the conference, and we send our best wishes to all participants. should you have any recommendations for improving the conference experience, we warmly invite you to share your ideas and suggestions with us.

Nabil Anwer and Fei Tao

Nabil Anwer  Fei Tao

General Chairs of the 3rd Digital Twin International Conference (DigiTwin 2023)

Paris and Beijing, October 11th, 2023
We would like to extend our most sincere thanks to all members of the organizing committee, the Digital Twin International Advisory Board, and volunteers for their support, without which, DigiTwin 2023 would not have been possible.

Furthermore, we are most grateful for the generous and continued support from all the sponsors.

Organizers
- LURPA (Automated Production Research Laboratory)
- Paris-Saclay University, France
- École Normale Supérieure Paris-Saclay, France
- Digital Twin (https://digitaltwin1.org)
- Taylor & Francis Group

Co-Organizer
- Digital Twin International Research Center, Beihang University
- S.mart
- SAGIP
- GDR MACS
- IRT SystemX

Sponsors
Based upon Digital Twin (https://digitaltwin1.org/), this conference is organized under the scientific guidance of the Digital Twin International Advisory Committee (DTIAC)(https://digitaltwin1.org/advisors/). The DTIAC is composed of 97 world-renowned domain experts who are advisors and ambassadors of Digital Twin.

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  South Ural State University, Russia

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**Assistant Chief Advisor**
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  Beihang University, China
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The complete conference program, together with additional information, can be found on the conference websites as follows:


The conference participants are welcomed to submit manuscripts to the open-access journal, Digital Twin, at https://digitaltwin1.org/. More information about Digital Twin, especially regarding the submission procedure, can be found at https://digitaltwin1.org/for-authors/article-guidelines. The articles will be published online with a valid DOI at the soonest 14 days since submission, followed by open peer review.

If you have any questions about conference logistics, please feel free to contact us.

• Qinglin Qi (China): kylin3366@buaa.edu.cn
• Yifan Qie (France): yifan.qie@ens-paris-saclay.fr
• Zhiping Wang (France): zhiping.wang@univ-tln.fr
• Li Yi (Germany): li.yi@mv.uni-kl.de
# General Program

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**Abbreviation:**

Session **CAF**: Digital twin concept, architecture, and framework  
Session **T**: Digital twin theory, method, key technologies and tools  
Session **R**: Reliability Digital Twin  
Session **AM**: Digital twin and additive manufacturing  
Session **MS-1**: Digital twin-driven manufacturing system  
Session **MS-2**: Digital twin driven manufacturing system  
Session **CC**: Smart Construction and City  
Session **ADV**: Advanced Manufacturing  
Session **RM**: Digital twin for remanufacturing  
Session **S**: Digital Twin Services Innovation  
Session **N**: Digital Twin Network  
Session **E**: Propulsion and Energy Systems  
Session **H**: Digital Twin for Health Care  
Session **AP**: Novel applications of digital twin
# Time Zone Conversion Table

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Wednesday, 11th October, 2023

(Paris Time) 9:00 - 9:30  (Beijing Time) 15:00 - 15:30

Zoom ID: 951 3395 7516
Tencent ID: 865-6014-8565

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Prof. Nabil Anwer |
| 9:05       | 15:05        | Digital Twin International Advisory Committee (DTIAC) Address  
Prof. Andrew Y C Nee |
| 9:10       | 15:10        | Congratulatory Address  
Eng Guan Ang (Managing Director of Taylor & Francis Group China) |
| 9:15       | 15:15        | Welcome Address  
Prof. Fei Tao |
Friday, 13th October, 2023
(Paris Time) 15:00 - 16:00  (Beijing Time) 21:00 - 22:00

Zoom ID: 951 3395 7516
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<td>Prof. Andrea Matta</td>
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<td>Prof. Nabil Anwer</td>
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# Keynote List

**Zoom ID: 951 3395 7516**  
**Tencent ID: 865-6014-8565**  
**Password:** Check your registered email box for password

| Keynote 1 | Enabling Tools for Human-Machine Interaction  
**Professor S. K. Ong**  
Fellow, International Academy for Production Engineering CIRP  
Mechanical Engineering Department  
College of Design & Engineering  
National University of Singapore |
|---|---|
| Keynote 2 | Foundations of Digital Twin concept and applications  
**Professor Alain Bernard**  
Fellow, French Academy of Technologies  
Fellow, International Academy for Production Engineering CIRP  
Digital Sciences Laboratory LS2N UMR CNRS 6004  
Ecole Centrale de Nantes, Nantes Université |
| Keynote 3 | Designing and Implementing Digital Twins  
**Dr. Lama Itani and Dr. Moubarak Gado**  
Application engineer,  
MathWorks |
| Keynote 4 | Ensuring Trustworthiness of Downstream Machine Learning Models against Unsecured Data for Digital Twins  
**Dr. Zhen Xiang**  
Postdoctoral Research Associate, Secure Learning Lab,  
University of Illinois Urbana-Champaign, US |
| Keynote 5 | Why PHM has HM? And how to achieve that through digital twin?  
**Professor Zhiguo Zeng**  
Associate Professor HDR  
CentraleSupélec, Université Paris-Saclay |
| Keynote 6 | Digital Twin for Machine Tools: from concept to application  
**Professor Tianliang Hu**  
Professor  
School of Mechanical Engineering,  
Shandong University, China |
**KEYNOTE 1**

**Professor S. K. Ong**

Fellow, International Academy for Production Engineering CIRP  
Mechanical Engineering Department  
College of Design & Engineering  
National University of Singapore

**Biography**

SK Ong lectures at National University of Singapore, and her research interests are virtual and augmented reality applications in manufacturing, ubiquitous manufacturing, assistive technology and rehabilitation engineering. She is a pioneer in the research and development of augmented reality technologies application in product design and manufacturing. As a firm believer that research outcomes should benefit the general population, she leads the laboratory to apply these augmented reality technologies that have been developed for manufacturing in the assistive technology area. She is a Fellow of the International Academy for Production Engineering CIRP, where she was the 1st from the Asia region and the 4th female fellow in the world to be elected in 2012. She received the 2004 Outstanding Young Manufacturing Engineer Award, US Society of Manufacturing Engineers and the 2009 Emerging Leaders Award in Academia (US Society for Women Engineers). She has published 8 books and over 300 international refereed journal and conference papers, with a google citation of more than 12,449, and a H-index of 62.

**Title: Enabling Tools for Human-Machine Interaction**

**Abstract**

Human-machine interaction (HMI) has been widely researched and reported, with approaches ranging from co-existence to collaboration and human-machine symbiosis. Many research and applications of HMI in human-robot collaboration and human-robot cooperation have been reported. Augmented Reality and Digital Twins have been applied in HMI. This presentation aims to provide an overview of the technical features and characteristics of various HMI approaches. The presentation will summarize the enabling tools for achieving human-machine symbiosis. The current limitation factors and future trends of human-machine symbiosis will also be discussed.
Biography

Emeritus Professor Alain Bernard, graduated in 1982, with a PhD achieved in 1989. He worked as Associate-Professor from 1990 to 1996 at Centrale Paris. From 1996 to 2001, he was appointed as a Full Professor in CRAN, Nancy I, and led the “Integrated Design and Manufacturing” team. Since 2001, he worked as a Full Professor at Centrale Nantes and was Dean for Research from 2007 to 2012. He was a Researcher at LS2N Laboratory (UMR CNRS 6004), and former head of the “Systems Engineering –Products-Processes-Performances” team. Prof. Bernard’s research topics include Knowledge Management (KM), Product Lifecycle Management (PLM), information system modelling, enterprise modelling, systems performance assessment, virtual engineering and additive manufacturing. He has supervised more than 40 PhD students and published more than 150 papers in refereed international journals and books. Prof. Bernard has been the Vice President of France Additive (French Association on Additive Manufacturing) from 1993 to 2003. He renewed and chaired the WG5.1 of IFIP (Global Product Development for the whole product lifecycle) until 2020. He is Fellow Emeritus of CIRP (International Academy for Production Engineering). In 2018, he was elected as Fellow of the Academy of Technologies of France (Académie des technologies). From 2004 to 2021, he has been Scientific Advisor at the French Ministry for Higher Education, Research and Innovation.

Title: Foundations of Digital Twin concept and applications

Abstract

Digital Twin concept is relatively new. During the last 30 years, different evolutions of digital representation of objects and systems allowed enlarging the capabilities of interactions between real and digital worlds, with a new positioning and interaction with humans. More recently, industry 4.0 accelerated the development of Digital Twin from concepts to operational level. At the same time and in many sectors, the concept has been adapted and is to be adopted for various applications and usages. This keynote will try to introduce and illustrate such fundamentals, evolutions and applications.
Biography

**Lama Itani** is an Application Engineer with the Academia Group at MathWorks. She holds an MSc in Mechanical Engineering and a PhD in Applied Optical Diagnostics from CentraleSupélec, France. Prior to joining MathWorks, she worked as Engine Optimization Engineer at Renault Group. At MathWorks, Lama supports instructors and researchers in integrating MATLAB/Simulink for AI applications.

**Moubarak Gado** is an application engineer at MathWorks since 2019 focusing on AI, digital twins, parallel computing and algorithm deployment. He holds a PhD in computational mechanics from University of Bordeaux (France) and University of the Basque country (Spain), a MSc in materials and processes from University of Lorraine & Arts et Métiers ParisTech & ENIM, and an Engineering Degree from ENIM. Prior to joining MathWorks, he was R&D engineer at CT Engineering Group where he worked on developing AI and simulation tools for predictive maintenance, anomaly detection, mechanical analysis, and structural optimization.

**Title: Designing and Implementing Digital Twins**

**Abstract**

In this talk on digital twins, we will address their significance, emphasizing the enhancement of design processes, acquiring pre-production technical insights, and operational optimization. We will explore various modeling methods, from physics-based to AI-driven representations, while addressing prevalent implementation challenges. Through real-world examples from our industry partners, we will discuss choices in twin construction, continuous updates, scalability concerns, and requisite skillsets. Practical applications on how MATLAB/Simulink were leveraged for designing and implementing digital twins will be highlighted through showcasing Atlas Copco's cost optimization and Nio's battery estimation pipeline for electrical vehicles.
Biography

Zhen Xiang is a postdoc from Secure Learning Lab, University of Illinois Urbana-Champaign. He earned his PhD from Pennsylvania State University in 2022. Zhen Xiang’s research interests cover many aspects of trustworthy machine learning, with a main focus on the robustness of machine learning models. He serves as the PC member for conferences such as ICLR, NeurIPS, and ICASSP, and reviewer for journals including TPAMI, TNNLS, and TIFS. Zhen Xiang is also the organizer of the first Trojan Removal Competition and the second Trojan Detection Challenge.

Title: Ensuring Trustworthiness of Downstream Machine Learning Models against Unsecured Data for Digital Twins

Abstract

Digital twins have found extensive application across various domains, including smart manufacturing, health management, power and energy systems, vehicles and transportation, and smart cities. They play a pivotal role in boosting the performance of the machine learning models involved in these domains through data enrichment. However, the flourish of data representation also poses new threats on machine learning models. With careful data poisoning, the learned model may easily carry a backdoor such that the model output may be altered targetedly when the input is embedded with a specific trigger pattern. This presentation shows how machine learning models fail against backdoor attacks on 2D and 3D data that are popular for digital twins. Moreover, two categories of defenses based on training set cleansing and model inspection, respectively, are discussed.
KEYNOTE 5

Professor Zhiguo Zeng
CentraleSupélec, Université Paris-Saclay
France

Biography
Zhiguo ZENG received the Ph.D. degree in reliability engineering from Beihang university in 2016. After that, he joined CentraleSupélec, Université Paris-Saclay, and became a full professor in 2023. His research focuses on the characterization and modeling of the failure/repair/maintenance behavior of components, complex systems and their reliability, maintainability, prognostics, safety, vulnerability and security. Dr. ZENG is an author/co-author of more than 100 papers in highly recognized international journals and conferences. His research has been funded by important government funding agencies like ANR and ERC, and also important industrial companies like EDF, SNCF, Orange and GE Healthcare. He is editorial board member of International Journal of Data Analysis Techniques and Strategies, and the leading guest editor of the special issue on “Dependent failure modeling” of the journal Applied Science. He is the co-holder of industrial chair Risk and Resilience of Complex Systems and co-head of the master program “Risk, Resilience and Engineering Management” in Université Paris Saclay.

Title: Why PHM has HM? And how to achieve that through digital twin?

Abstract
Prognostics and Health Management (PHM) has been a hot topic in academia and industry for many years. However, most of the research effort is on developing more accurate and efficient algorithms for remaining useful life (RUL) prediction. How to make use of the predicted RUL to support health management is not well studied as compared to the RUL prediction problem. One of the most important use case for health management is maintenance planning, i.e., making decisions regarding when to do replace a component/system preventively. In this talk, we show some of our recent works on this topic. In particular, we present an use case of predictive maintenance of aircraft engine, i.e., maintenance planning based on the predicted RUL. Both single-component-level and fleet-level planning are discussed. Then, we discuss the potential benefits digital twin techniques can bring to the PHM community. A detailed research roadmap, as well as an open-source experimental platform developed for demonstrating digital twins for predictive maintenance will be discussed.
KEYNOTE 6

Professor Tianliang Hu

Professor
School of Mechanical Engineering,
Shandong University, China

Biography
Tianliang Hu received his BS and PhD in Mechanical Engineering in 2003 and 2009 from Shandong University. He was a visiting Ph. D student in IMS Lab, University of California, Davis, from Feb. 2007 to Feb. 2008 supported by CSC. He began his career in the School of Mechanical Engineering, Shandong University from Jan. 2009. In Jan. 2020, he was awarded as the Qilu Young Scholar Professor in Shandong University. He also was awarded as the Taishan Scholar (Young Expert) of Shandong Province in Jan. 2021. He now serves as the Director of Shandong Provincial Engineering Research Center for Intelligent Manufacturing and Control System. Prof. Hu’s research interests include intelligent manufacturing, digital twin, CNC technology, and robotics. His research has been funded by many important national and provincial research projects. Prof. Hu is also very active in the standardization work of manufacturing industry. He serves as the Vice Secretary of SAC/TC159/SC1 and the working group convener of IEC/TC44/MT60204-34 and SAC/TC22/IWG4. He was/is involved in the developments of many international standards and national standards related to manufacturing industry.

Title: Digital Twin for Machine Tools: from concept to application

Abstract
Machine tool is the “mother machine” of the industry. It’s digitalization is the basis of the intelligent manufacturing system. Therefore, how to improve the intelligence of the machine tool becomes a hot topic. Digital Twin, with its advantages from concept to application, gives an effective way for the digitalization of complex equipments. In this talk, the background of the machine tool digitalization work will be reviewed. Then the concept of the Digital Twin for Machine Tool will be proposed. With the analysis of the characteristic of the machine tool, the roadmap for the implementation of Digital Twin for Machine Tool will be discussed and the key issues will be addressed. The application of Digital Twin for Machine Tool will be presented as case studies in this talk as well.
The 3rd Digital Twin International Conference (DigiTwin 2023)

## Sessions List

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<td><strong>Prof. Benoit Eynard</strong>&lt;br&gt;Université de Technologie de Compiègne, France&lt;br&gt;<strong>Prof. Vincent Chevet</strong>&lt;br&gt;INSA Lyon, France</td>
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<td>Digital twin theory, method, key technologies and tools</td>
<td><strong>Prof. Bernard Riera</strong>&lt;br&gt;Université de Reims Champagne-Ardenne, France</td>
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<td><strong>Prof. Yi Ren</strong>&lt;br&gt;Beihang University, China&lt;br&gt;<strong>Dr. Cheng Qian</strong>&lt;br&gt;Beihang University, China&lt;br&gt;<strong>Dr. Jianle Fan</strong>&lt;br&gt;Fudan University, China</td>
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<td>Digital twin and additive manufacturing</td>
<td><strong>Dr. Yicha ZHANG</strong>&lt;br&gt;Belfort-Montbéliard University of Technology, France&lt;br&gt;<strong>Dr. Yunlong TANG</strong>&lt;br&gt;Monash University, Australia&lt;br&gt;<strong>Dr. Yang SHENG</strong>&lt;br&gt;University of Guelph, Canada</td>
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<td>Session MS-1</td>
<td>Digital twin-driven manufacturing system</td>
<td><strong>Dr. Shimin Liu</strong>&lt;br&gt;The Hong Kong Polytechnic University, China&lt;br&gt;<strong>Prof. Pai Zhang</strong>&lt;br&gt;The Hong Kong Polytechnic University, China</td>
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<td>Digital twin-driven manufacturing system</td>
<td><strong>Prof. Mamadou Kaba Traore</strong>&lt;br&gt;Université de Bordeaux, France&lt;br&gt;<strong>Dr. Zhiguo Zeng</strong>&lt;br&gt;CentraleSupélec, France</td>
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<td>Smart Construction and City</td>
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<td><strong>Prof. Jinhua Xiao</strong>&lt;br&gt;Wuhan University of Technology, China&lt;br&gt;<strong>Prof. Eujin Pel</strong>&lt;br&gt;Brunel University London, UK</td>
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<td><strong>Prof. Songhua Ma</strong>&lt;br&gt;Shandong University, China&lt;br&gt;<strong>Prof. Dedong Ma</strong>&lt;br&gt;Qilu Hospital of Shandong University, China&lt;br&gt;<strong>Dr. Yongli Wei</strong>&lt;br&gt;University of Health and Rehabilitation Sciences, China</td>
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<td>Session AP</td>
<td>Novel applications of digital twin</td>
<td><strong>Dr. Makhlof Hadji</strong>&lt;br&gt;IRT SystemX, France&lt;br&gt;<strong>Prof. Grégory Paraut</strong>&lt;br&gt;ENS Paris-Saclay, France&lt;br&gt;<strong>Prof. Nabil Anwar</strong>&lt;br&gt;University Paris-Saclay, France</td>
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The 3rd Digital Twin International Conference (DigiTwin 2023)

Session on
**Digital twin concept, architecture, and framework (CAF)**

Session chairs:
- **Prof. Benoît Eynard**
  Université de Technologie de Compiègne, France
- **Prof. Vincent Cheutet**
  INSA Lyon, France

Wednesday, October 11th-12th 2023
Zoom ID: 951 3395 7516
Tencent ID: 865-6014-8565

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| 10:30      | 16:30      |              | **CAF-1** An Industrial Digital Twin classification framework
| 11:00      | 17:00      |              | **CAF-2** From Concept to Deployment: A 5C CPS Architecture-Based Methodology for Streamlined Development and Application
Nathalie Julien and Mohammed Adel HAMZAOUİ |
| 11:30      | 17:30      |              | **CAF-3** Digital Twinning of an Engineering Manufacturing Environments at the Local Level
Keenan Granland, Zijue Chen and Yunlong Tang |
| 12:00      | 18:00      |              | **CAF-4** Principles governing development and usage of Digital Twins
Jean-Luc Garnier |
| 12:30      | 18:30      |              | **CAF-5** A high Level Architecture for Digital Twin Interoperability: Composing Digital Twins into Systems of Twins
Mamadou Kaba TRAORE |
| October 12th |            |              |                                                                                                  |
| 10:00      | 16:00      |              | **CAF-6** Objective-driven digital twin development
Thomas ROUSSELOT, Christian KOUMLAH MBEY, Jean-Luc GARNIER and Pascal HUBERT |
| 10:30      | 16:30      |              | **CAF-7** Digital Twin Framework for Use Case Definition, Selection, and Implementation
Till Böttjer and Sara Blasco Román |
| 11:00      | 17:00      |              | **CAF-8** Painting of the digital twin to better understand and implement it in manufacturing
Renard Dimitri, Saddem Ramla, Annebicque David, Riera Bernard |
| 11:30      | 17:30      |              | **CAF-9** Digital Twin Architecture Design through Data Lifecycle Modelling
Nathalie Julien and Mohammed Adel HAMZAOUİ |
The 3rd Digital Twin International Conference (DigiTwin 2023)

Session on
Digital twin theory, method, key technologies and tools (T)

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| 10:30      | 16:30        | **T-1** Online Validation of Manufacturing System Digital Twins  
Giovanni Lugaresi and Andrea Matta |
| 11:00      | 17:00        | **T-2** Mechanism data fusion modeling digital twin method and application practice in spacecraft systems  
HUANG Lei, ZHOU Fanli, WANG Wei, SHANG Shuai and ZHOU Haocheng |
| 11:30      | 17:30        | **T-3** Progressive learning of a hybrid model for improved adaptability in the classification of motor fault diagnosis  
Morgane Suhas Emmanuelle Abisset-Chavanne Pierre-André Rey |
| 12:00      | 18:00        | **T-4** Digital Twinning Method of the Whole Wellbore Temperature-Pressure Field for Random Monitoring Locations within Oil and Gas Wells  
Maliang Wang, Wenlan Wei and Yue Hu |
| 12:30      | 18:30        | **T-5** No Code Environments and Digital Twin Trust  
Matthew S. Bonney |

Session chairs:

**Prof. Bernard Riera**  
Université de Reims Champagne-Ardenne, France

Wednesday, October 11th 2023  
Zoom ID: 914 8080 9511  
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## Session on Reliability Digital Twin (R)

**Session chairs:**

- **Prof. Yi Ren**
  - Beijing University, China

- **Dr. Cheng Qian**
  - Beijing University, China

- **Dr. Jiajie Fan**
  - Fudan University, China

### Agendas

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  Dariusz Mazurkiewicz, Poland |
| 10:30      | 16:30        | **R-2** The novel tendency of uncertainty quantification metrics in model updating and sensitivity analysis  
  Sifeng Bi, UK |
| 11:00      | 17:00        | **R-3** Digital Twin for mission critical electronics  
  Jiajie Fan, China |
| 11:30      | 17:30        | **R-4** From Rigid to Reliable: Leveraging Digital Twin for Region-Centred Medical Image Alignment  
  Jakub Mitura, Poland |
| 14:00      | 20:00        | **R-5** AI-based Adaptive Surrogate Modeling Framework for In-service Performance Prediction with Validation by the UV-LED Modules  
  Cadmus Yuan, China |
| 14:30      | 20:30        | **R-6** A Conceptual Framework for the Reliability Assessment of LED Lighting Products Using Digital Twin  
  Mesfin Ibrahim, China |
| 15:00      | 21:00        | **R-7** Causal Influences Based Multiple Degradation Features Modeling Oriented to Reliability Digital Twin  
  Zeyu Wu, China |
| 15:30      | 21:30        | **R-8** Digital Twin-Driven Reliability Method of Lithium-ion Battery Packs  
  Quan Xia, China |

Thursday, October 12th 2023  
Zoom ID: 935 8413 8771  
Tencent ID: 543-4058-7725
### Session on Digital Twin and Additive Manufacturing (AM)

**Session chairs:**
- **Dr. Yicha ZHANG**
  Belfort-Montbéliard University of Technology, France
- **Dr. Yunlong TANG**
  Monash University, Australia
- **Dr. Yang SHENG**
  University of Guelph, Canada

**Thursday, October 12th 2023**

**Zoom ID:** 914 8080 9511  
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Yancheng Zhang, France |
| 10:30      | 16:30        | **AM-2** Towards a system of digital twin for additive manufacturing  
Yunlong Tang, Australia |
| 11:00      | 17:00        | **AM-3** Field-driven toolpath-oriented constructive design method for additive manufacturing for medical digital twin application  
Zhiping Wang, France |
| 11:30      | 17:30        | **AM-4** A use case for the development of a digital twin of a 3D-printed bionic hand  
Li Yi, Germany |
| 14:00      | 20:00        | **AM-5** Digital Twin driven smart manufacturing based on multimodal data  
Zhiqiang Wang, France |
| 14:30      | 20:30        | **AM-6** Efficient macroscopic and mesoscopic numerical methods based on finite element method for predicting temperature distribution during additive manufacturing processes  
Yabo JIA, France |
| 15:00      | 21:00        | **AM-7** A paradigm of DT & toolpath-driven Hybrid platform for functional AM  
Yicha Zhang, France |
| 15:30      | 21:30        | **AM-8** A Digital Twin-Driven Framework for Quality Improvement of FDM Process  
Sheng Yang, Canada |
### Session on Digital Twin-driven Manufacturing System (MS-1)

#### Session chairs:

**Dr. Shimin Liu**  
The Hong Kong Polytechnic University, China

**Prof. Pai Zheng**  
The Hong Kong Polytechnic University, China

Friday, October 13th 2023  
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Dr. Yuqian Lu, New Zealand |
| 10:30      | 16:30        | **MS1-2** Intelligence Monitoring, Diagnosis & Prognosis for Remanufacturing of Industrial Equipment  
Dr. Ming Zhang, UK |
| 11:00      | 17:00        | **MS1-3** Ensemble learning with a genetic algorithm for surface roughness prediction in multi-jet polishing  
Dr. Ruoxin Wang, China |
| 11:30      | 17:30        | **MS1-4** Development of Smart Manufacturing for Ultra-Precision Machining Technology  
Dr. Zhicheng Xu, China |
| 13:00      | 19:00        | **MS1-5** An introduction to Identicality for Digital Twins for the manufacturing domain  
Mr. Shuo Su, UK |
| 13:30      | 19:30        | **MS1-6** Convolutional Neural Networks for Automatic Virtual Metrology  
Ms. Suiyan Shang, China |
| 14:00      | 20:00        | **MS1-7** Digital Twins in Human-robot Collaborative Interaction: An investigation  
Mr. Jianhao Lv, China |
Session on Digital Twin-driven Manufacturing System (MS-2)

Session chairs:

Prof. Mamadou Kaba Traore  
Université de Bordeaux, France

Dr. Zhiguo Zeng  
CentraleSupélec, France

Wednesday, October 11th, 2023
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| 10:30      | 16:30        | **MS2-1** Research on Data Acquisition and Management System for Production Line based on Digital Twin and Cloud-fog-edge Computing Collaboration  
Zhiyuan Li, Xuesong Mei, Dawei Zhang, Jun Xu, Zheng Sun |
| 11:00      | 17:00        | **MS2-2** Digital twins for enhanced efficiency and quality in milling of structural parts for the aerospace industry  
Albrecht Hänel, Guanchen Gong, Eric Wenkler, Uwe Teicher, André Seidel1 and Steffen Ihlenfeldt |
| 11:30      | 17:30        | **MS2-3** Digital Twin Enhanced Agile Design of Ship Pipeline Systems  
WANG Xin and ZHANG Zhinan |
| 12:00      | 18:00        | **MS2-4** A Multi-objective Optimisation for a Data-driven Digital Twin of CNC Machining Processes  
V. S. Vishnu, Kiran George Varghese, K. Suresh and B. Gurumoorthy |
| 15:00      | 21:00        | **MS2-5** Robotic arm path planning system based on digital twin  
Rui Zhou, Manlu Liu, JinHao Li, Yu Liu |
| 15:30      | 21:30        | **MS2-6** Digital twin for quality assurance Needs – Illustration on micro-gear  
Jean-Yves Dantan, Gisela Lanza, Amir Khezri, Vivian Schiller, Lazhar Homri1, Alain Etienne |
| 16:00      | 22:00        | **MS2-7** Software Defined Maintenance using Digital Twin for Manufacturing Optimization  
Selma Khebbache and Makhlof Hadji |
| 16:30      | 22:30        | **MS2-8** Lab-on-a-Cloud A New Pathway Towards Accessible Manufacturing Education  
Sheng Yang |
## Session on Digital Twin for Smart Construction and Cities (CC)

**Session chairs:**

- **Mr. Yishuo Jiang**
  The University of Hong Kong, China
- **Dr. Ray Y. Zhong**
  The University of Hong Kong, China
- **Prof. Xiqiang Wu**
  Southeast University, China
- **Dr. Yantao Yu**
  Hong Kong University of Science and Technology, China

**Wednesday, October 11th 2023**

**Zoom ID:** 935 8413 8771  
**Tencent ID:** 543-4058-7725

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| 10:30      | 16:30        | **CC-1** Digital roads of the future: towards a highway digital twin for road maintenance management  
Mengtian Yin, UK |
| 11:00      | 17:00        | **CC-2** Augmenting construction progress tracking and digital information modeling utilizing computer vision and BIM  
Wei Wei, China |
| 11:30      | 17:30        | **CC-3** Application of Digital Twin in the Building Demolition Waste Trading: A Technical Exploration  
Shuaiming Su, China |
| 12:00      | 18:00        | **CC-4** Artificial-Intelligence Digital Twin Framework for Smart Firefighting  
Tianhang Zhang, China |
| 12:30      | 18:30        | **CC-5** Assessing the resilience of transport infrastructure under climate change: a case study of London rail transit systems  
Wei Bi, UK |
| 15:00      | 21:00        | **CC-6** The sustainable concrete recycling process through smart BIM: a case study in Hong Kong  
Svetlana Besklubova, China |
| 15:30      | 21:30        | **CC-7** Cyber-Physical Internet Framework Based on a Five-Layer Model  
Chenglin Yu, China |
| 16:00      | 22:00        | **CC-8** Exploring the Interplay Between Digital Twins and the Metaverse  
Junyang Chen, China |
The 3rd Digital Twin International Conference (DigiTwin 2023)

### Session on Digital Twin for Advanced Manufacturing (ADV)

**Session chairs:**
- **Prof. Hongyu Zheng**
  Shandong University of Technology, China
- **Prof. Yingchun Guan**
  Beihang University, China

Friday, October 13th 2023  
Zoom ID: 914 8080 9511  
Tencent ID: 779-9597-5313

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| 10:00      | 16:00        | **ADV-1** Digital Twin Driven for Tool Wear Monitoring Based on Multi-Sensor Data Fusion and Improved LSTM Network  
Jiang Guo, China |
| 10:30      | 16:30        | **ADV-2** Digitization, Sensorization and Machine Learning for Intelligent Hybrid Laser Aided Additive Manufacturing  
Prof. Guijun Bi, China |
| 11:00      | 17:00        | **ADV-3** Coherent beam combining of fiber lasers  
Prof. Pu Zhou, China |
| 11:30      | 17:30        | **ADV-4** The next generation of 3D printing: multi-materials additive manufacturing  
Prof. Shoufeng Yang, China |
| 12:00      | 18:00        | **ADV-5** Development of a Digital Twin Framework for Micro Milling  
Prof. A. Senthil Kumar, Singapore |
### Session on Digital Twin for Remanufacturing (RM)

**Session chairs:**

- **Prof. Jinhua Xiao**  
  Wuhan University of Technology, China  
  [Zoom ID: 913 6804 0930]  
  [Tencent ID: 558-3473-8731]

- **Prof. Eujin Pei**  
  Brunel University London, UK

### Agendas

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<tr>
<td>10:00</td>
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<td><strong>RM-1</strong> Simulation of Mobile Manipulator Based on Digital Twin</td>
<td>Chen Zheng, China</td>
<td>Wuhan University of Technology</td>
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<tr>
<td>10:30</td>
<td>16:30</td>
<td><strong>RM-2</strong> Digital Twin-driven Robotic Disassembly Sequence Dynamic Planning under Uncertain Missing Condition</td>
<td>Jiayi Liu, China</td>
<td>Wuhan University of Technology</td>
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<tr>
<td>11:00</td>
<td>17:00</td>
<td><strong>RM-3</strong> Intelligent Process Planning for Additive Manufacturing: Concepts and Applications</td>
<td>Yi Xiong, China</td>
<td>Wuhan University of Technology</td>
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<tr>
<td>11:30</td>
<td>17:30</td>
<td><strong>RM-4</strong> Digital twin-assisted multi-agent human and robots disassembly operations towards uncertain remanufacturing</td>
<td>Jinhua Xiao, China</td>
<td>Wuhan University of Technology</td>
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The 3rd Digital Twin International Conference (DigiTwin 2023)

Session on

**Digital Twin Services Innovation (S)**

**Session chairs:**

**Prof. Ying Cheng**
Beihang University, China

**Prof. Feng Xiang**
Wuhan University of Science and Technology, China

**Prof. Lei Wang**
Wuhan University of Technology, China

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| 10:30      | 16:30        | **S-1** Digital Twins: Revolutionizing Decision-Making Processes  
Prof. Greg Zacharewicz, France |
| 11:00      | 17:00        | **S-2** Causal Analysis and Optimization Decision-Making for Digital Twins of Complex Industrial Systems  
Prof. Wei Qin, China |
| 11:30      | 17:30        | **S-3** The Concept, System Structure and Operating of industrial Digital Twin System (iDTS)  
Prof. Haoqi Wang, China |
| 12:00      | 18:00        | **S-4** Mining and optimization of manufacturing service collaboration considering reliability and credibility in industrial cloud environment  
Prof. Lei Wang, China |
| 12:30      | 18:30        | **S-5** Data-driven active perception and optimal allocation of manufacturing resource services  
Prof. Geng Zhang, China |

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## Session on Digital Twin Network (N)

**Session chairs:**

**Dr. Tao Sun**  
China Mobile Research Institute, China

**Dr. Diego Lopez**  
Telefonica I+D, Spain

Thursday, October 12th 2023  
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| 10:00      | 16:00        | **N-1** Enabling Digital Transformation Through an Intelligent Interconnected Ecosystem of Digital Twins  
Prof. Ramona Trestian, Middlesex University, UK |
| 10:30      | 16:30        | **N-2** 6G enabled Future Robotics  
Dr. Xueli An, Munich Research Center, Huawei Technologies Co. Ltd, Germany |
| 11:00      | 17:00        | **N-3** Digital Twin Edge Networks for Intelligent Transportation  
Prof. Yunlong Lu, Beijing Jiaotong University, China |
| 11:30      | 17:30        | **N-4** Digital twin for large-scale radio access network optimization  
Dr. Wenfeng Hu, AI Technology and Innovation, Ericsson, Sweden |
| 12:00      | 18:00        | **N-5** Digital Twin empowered Computation Offloading  
Prof. Yueyue Dai, Huazhong University of Science and Technology, China |
| 12:30      | 18:30        | **N-6** Digital Twin in Optical Networks  
Dr. Mingyang Lyu, Nokia Shanghai Bell Company, China |
Session on
Digital Twin Propulsion and Energy Systems(E)

Session chairs:

Prof. Bosen Wang  
Beihang University, China

Prof. Yihao Tang  
Beihang University, China

Prof. Wang Han  
Beihang University, China

Wednesday, October 11th 2023
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| 15:00      | 21:00        | **E-1** Effects of droplet evaporation on two-phase rotating detonations  
Prof. Songbai YAO, China |
| 15:30      | 21:30        | **E-2** High-order compact gas-kinetic scheme for compressible flow simulations  
Dr. Fengxiang ZHAO, China |
| 16:00      | 22:00        | **E-3** A study of two-equation soot models in laminar and turbulent non-premixed flames  
Weitao Liu, Germany |
| 16:30      | 22:30        | **E-4** Combustion Intensification Mechanism in a Vortex-Tube Reactive Flow  
Dr. Shoujun Ren, Canada |
| 17:00      | 23:00        | **E-5** Effects of turbulence on variations in early development of hydrogen and iso-octane flame kernels under engine conditions  
Dr. Hongchao Chu, Germany |
The 3rd Digital Twin International Conference (DigiTwin 2023)

Session on

**Digital Twin for Health Care (H)**

**Session chairs:**

**Prof. Songhua Ma**  
Shandong University, China  
Thursday, October 12th 2023  
Zoom ID:  913 6804 0930  
Tencent ID: 558-3473-8731

**Prof. Dedong Ma**  
Qilu Hospital of Shandong University, China

**Dr. Yongli Wei**  
University of Health and Rehabilitation Sciences, China

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| 10:00      | 16:00        | **H-1** Musculoskeletal Digital Twin for Multiscale Orthopaedic Biomechanics  
Prof. Liming Shu, China |
| 10:30      | 16:30        | **H-2** Towards Digital Twin for Human Skeleton in Smart Manufacturing with Predictive Modelling  
Mr. Xiwang He, China |
| 11:00      | 17:00        | **H-3** Digital twin application for the medical equipment research and development  
Prof. Dedong Ma, China |
| 11:30      | 17:30        | **H-4** Research on diagnosis and treatment of respiratory diseases based on digital twin  
Mr. Xianhui Lian, China |
**Session on**

**Novel applications of digital twin (AP)**

**Session chairs:**

**Dr. Makhlouf Hadji**  
IRT SystemX, France

**Wednesday, October 11th 2023**  
Zoom ID: 951 3395 7516  
Tencent ID: 865-6014-8565

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| 15:00      | 21:00        | **AP-1** A digital twin approach for intelligent condition monitoring of wind turbines under uncertainties  
Xiaomo Jiang, Yu Jia, Huaiyu Hui, and Zhicheng Wang |
| 15:30      | 21:30        | **AP-2** Multi-components and multi-physics field synergetic digital twin architecture in the oil and gas well engineering  
Wenlan Wei, Yue Hu and Maliang Wang |
| 16:00      | 22:00        | **AP-3** Digital Twins on Airport Management  
Carbajal, Eduardo, Goepp, Virginie, Marmier, François and Rasovska, Ivana |
| 16:30      | 22:30        | **AP-4** Digital Twin Implementation for Predictive Maintenance  
Anouar Nahi, Makhlouf Hadji, Guillaume Denis and Selma Khebbache |
| 17:00      | 23:00        | **AP-5** Virtual-real Integrated System For Remote-Controlled Ship: Architecture, Design, and Implementation  
Hengbin Lin |

(To be continued)
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Session chairs:
Prof. Gré고ry Faraut
ENS Paris-Saclay, France
Prof. Nabil Anwer
University Paris-Saclay, France

Thursday, October 12th 2023
AP6- AP9  Zoom ID: 951 3395 7516
Tencent ID: 865-6014-8565
AP10- AP13 Zoom ID: 913 6804 0930
Tencent ID: 558-3473-8731

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| 14:00      | 20:00        | **AP-6** A data-driven wireless network precise planning system: digital and intelligent twinning on resource allocation  
Feng Jiang and Ritao Cheng and Shen Wang |
| 14:30      | 20:30        | **AP-7** Digital Twin for Sustainable Intralogistics  
Adnane Drissi Elbouzidi, Selmen Boubaker, Robert Pellerin, Abdessamad Ait El Cadi and Samir Lamouri |
| 15:00      | 21:00        | **AP-8** A Digital Twin System Design of an Intelligent Energy-Efficient Data Center  
Tianyou Xue, Guice Yao, Dongsheng Wen |
| 15:30      | 21:30        | **AP-9** Optimizing Healthcare Resource Allocation through Digital Twins: A Multi-objective Approach for Efficiency, Equity, and Resilience  
Wenjun Lin, Paul Babyn, Yan Yan, and Wenjun Zhang |
| 14:00      | 20:00        | **AP-10** Optimizing Built Asset Management: A Smart Inspection Framework via Digital Twin Technologies  
Yijun Huang, Jihan Zhang and Ben M. Chen |
| 14:30      | 20:30        | **AP-11** Architects' design spaces towards digital twins for design  
Nader Boutros and Christian Giraud |
| 15:00      | 21:00        | **AP-12** Digital Twin of an education modular smart building  
Julien Berton and Pierre-Antoine Cormier |
| 15:30      | 21:30        | **AP-13** Improving the study of noisy X-ray Raman scattering images of cultural heritage objects using a digital twin  
Laure Cazals, Agnès Desolneux, Alessandro Miron, Simo Huotari2, Christoph Sahle, Lauren Dalecky, Jean-Pascal Rueff, and Loïc Bertrand |
The 3rd Digital Twin International Conference

**DigiTwin 2023**

**Secretary Contact**

- Qinglin Qi (China): kylin3366@buaa.edu.cn
- Yifan Qie (France): yifan.qie@ens-paris-saclay.fr
- Zhiping Wang (France): zhiping.wang@univ-tln.fr
- Li Yi (Germany): li.yi@mv.uni-kl.de

**Website**

http://www.dtiac.com/ (China)
https://digitwin2023.sciencesconf.org/ (France)