2025 8th IEEE International Conference on Industrial Cyber-Physical Systems (ICPS)

Monday, 12 May 2025

08:30-09:00	*Room T151* **Conference Opening** The conference chairs and the president of the university will welcome the guests, explain the conference program, and open the conference. - Prof. Gerhard Kreutz, HSEL President - Prof. Milos Manic, IEEE IES President - Prof. A.W. Colombo, ICPS 2025 General Chair Chairs: Armando Walter Colombo
09:00-10:00	*Room T151* **Keynote: Sustainable and Efficient Digitalization of Production Environments with the Asset Administration Shell, by Prof. Michael Hoffmeister** Speaker: Prof. Michael Hoffmeister, FESTO, IDTA, HKA Abstract: How to create business potential in the future of production? This keynote will discuss strategically important factors of creating digital twins and how to address these through standardization and interoperability. The talk will introduce the main concepts of the Asset Administration Shell and how these are related to potential business benefits for future applications. Important directions in open source software and standardization, e.g., for the potential Digital Product Passport, will be reflected. The talk will address skills, tools, and methodologies, which will become relevant soon. CV: Prof. Dr. Michael Hoffmeister is a professor at the Karlsruhe University of Applied Sciences (HKA) in the field of mechatronics and is a researcher with Festo, which is an internationally renowned manufacturer of industrial components. He is a known driver of the AAS in Industry 4.0, is a board member of the IDTA, heads the IDTA working group for Submodels, and is convenor of the respective IEC 63278 standard for the AAS. Chairs: Armando Walter Colombo, Stamatis Karnouskos
10:00-10:30	*Technikum D13* **Coffee Break**
10:30-12:00	*Seminar Room S211* **ICPS Architectures & Engineering** Chairs: Paulo Leitao, Yuanchen Zhao **Coordination and Communication for Online-Reconfigurable Real-Time Distributed Control** *Lucas Romier, Jan Wilch, Birgit Vogel-Heuser* **An Architecture of a NOA-based Secure Internet of Things Edge Gateway** *Yuanchen Zhao, Heiko Schoon, Benedikt Schmetz, Torben Miny, Patrick Felke, Tobias Kleinert* **PTSAnalysis – A Static Program Analysis Tool to Capture Inter-Function Data Dependencies** *Balz Maag, Guanshujie Fu, Thanikesavan Sivanthi, Pengcheng Huang* **Alignment of ADACOR Holonic Architecture with RAMI4.0 and Industry 5.0 Principles** *Paulo Leitao, Jose Barbosa*

Monday, 12 May 2025

A Standardized Specification Approach for Graphical Domain-Specific Languages *Katharina Polanec, Simon Eschlberger, Jounes-Alexander Gross, Mergim Millaku, Christian Neureiter*

Toward the Trust-Enhanced MAPE-K Loop: A Novel Robotic Software Architecture *Sahar Nasimi Nezhad, Paul De Meulenaere, Bert Van Acker*

Seminar Room S202

ICPS Energy

Chairs: Chengbin Ma

Carbon-Aware Scheduling for Cyber-Physical Systems in the Edge-Cloud Continuum *Johan Kristiansson, Jerker Delsing, Thomas Ohlson Timoudas*

Deriving Functional Requirements for CPPS in Energy-Flexible Operations: A Systematic Review of Case Studies *Lasse Reinpold, Lukas Peter Wagner, Felix Gehlhoff, Alexander Fay*

Real-Time Certified Model Predictive Control for Multi-Active-Bridge Converters *haojun qin, Chang Liu, Ming Liu, Chengbin Ma*

A simulation-based study on the influence of charging speed and battery size of electric vehicles on the autarky of residential areas using V2Q *Flemming Stötzer, Lennart Börchers, Joachim Schwarz, Till Becker, Marc Hanfeld*

Industry 4.0 Compliant Digitalization Solution for Distributed Energy Resources and Biodiversity in the context of Smart Grids *Martin Alejandro Bär, Heiko Schoon, Kerstin Wunder, Armando Walter Colombo*

Seminar Room S215

ICPS and Data Science

Chairs: Franz Kunze

Implementation of an OPC UA Information Model for KPI Calculations and Dashboard Reporting based on ISO 22400 *Maximilian Bega, Furkan Ercan, Bernd Kuhlenkötter*

Dynamic Parcel Sorting Strategies Based on Digital Twin Optimization *Wei Zhang, Renming Liu, Le Liao, Chuan Huang*

Simulating Personalized Smart-Home Activity Datasets with Generative AI: A Case Study *Harditya Sarvaiya, Masaki Hasegawa, Haibo Zeng, Xinghua Gao, Na Meng*

Comparative Analysis of Synthetic Data Generation for Object Detection: CAD Models vs. 3D Scans of Industrial Items and Hybrid Approaches *Abdullah Farrukh, Tatjana Legler, Achim Wagner, Martin Ruskowski*

Alarm Flood Root-Cause Detection using an Adaptive Causal Directed Graph with an Extended Heuristic Rule-Base *Franz Christopher Kunze, Alexander Fay*

Dashboard Tool for Supporting Control Software Variability Maintenance in Industrial Automation *Shubham Sharma, Alexander Stummer, Rick Rabiser, Alois Zoitl*

12:00-13:00

Mensa/Canteen

Lunch

13:00-14:30

Room 1.001

TU2: Threshold concepts in teaching and learning about Cyber-Physical Systems (CPS)

Monday, 12 May 2025

	Abstract: The premise of the tutorial session is to introduce the threshold concept framework for designing experiences to support learning in the field of Cyber-Physical Systems (CPS). This tutorial will introduce our current understanding of potential threshold concepts in the CPS field based on the Delphi study we conducted with 11 international CPS experts. We will then invite the participants to engage in dialogue using an exercise called Q Methodology to refine the previous findings into a more parsimonious set of potential threshold concepts useful to the broader CPS community and educators. The tutorial session will close with a group discussion about the participants' experiences with the Q Methodology exercise, where results will be shared. In this tutorial, the following topics will be covered: - Threshold concepts in teaching and learning threshold concepts in CPS - The Delphi method / study as a mechanism for identifying threshold concepts in CPS - Q Methodology as a mechanism for refining threshold concepts in CPS Speaker Bio: Prof. David Reeping is an Assistant Professor in the Department of Engineering and Computing Education at the University of Cincinnati. He is a mixed methodologist with a particular interest in pairing qualitative methods with emerging advanced quantitative methods. His current research includes transfer student experiences, threshold concepts, measuring curricular complexity, and student interactions with generative AI. He earned his Ph.D. in Engineering Education from Virginia Tech and was a National Science Foundation Graduate Research Fellow. He received his B.S. in Engineering Education from Ohio Northern University, where he was trained as a high school mathematics teacher. Chairs: David Reeping
13:00-15:00	*Seminar Room S5* **TU1: Introduction to the Asset Administration Shell (AAS)** Abstract: Industry 4.0 refers to the intelligent networking of machines and processes with the help of information & communication technology, and the digital twin is considered a key enabler for various use cases of Industry 4.0. Digital Twins are the digital representation of an asset, where an asset is anything that has added value to an organization. The Asset Administration Shell (AAS) is the standardized digital representation of this asset. The Industrial Digital Twin Association (IDTA) works for the standardization of AAS and making it the de-facto technology for industry. This tutorial introduces the importance of AAS and how it helps achieve interoperable digital twins. It will also focus on benefits and general use cases of AAS, such as identification of the assets, Product Carbon Footprint (PCF), Product Change Notification (PCN), Digital Product Passport (DPP), and so on. This tutorial also emphasizes hands-on exercises around AAS. In these

Monday, 12 May 2025

	exercises, the participants will gain practical experience on how to create an AAS from a day-to-day example. These exercises also include an introduction to IDTA published Submodels such as Digital Nameplate and Hierarchical Structures Enabling Bill of Materials. Insights into the status of the international standardization of the AAS will be given. AAS is widely known as a foundation technology enabling Dataspaces such as Manufacturing-X to generate value based on interoperable data exchange. AAS is considered an important factor in complying with European Union (EU) regulations such as Digital Product Passport (DPP). Thus, this The tutorial directly relates to the topics of digital transformation, paradigms, methods, and tools in ICPS. This tutorial is best fit for the participants who are looking for the answer to “How to get started with Asset Administration Shells?”. This tutorial aims to familiarize the audience with the concept of AAS along with the practical experience. The tutorial will consist of an insightful presentation on AAS as well as the exercises along with interactive discussions. The exercises will use an online beginner-friendly tool to create and model the AAS. In this tutorial, the following topics will be covered: - Motivation for digital twins - Today’s digital twins vs interoperable digital twins by IDTA (AAS) - Submodels - Current use cases and developments - Hands-on exercise: Digital Nameplate - Hands-on exercise: Bill of Materials - Hands-on exercise: Product Type to Instance - Demonstration on Product Carbon Footprint Showcase Speaker Bio: Prof. Dr. Michael Hoffmeister is a professor at the Karlsruhe University of Applied Sciences (HKA) in the field of mechatronics and is a researcher with Festo, which is an internationally renowned manufacturer of industrial components. He is a known driver of the AAS in Industry 4.0, is a board member of the IDTA, heads the IDTA working group for Submodels, and is convenor of the respective IEC 63278 standard for the AAS. Juilee Tikekar is working as a Digital Twin Expert at IDTA. Her main responsibilities at IDTA include driving forward open-source development for AAS and supporting the community in implementing AAS. Chairs: Michael Hoffmeister, Juilee Tikekar
15:00-15:30	*Technikum D13* **Coffee Break**
15:30-16:30	*Seminar Room S5* **TU1: Introduction to the Asset Administration Shell (AAS) (cont.)**
15:30-17:00	*Seminar Room S203* **ICPS Architectures & Engineering** Chairs: Peter Gorm Larsen **Real-Time Interaction with a Ship Bridge Simulator via a Multi-Threaded Framework** *Beatriz Sanguino, Tongtong Wang, Øivind Kjerstad,*

Monday, 12 May 2025

Guoyuan Li, Houxiang Zhang

Field-level Reconfiguration of Real-time Distributed PLC Operating Procedures *Jan Wilch, Birgit Vogel-Heuser*

REimagined: A Domain-Specific Language for Model-Based Requirements Engineering *Sarah Riedmann, Christoph Binder, Markus Peter, Christian Neureiter*

A System Architecture for Scheduling in Human Centered Flexible Manufacturing Environments *Pol Bikhan, Benjamin Maveau, Reza Ghorbani Saber, Diana Espinosa*

Exploring DevOps for Integrating Physical and Digital Twins in Cyber-Physical Systems *Marco Picone, Prasad Talasila, Nicola Bicocchi, Peter Gorm Larsen*

Seminar Room S217

ICPS Technologies and Applications

Chairs: Massimiliano Pirani

Human-Centricity in Industry 5.0 - A Systematic Literature Review of Practical Implementations *Daniel Weerts, Maren Petersen*

Performance of RAG-Based Systems in Industrial Organizations: A Case Study in the Automotive Industry *Nils Mayat, Charlotte Wachter, Sonja Spatzenegger, Tim Weißer, Marcos Padrón Hinrichs, Robert H. Schmitt*

Verifiable actor model systems through Relational-model Multi-Agent System and Zero-Knowledge Proofs *Massimiliano Pirani, Alessandro Cucchiarelli, Luca Spalazzi, Tariq Naeem*

Towards a Continuous Ergonomic Evaluation of Manual Workstations in the Digital Factory *Janis Sprenger, Niklas Braun, Sven Reichardt, Bjoern Kellner*

17:30-19:00

Library

Welcome Reception

Social Event

Tuesday, 13 May 2025

08:30-10:00

Seminar Room S211

Advances in Data-Driven Fault Diagnosis and Fault-Tolerant Control for Industrial Systems

Self-Organizing Map Applications for Predictive Maintenance: A Review *Maryam Assafo, Peter Langendörfer*

Iterative search-based RAG: Using iterative retrieval for efficient large language model enhancement in industrial fault diagnosis *Jiamin Xu, Zhiwen Chen, Jiang Zhaohui, Dong Zhao*

Data-Efficient Handling of Temporary Uncertainties in Online Alarm Flood Classification *Gianluca Manca, Franz Christopher Kunze, Alexander Fay*

An Evolutionary Algorithm with Adaptive Global-Local Diversity for Data-Driven Optimization and Its Industrial Application *xujie tan, Yalin Wang, Jing Liao, Guohua Wu, Qizhang Luo, Chenliang Liu*

From Linear to Nonlinear: An Efficient Industrial Data Attribution Method for Regression Models *Qingkai Sui, Yalin Wang, Yijing Fang, Minghao Han, Chenliang Liu*

Seminar Room S217

Tuesday, 13 May 2025

Artificial Intelligence in ICPS

Chairs: Gavin Kane

Online-adaptive data stream processing via cascaded and reverse adaptation *Detlef Arend, Andreas Schwung*

Refining NLP Semantic Matches through Dialogue with Large Language Models *Sebastian Heppner, Ayan Zholdybayev, Marko Ristin, Torben Miny, Hans Wernher van de Venn, Tobias Kleinert*

Cascaded TinyML-based Reduction for the Anomaly Detection Model of an Industrial Combustion System *Iman Sharifirad, Jalil Boudjadar, Peter Gorm Larsen*

Machine Learning Models for Prediction of Energy Flexibility in Commercial Buildings *Philipp Wussow, Jan Haase*

GAP-CAN: Gradient-Based Adversarial Attack on Transformers for CAN Bus Anomaly Detection *Devin Drake, Victor Cobilean, Harindra Sandun Mavikumbure, Milos Manic, Swagat Das, Morgan Stuart*

Seminar Room S202

Cyber-Physical Security of Networked Control Systems

Chairs: Marco Cook

Optimal Deception Attacks in Remote State Estimation with Linear Encryption *Jing Zhou, Jun Shang, Tongwen Chen*

Secure State Estimation for Intelligent Vehicles against Cyber-security Threats *Yiwen Lu, Zishuo Li, Xinlei Yi, Yilin Mo*

Physics-Informed Bayesian Neural Network for Li-Ion Battery Continual Learning *Kaixin Cui, Tianran Gao, Dawei Shi*

FedMqADV: A unified framework for end-to-end evaluation of MQTT-based Federated Learning in adversarial setting *Ndiaye Ndeye Gagnessiry, Christoph Ruland, Karl Waedt, Oumayma Zeddini, Erkin Kirdan*

On the Cost of Asset Discovery Techniques for Industrial Control Systems *Marco Cook, Dimitrios Pezaros, Jan Chyzy*

10:00-10:30

Technikum D13

Coffee Break

10:30-11:30

Room T151

Keynote: Digital Product Passport – Make a Virtue of Necessity, by Ruediger Fritz

Speaker:
Rüdiger Fritz, Twindustrial GmbH, Germany

Abstract:
For manufacturing companies, the future Digital Product Passport is an opportunity, not another bureaucratic burden. With smart ideas and an innovative mindset, companies can improve their product and their processes, can outperform their competitors, and gain substantial benefit from this bureaucratic deliverable. Let's explore these bold theses and get inspired by some impulses to think out of the box and start to implement a system solution instead of a quick point solution, short before the DPP becomes mandatory

Tuesday, 13 May 2025

	Speaker Bio: Rüdiger Fritz, an industrial engineer educated at the Karlsruhe Institute of Technology (KIT), brings over 25 years of experience in the IT industry, including 23 years at SAP, where he held roles such as Development Architect and Senior Director for Product Management in Supply Chain Management. A passionate advocate for Industry 4.0, the Digital Product Passport (DPP), and Digital Twin technologies, he is now co-founder of Twindustrial GmbH, which is an innovation-driven company dedicated to redefining the potential of Digital Twins to develop forward-thinking industrial solutions. Rüdiger's career reflects a deep commitment to shaping the future of digital transformation in manufacturing and supply chains. Chairs: Armando Walter Colombo, Stamatis Karnouskos
11:30-13:00	*Mensa/Canteen* **Lunch**
13:00-15:00	*Room 1.001* **Industry Forum Session 2: Digitalization in the circular economy and logistics - regional solutions for a sustainable future** About this session: In this session, you will gain exclusive insights into how regional companies are successfully implementing sustainable production and the circular economy. Find out how resource-saving processes, intelligent recycling and optimized value chains lead to long-term competitive advantages. At the same time, you will learn about innovative logistics solutions that companies are using to meet the challenges of digital transformation. You can look forward to best practices, current projects and exciting contacts from the region. Talk: Digitizing Circular Economy (Jens Duin, SYNQONY Group) Talk: Digital transformation for greater resource efficiency (Digi-Ress) (Hartmut Schoon, Enneatech AG) Talk: Digital Self-Sovereign Product Passport (Jonas Kallisch, OFFIS Institute for Information Technology) Talk: Decentralized Transparency: Blockchain as the Key to Sustainable Supply Chains (Tobias Jornitz, Fraunhofer IML) Talk: Digital product passport as the cornerstone of circularity (Steffen Boelling, Fraunhofer IML) Chairs: Andre Wessels
	Technikum D13 **Industry Forum Session 1: Data Platforms - Challenges, Best Practices and Benefits** About this session: In an era defined by data-driven transformation, modern enterprises rely on data platforms as the foundation for analytics, AI, and operational efficiency. This session will examine the key challenges organizations face in building

Tuesday, 13 May 2025

	and maintaining scalable, secure, and high-performing platforms—including fragmented data landscapes, evolving compliance requirements, and infrastructure complexity. The discussion will highlight industry best practices for platform architecture, data governance, and cloud integration, as well as the strategic benefits gained through enhanced agility, real-time insights, and improved decision-making. Designed for technology leaders and data professionals, this session offers practical insights into aligning data platform strategies with business objectives in an increasingly complex digital environment. Talk: Bridging Industries: Aerospace-X as a digital Data Ecosystems in Aviation based on results from the Automotive Data Ecosystem Catena-X (Marvin Manoury, Fraunhofer IPK) Talk: DAVID: Advancing Interoperable Data Spaces in Manufacturing-X (Alfred Barnard, ifak Institut für Automation und Kommunikation e.V.) Talk: HealthTrack-X: Trailblazer of a Digitalized Supply Chain for the Industrial Healthcare Sector (Ege Hüsemoglu, Bundesverband der Deutschen Industrie e.V.) Talk: Driving engineering success with modern data platforms (Carsten Manske, KPMG) Talk: Disaster Management & Recovery: Requirements, Industry Standards and Challenges (Gowry Sritharan, Lufthansa Industry Solutions GmbH) Chairs: Christoph Wunck, Stamatis Karnouskos
13:00-16:00	*Luettje Studi Huus* **Technical Tour: Volkswagen Emden**
15:00-15:30	*Technikum D13* **Coffee Break**
15:30-17:15	*Seminar Room S203* **ICPS Automation and Autonomy** Chairs: Dimitrios Spanos **Leveraging Weighted Knowledge Graphs for Modeling and Analyzing Information Dependencies in Automated Production Systems** *Fan Ji, Zhenyu Wang, Birgit Vogel-Heuser* **Sepsis Detection Exploiting Biomarker Analysis with Deep Neural Networks** *Dimitrios Spanos, Nikolaos Passalis, Dimosthenis Spasopoulos, Evangelia Chatzianagnostou, Juan Carlos Ruiz Rodríguez, Juan Jose Gonzalez Lopez, Laura M. Lechuga, Mari Carmen Estévez, Nikos Pleros, Anastasios Tefas* **Automating Asset Generation of Motion Systems from CAD Data in a Game Engine Using FMI** *Juan Chowdhury, Kurt Stockman, Jeroen De Kooning* **CityTrix: constrained motion planning for automated complex vehicle**

Tuesday, 13 May 2025

combinations *Niklas Leukroth, Ying Qu, Sebastian Wagner, Felix Keppler, Nikolay Belov*

A Laboratory Fault-Injection Automation System for Industrial Pumping Predictive Maintenance *Gonçalo Azinheira, Sergio Brito, Jorge Semiao, Nelson Sousa*

Seminar Room S217

Artificial Intelligence in ICPS

Chairs: Jack Nunnelee

Enabling Symbiosis in Multi-Robot Systems through Multi-Agent Reinforcement Learning *Didem Gurdur Broo, Xuezhi Niu, Natalia Calvo Barajas*

Selective Mixup: Exploring Data Augmentation for Long Time Series in Confectionery Manufacturing *Shuhei Yamazaki, Takuya Maekawa*

Evading Detection: A Targeted Adversarial Attack on VAE-LSTM-Based Anomaly Detection in ICPS *Romarick Yatagha, Karl Waedt, Christoph Ruland*

Demonstration-Based AI Learning for Dynamic Motion Response in Metal Powder 3D Printing *Libia Romero Escobedo, Steffen Straßburger, Thomas Bär*

The Crucial Role of Problem Formulation in Real-World Reinforcement Learning *Georg Schäfer, Tatjana Krau, Jakob Rehrl, Stefan Huber, Simon Hirlaender*

IoT Device Fingerprinting Using Byte Histograms *Jack Nunnelee, Alexander Howe, Philip Rahal, Mauricio Papa*

Reliable Uncertainty Estimation in Autonomous Systems via Feature Collapse Mitigation *Dimitrios Spanos, Nikolaos Passalis, Anastasios Tefas*

17:30-19:00

Luettje Studi Huus

City Tour Emden

Experience Emden's Fascinating History on a Unique City Tour!

Begin your journey at the Kesselschleuse, the heart of Emden's maritime history, where you'll learn how this remarkable structure regulates the harbor facilities and transformed the city into a vital trade hub. From there, the tour takes you along the Emden Wall and through preserved parts of the historic old town.
At the Delft, one of the oldest harbor basins, you'll dive into Emden's seafaring legacy. Here stands the Emden City Hall—a symbol of citizen self-governance and the 16th-century revolution that politically reshaped the region.
The tour concludes at the Great Church, a testament to Emden's religious significance. Along the way, you'll explore Emden's history during the Nazi era, which led to destruction in World War II, and the city's democratic post-war reconstruction.
Highlights include:
Insider tips on Emden's best restaurants, offering traditional East Frisian cuisine and fresh seafood.
A journey through 800 years of history, from maritime trade and revolution to resilience after war.
Route: Kesselschleuse Emden Wall Historic Old Town/Delft Emden City Hall Great Church

Duration: 90 minutes

Tuesday, 13 May 2025

Language: English/German (specify preference)
Tips: Wear comfortable shoes and bring curiosity! Discover how Emden's past shapes its vibrant present.
Chairs: Christian Röben

Wednesday, 14 May 2025

08:30-10:00

Seminar Room S211

Artificial Intelligence in ICPS

Chairs: Philipp Wussow

- **Deep Learning Methods for Detecting Thermal Runaway Events in Battery Production Lines** *Athanasios Athanasopoulos, Matúš Mihalák, Marcin Pietrasik*
- **Predicting the Lifespan of Industrial Printheads with Survival Analysis** *Dan Parii, Evelyne Janssen, Guangzhi Tang, Charis Kouzinopoulos, Marcin Pietrasik*
- **Deep Learning-based Time Series Forecasting for Industrial Discrete Process Data** *Olaf Sassnick, Thomas Rosenstatter, Andreas Unterweger, Stefan Huber*

Seminar Room S217

Digital Transformation, Paradigms, Methods and Tools

Chairs: Alexandre Oliverira Junior

- **Industrial Metaverse Digital Twin: ISO 23247 Compliant Architecture for AI-Driven Simulation** *Alexandre Oliveira Júnior, José Luis Calvo Rolle, Rui Pires, Paulo Leitao*
- **Asset Administration Shells for Integrated Toolchains and Collaborative Automation Engineering: Insights from the Factory-X Project** *Hesam Rezaee Ahvanouee, Johannes Hoos, Björn Sautter, Markus Kiele-Dunsche, Dieter Arnold, Konrad Heidrich, Jonas Bleibdrey, Josef Schmelter, Heiko Haag, Alexander Fay*
- **Quick Response Code-Integrated Digital Twin with Asset Administration Shells** *Björn Otto, Saida Burmaganova, Marko Ristin, Nico Braunisch, Martin Wollschlaeger, Hans Wernher van de Venn*
- **Towards a Toolkit for Semantic Interoperability in Data Spaces** *An Ngoc Lam, Roberto Avogadro, Francisco Martin-Recuerda, Brian Elvesæter, Xiang Ma, Erik Johan Nystad, Dumitru Roman, Arne J. Berre*
- **An Automated Approach to Compliance Testing of Standardized Submodel Templates** *Israt Nowshin, Ghada Mohamed, Dirk Schöttke, Aaron Zielstorff, Stephan Schäfer*
- **The MOSIM Framework: Simulating Smart Workers in the Industrial Metaverse** *Janis Sprenger, André Antakli, Klaus Fischer*

Seminar Room S202

ICPS Theory and Technologies

Chairs: Fadi Mohsen

- **Scheduling for the Orchestration of Distributed Real-Time Applications** *Moritz Walker, Steffen Wörtz, Michael Neubauer, Armin Lechler, Alexander Verl*
- **HoneyShip: Unveiling Cyber Threats to Maritime VSAT Systems with a High-Interaction Honeypot** *Jeroen Pijpker, Fadi Mohsen, Stern Brouwer*
- **Cybersecurity Threat Sharing Platform MISP Tailored for Maritime Environment** *Jani Vanharanta, Jani Ekqvist, Jarkko Paavola, Marko Suojanen*

Wednesday, 14 May 2025

	Improving a SALBP-1 solver by tuning flexible termination criteria with simulated solving *Christoffer Fink, Olov Schelén, Ulf Bodin* **Challenges and lessons learned for industry transfer of DPP solutions** *Marvin Manoury, Malina Wiesner, Theresa Riedelsheimer, Finn Honsberg, Kai Lindow*
10:00-11:00	*Room T151* **Keynote The ECS-SRIA Roadmap - its Impact to the Software Defined Vehicle, by Michael Paulweber** Speaker: Michael Paulweber, INSIDE Industry Association / AVL List GmbH Abstract: ECS-SRIA is the Electronics Components and System Strategic Research and Innovation Agenda. Why this ECS-SRIA? The range of this ECS-SRIA is very wide, going from transistors within silicon chips acting as individual electrical switches for integration in smart systems up to global System of Systems performing complex cognitive tasks and interacting with numerous humans and machines over a wide geographical spread. The first part of the ECS-SRIA is composed of four chapters focused on the Foundational Technology Layers and their technical challenges along the technology stack, from materials and process technology to components, modules and their integration into electronic systems, embedded software developments and software technologies, to full systems and Systems of Systems. These foundational layers are characterized by hierarchical dependencies due to the inherent nature of ECS and the way they compose and integrate in complex structures. Advances in all Foundational Technology Layers will be essential to creating new electronic chips, components, modules, systems, and systems of systems along the value chain: these are the fundamental elements required to build the digitalization solutions of the future. Speaker Bio: Director of Research & Technology ITS, AVL List GmbH Vice president INSIDE industry association, https://inside-association.eu/about/
11:00-12:00	*Room T151* **Keynote: AI in Cyber Security of Cyber Physical Systems: Friend or a Foe, by Prof. Milos Manic** Speaker: Prof. Milos Manic, IEEE IES President, Virginia Commonwealth University (VCU), USA Abstract: Recent advancements in Artificial Intelligence (AI) have created unprecedented opportunities for real-time monitoring and understanding of the behavior and health of complex systems. However, the use of AI for anomaly detection and intrusion prevention often come with a “warning label”. This talk will explore the latest developments in AI through real-world case

Wednesday, 14 May 2025

	studies, reflecting on both best practices and challenges in designing effective AI systems. We will examine scenarios involving both large and limited datasets, discuss the integration of human expertise and physics-based models, and emphasize the critical role of effective visualization and explainability in the deployment of trustworthy AI solutions. This interactive talk will begin with the fundamentals of neural networks and deep learning, explore global trends in AI for cyber-physical systems (CPS), and conclude with an overview of the IEEE Industrial Electronics Society (IES), highlighting opportunities for engagement with the world's largest professional organization. Speaker Bio: Dr. Manic is a Professor with the Computer Science Department and Director of VCU Cybersecurity Center at Virginia Commonwealth University. He completed over 60 research grants in AI/ML in cyber, energy, and intelligent controls. He authored over 250 refereed articles in international journals, books, and conferences, has given over 70 invited talks around the world, holds several U.S. patents and has won 2018 R&D 100 Award for Autonomic Intelligent Cyber Sensor (AICS), one of top 100 science and technology worldwide innovations in 2018, and is recipient of the 2023 FBI DCLA Director's Community Leadership Award for innovative research in AI & cybersecurity. He is an inductee of the US National Academy of Inventors (senior class of 2023, member class of 2019), and a Fellow of the Commonwealth Cyber Initiative (specialty in AI & Cybersecurity). He holds a Joint Appointment with Idaho National Laboratory. He is an IEEE IES President (2024-2025), after serving in multiple IES officer positions, IEEE Fellow (for contributions to machine learning based cybersecurity in critical infrastructures), recipient of IEEE IES 2019 Anthony J. Hornfeck Service Award, 2012 J. David Irwin Early Career Award, 2017 IEM Best Paper Award, associate editor of IEEE Transactions on Industrial Informatics, IEEE Open Journal of Industrial Electronics Society, and IEEE IES Senior Life AdCom member. He served as AE of Trans. on Industrial Electronics, was a founding chair of IEEE IES Technical Committee on Resilience and Security in Industry, and was a General Chair of IEEE ICIT 2023, IEEE IECON 2018, IEEE HSI 2019. Chairs: Armando Walter Colombo, Stamatis Karnouskos
12:00-13:00	*Mensa/Canteen* **Lunch**
13:00-15:00	*Technikum D13* **Industry Forum Session 3: Production from Europe** About this session: Europe stands for high-quality, sustainable and technologically advanced production. This session is dedicated to Europe's role as a global industrial location and highlights how regional strengths, innovative ecosystems and strategic cooperation ensure competitiveness. Learn about successful examples where European values such as quality, responsibility and resilience meet modern production technologies. Discuss with experts which political, economic and technological course must be set for a strong European industry.

Wednesday, 14 May 2025

	Talk: Industrializing Intelligence: When smart gets real (Kristofer Bengtsson, Volvo Group) Talk: Software-defined CPS (Olov Schelén, Xarepo AB) Talk: Culture Change in Swedish Industry vs Digital Transformation (Erik Molin, CEO SEIIA) Talk: tbd (Erik Swan, Husqvarna Group) Chairs: Jerker Delsing
13:00-16:30	*Luettje Studi Huus* **Technical Tour: Meyer Werft Papenburg**
15:00-15:30	*Technikum D13* **Coffee Break**
15:30-17:00	*Seminar Room S203* **ICPS Theory and Technologies** Chairs: Alfred Ocaka **Robust Transmission for Time Sensitive Networking Considering Transmission Failure Uncertainty** *xin li, Shihui Duan, Qimin Xu, Cailian Chen, Xinping Guan* **A Hybrid Anomaly Detection Framework for OT Networks Using Leaky Bucket Algorithm and Principal Component Analysis** *Alfred Ocaka, Diarmuid O'Briain, Keara Barrett* **Autonomous Collision-free Scheduling in Low-Power Wireless Sensor Networks** *Andras Pinter, Leandro Indrusiak, Ian Gray* **Architecting Scalable ICPS for the Automotive Industry: Integrating NVIDIA AI Microservices with Eclipse Arrowhead** *Eduard Cristian Popovici, Octavian Fratu, Alexandru Vulpe, Cosmina Stalidi, George Suciu*
	Seminar Room S217 **Digital Transformation, Paradigms, Methods and Tools** **Virtually Commissioned Semantic Recipes based on OPC UA Skills** *Kay Köhle, Darko Anicic, Thomas Runkler, Kirill Dorofeev, Aparna Thuluva, Rene Graf* **AAS Meets OPC~UA: A Unified Approach to Digital Twins** *Nico Braunisch, Uwe Schmidt, Marko Ristin, Erik Proskurin, Tino Bischoff, Hans Wernher van de Venn, Martin Wollschlaeger* **Towards a Configurable Verification and Validation Framework for Critical Cyber-Physical Systems** *Ármin Zavada, Géza Kulcsár, Vince Molnár, Ákos Horváth* **Contributions in an Environment: Mixed Reality and Digital Twin with the Aim to Supply Constraints Found in Twinning** *Fabiano Stingelin Cardoso, Ronnier Frates Rohrich, André Schneider de Oliveira* **Design of a Digital Twin-based System for Bridges** *Tagline Treichel, Aaron Zielstorff, Mohammad Ghazanfar Ali Danish Mohammad Ghazanfar Ali Danish, Johannes Wimmer, Stefan Küttenbaum, Thomas Braml* **Synthetic Textual Data Generation: A Few-Shot Learning-Based Approach for DPPs with Novel Metrics** *A M ESFAR E ALAM, Amir Taherkordi*
	Seminar Room S213

Wednesday, 14 May 2025

Integrating Smart Workers in ICPS: Work Planning, Scheduling and Active Assistance

Chairs: Thies Pfeiffer

- **Towards Computational Quality Management for Automatically Generated Adaptive Work Instructions in Industry 5.0** *André Dirks, Jannik Franssen, Thies Pfeiffer*
- **Towards fair employee-job assignments in final assembly stations** *Endre Eros, Atieh Hanna, Nastasja Sosdean, Knut Åkesson*
- **Real-Time Operation Identification Using a Structure Evolving Fuzzy Finite State Machine** *Bibilewela Pathirathna, Mario Thron*
- **Adaptive Assembly Plan Generation in Industry 4.0** *Andre Antakli, Daniel Spieldenner*

19:00-22:00

Klub zum guten Endzweck

Gala Dinner

Thursday, 15 May 2025

08:30-09:45

Online Room

Virtual Session

Chairs: José Barbosa

- **Influence of Faulty Signatures in Batch Verification in VANET** *Sujash Naskar, Carlo Brunetta, Gerhard Hancke, Tingting Zhang, Mikael Gidlund*
- **SCA-DETR: An Efficient DETR Based on Spatial-Channel Attention** *Mingsen Li, Yong-Feng Zhang*
- **Autonomous Hydroponic Laboratory (AHL): Engineering a I4.0-compliant Component within a Digitalized Dairy Production Infrastructure** *Maria Laura Caliusco, Armando Walter Colombo, Maria Luciana Roldan, Agustín Mattei*
- **Lost in the Noise: Evaluating ASR Performance in Industrial and Environment Noise** *Sara M. Pearsell, Oliver Niebuhr*
- **Sparse Forward-Forward Algorithm: Efficient Machine Learning for Resource-Constrained Edge Devices in TinyML** *Marcus Rüb, Michael Rueb, Axel Sikora*

08:30-10:00

Seminar Room S217

ICPS Digital Transformation, Modeling, and Control

Chairs: Tongtong Wang

- **Study on the Performance of an Event-Based Cloud Multiple NMPC** *Alvin Surjana, Elmar Ahle, Dirk Söffker*
- **Design of a Data-Driven Cyber-Physical System Using a Performance Assessment Mechanism** *Zhifeng Li, Kei Hiraoka, TORU YAMAMOTO*
- **Adaptive and Continuous Maritime Vessel Trajectory Prediction Under Varying Environments with Uncertainty Awareness** *Tongtong Wang, Beatriz Sanguino, Guoyuan Li, Houxiang Zhang*
- **Power State Machines: Structuring Black-Box Models for Determining Energy Consumption** *Sören Stingl, Friederike Bruns, Fabian Kott, Andreas Rauh*

Technikum D13

Work In Progress

Chairs: Martina Vinetti

- **A Framework for Interoperability in Software Defined Vehicles using**

Thursday, 15 May 2025

	Asset Administration Shells *Akshay Kumar Venkatesha Narla, Daniel Dittler, Nasser Jazdi Motlagh, Michael Weyrich* **Multi-Cluster Orchestration Framework for Cloud Native Manufacturing** *Talib Sankal, Praveen Mohanram, Niels König, Robert H. Schmitt* **Digital Twin Architecture Patterns for Real-Time Control Systems** *Mainak Majumder, Bianca Wiesmayr, Alois Zoitl* **Work in progress: Decision support system for rescheduling blocked orders** *Christoffer Fink, Olov Schelén, Ulf Bodin* **Measuring the Robustness of Supervised ML Models to Label Noise in Industrial Data** *Marcel Dix, Gianluca Manca, Alexander Fay* **Manufacturing Cost Optimization through KPI Monitoring and Intelligent Digital Machine Twins** *Libia Romero Escobedo, Steffen Straßburger, Thomas Bär* **Towards Energy Optimization in Metal 3D Printing: An Assisted Simulation Approach for TruPrint 3000** *Libia Romero Escobedo, Steffen Straßburger, Thomas Bär* **Utilizing the Mixture-of-Agents Approach for Entity Resolution and Data Landscape Homogenization in Manufacturing Domains** *Maximilian Bega, Bernd Kuhlenkötter* **Identification of Minimally Restrictive Assembly Sequences using Supervisory Control Theory** *Martina Vinetti, Martin Fabian*
09:45-10:05	*Online Room* **Virtual Session WiP** Chairs: José Barbosa **An Orchestration Engine Approach for Building Digital Product Passports in the Dairy Value Chain** *Shubham Raut, María Luciana Roldan, Pablo Villarreal, Maria Laura Caliusco, Armando Walter Colombo* **Evaluating LLM Prompting Strategies for Industrial Functional Safety Risk Assessment** *Padma Iyenghar* **A Feasibility Study on Chain-of-Thought Prompting for LLM-Based OT Cybersecurity Risk Assessment** *Padma Iyenghar, Christopher Zimmer, Claudio Gregorio* **Benchmarking Commercial MILP Solvers: Insights on Parallelism for the N-Queens Problem** *Ali Abbasi, Rui Ribeiro, João L. Sobral, Nelson Ricardo Rodrigues*
10:00-10:30	*Technikum D13* **Coffee Break**
10:30-11:30	*Room T149* **Keynote: Cyber-Physical Systems Today and Tomorrow - Complexity and Evolutions, by Prof. Jerker Delsing** Speaker: Jerker Delsing, Lulea University of Technology, Sweden Abstract: Today's Cyber-Physical Systems are most often discussed in terms of small isolated interactions between our physical world and our digital world. This is now evolving towards System of Cyber Physical Systems - SoCPSs. We will see both cyber digital and physical interaction and feedback loops across our SoCPSs. It's easy to imagine that our SoCPS will rapidly grow to a very large

Thursday, 15 May 2025

	number of interactions between CPSs, just imagine an airport, a mine, or a smart city. Each of these examples will have a life cycle of many decades or even centuries. Comparing this to the life cycle of digital cyber parts (software and hardware) with a lifetime of 10 years for the hardware and maybe months for the software part indicates that evolution will be at hand, and with this, emergent behaviors. How can such complexity be handled by organizations and cyber machines? Information interoperability and understandability will become critical to proper evolution management. A related question is how cyber machines can evolve potentially autonomously to keep and evolve our SoCPSs performance without engineering and maintenance costs becoming the big bottleneck. Speaker Bio: Prof. Jerker Delsing received 1988 a PhD degree in Electrical Measurement from Lund University. In 1994, he was promoted to associate professor in Heat and Power Engineering. In 1995, he was appointed chair professor in Industrial Electronics, renamed to Cyber Physical Systems at Luleå University of Technology. His research profile is CPS/SoS engineering automation. Prof. Delsing has engaged in large EU projects, e.g., IMC-AESOP, Arrowhead (coordinator), Productive4.0 (WP lead), Arrowhead Tools (coordinator), AIMS5.0 (WP lead), Arrowhead fPVN (coordinator) Prof. Delsing is vice president and board member, INSIDE Industry Association, and board member, ProcessIT Innovations. Chairs: Armando Walter Colombo, Stamatis Karnouskos
11:30-12:00	*Technikum D13* **Closing Ceremony**
12:00-13:00	*Mensa/Canteen* **Lunch**