

2024 IEEE 7th International Conference on Industrial Cyber-Physical Systems

Monday, 13 May 2024

09:00-10:00	<p>Arch View Ballroom</p> <p>Plenary Talk: Artificial Intelligence of Things in Manufacturing Roland Essmann, Artificial Intelligence of Things in Manufacturing</p>
10:00-10:30	<p>Arch View Ballroom</p> <p>Break</p>
10:30-12:10	<p>Broadway II</p> <p>Artificial Intelligence for ICPS From Unstructured Product Descriptions to Structured Data for Industry 4.0 with ChatGPT <i>Christof Tinnes, Uwe Hohenstein, Hans Wernher van de Venn, Marko Ristin, Kiavash Fathi</i> Conjugacy Search Problem Homomorphic Encryption Based Vertically Federated Graph Neural Network <i>Bo Mi, Zeng Ran</i> Prediction of irrigation water requirement based on parallel CNN-LSTM model and Mann-Kendall test <i>Hao Wen, Haochen Ma, Yu Du, Jinchao Zhang, Li He</i> Fed-SMAE: Federated-Learning Based Time Series Anomaly Detection with Shared Memory Augmented Autoencoder <i>Jie Huang, Danya Xu, Tao Yang</i> Data-Driven Prediction of Plunge Milling Force Using Stochastic Differential Equations <i>Feng Hua, Yasen WANG, Ziheng ZHOU, Zhanpeng YANG, Zhihui WANG, Cheng Cheng</i></p> <p>Grand Suite 2</p> <p>Autonomy and Intelligence for ICPS Advanced Observer Design for Sensorless Control in Industrial Physical Systems <i>Haoxun Shen, Runze Guo, Dongda Liu, Suneel Kommuri</i> Output Tracking Control of Nonlinear Systems With Statistical Learning-based Extremum Seeking <i>Jiliang Song, Dawei Shi, Junzheng Wang</i> Safe Reinforcement Learning for Connected and Automated Vehicle Platooning <i>Kai Jiang, Yun Lu, Rong Su</i> Exploring the linkage between partition-based distributed extended Kalman filter and distributed full-information estimation <i>Xiaojie Li, Xunyuan Yin</i> A Data-Driven Two-Stage Dynamometer Diagram Inference Approach for Variable Operational Conditions in Pumping Machines <i>Jiusi Zhang, Hao Luo, Jilun Tian, Xinyu Qiao, Xiaoyi Xu, Yuchen Jiang, Shen Yin, Okayay Kaynak</i></p> <p>Broadway I</p> <p>Energy and Power Electronics for ICPS Frequency optimization aiming at lightweight Design of Electro-aerodynamic Propulsion HVPS <i>ffAE</i> Measurement Method of Capacitive Current in Distribution Network Under Parallel Operation of Double Arc-suppression Coils <i>chen liu</i> Enhanced Unscented Kalman Filter for Accurate State of Charge Estimation in Aerial Drone Lithium-Ion Batteries <i>Islam Md Monirul, Li Qiu, Ali Ahmad</i></p>

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	<p>SOC Estimation of Lithium-ion Battery Based on Dual Time Scale SVD-UKF Algorithm <i>Zhenhan Ye, Zehua Ye, Dan Zhang, Qiyun Ge</i></p> <p>Speed control of a permanent magnet synchronous motor utilizing fractional-order principles <i>Mingzhuo Zhou, Keyong Shao</i></p> <p>Grand Suite 1</p> <p>Special Session: Performance Assurance of Industrial Wireless Systems</p> <p>Chairs: Richard Candell, Kang Lee</p> <p>On the Impact of TIG Welding Interference on Industrial Wi-Fi Networks: Modeling of Empirical Data and Analytical Studying of Coexistence <i>Mohamed Kashef, Jing Geng, Karl Montgomery, Richard Candell</i></p> <p>Mixing Neural Networks and Exponential Moving Averages for Predicting Wireless Links Behavior <i>Gabriele Formis, Stefano Scanzio, Lukasz Wisniewski, Gianluca Cena</i></p> <p>Wireless Safe Data Transmission Protocol Links for Railway Applications <i>Pablo Sanz, Jon Montalban, Aitor Arriola, Pablo Angueira</i></p> <p>An Analytical Evaluation for Software-based TSN in Industrial Wi-Fi Networks <i>Mohamed Kashef, Karl Montgomery, Richard Candell</i></p> <p>Scheduling with Probabilistic Per-Packet Real-Time Guarantee for Industrial URLLC <i>zhibo meng, Hongwei Zhang, James Gross</i></p>
12:10-13:30	<p>Arch View Ballroom</p> <p>Lunch</p>
13:30-14:30	<p>Arch View Ballroom</p> <p>Industry Forum (I)</p> <p>Chad Lloyd, Protecting Critical Assets in Aging Infrastructure with Modern Solutions</p> <p>Marten Lohstroh, Software Design Automation for Industrial Cyber-Physical Systems</p>
14:30-15:00	<p>Arch View Ballroom</p> <p>Break</p>
15:00-16:40	<p>Grand Suite 2</p> <p>Design and Manufacturing</p> <p>Chairs: Philipp Rosenthal</p> <p>Automated Derivation of Application Workload Models for Design Space Exploration of Industrial Distributed Cyber-Physical Systems <i>Faezeh Sadat Saadatmand, Todor Stefanov, Ignacio Gonzalez-Alonso, Andy Pimentel, Benny Akesson, Marius Herget, Martin Christiaan Bor</i></p> <p>Plan-Based Derivation of General Functional Structures in Product Design <i>Philipp Rosenthal, Niels Demke, Frank Mantwill, Oliver Niggemann</i></p> <p>Predictive Model for Machining Time in CNC Lathe Process <i>Hsing-Wu Chen, Kuo-Chang Wu, Wei-chen Lee</i></p> <p>Design of an ISO 23247 Compliant Digital Twin for an Automotive Assembly Line <i>Victória Melo, Jose Barbosa, Gonçalo Mota, Fernando De la Prieta, Paulo Leitao</i></p> <p>Demonstrating Containerization of Model Predictive Control for</p>

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	Modular Plants <i>Lucas Vogt, Zohra Charania, Jonathan Mädler, Julius Lorenz, Helaleh Badrnoebashar, Amy Koch, Leon Urbas</i>
	Broadway I Multi-Robot and Human-Robot Autonomy Chairs: Xuan Wang Visual Autonomous Quadrotor Navigation Using an Improved Artificial Potential Field <i>Jose Daniel, Shaoshuai Mou</i> Vision-based Navigation for the Affine Formation Control of a Multi-Robot Team <i>Zike Wang, Ya-Jun Pan</i> Multi-Robot Formation Control with Human-on-the-Loop <i>Tianyu Zhou, Zehui Lu, Shaoshuai Mou</i> Human Uncertainty-Aware MPC for Enhanced Human-Robot Collaborative Manipulation <i>Al Jaber Mahmud, Duc M. Nguyen, Filipe Veiga, Xuesu Xiao, Xuan Wang</i> Digital Twins in Human-Robot Collaboration: Systematic Analysis of Literature and Challenges <i>Piatan Palar, Luis Piardi, André Oliveira, Paulo Leitao</i>
	Grand Suite 1 Special Session: Fault Diagnosis and Attack Defense for ICPS Chairs: Youming Zhang Zero Dynamics Attacks on Unknown Bilinear Systems: Case Study <i>M. Aminul Haq, W. Steven Gray</i> Detection of Ladder Logic Bombs in PLC Control Programs: an Architecture based on Formal Verification <i>Antonio Iacobelli, Lorenzo Rinieri, Andrea Melis, Amir Al Sadi, Marco Prandini, Franco Callegati</i> FDI Attack Detection Based on L2 Gain Performance Adaptive Integral Sliding Mode Observer <i>JIN LI, Youmin Zhang</i> Securing Cyber-Physical Systems with Two-level Anomaly Detection Strategy <i>Zeeshan Ahmad, Andrei Petrovski</i> Real-time PV Fault Detection using Embedded Machine Learning <i>Deep Pujara, David Ramirez, Andreas Spanias, Cihan Tepedelenlioglu, Devarajan Srinivasan</i>
15:00-18:00	Arch View Ballroom Workshop

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09:00-10:00	Arch View Ballroom Plenary Talk: Recent Advances of Industrial AI Augmented CPS for Highly Connected and Complex Industrial Systems Jay Lee, Recent Advances of Industrial AI Augmented CPS for Highly Connected and Complex Industrial Systems
10:00-10:30	Arch View Ballroom Break
10:30-12:10	Broadway II

Tuesday, 14 May 2024

Modeling

Sparse Measurement Algorithm Execution Time Prediction on Heterogeneous Edge Devices for Early Stage Software-Hardware

Matching *Bernhard Rupprecht, Birgit Vogel-Heuser, Jannik Möhrle, Dominik Hujo, Yizhi Wang*

Complexity Analysis of Industrial Scale Cyber Physical Systems *Ibtihaj Ahmad, Zain Ul Islam, SALEEM RIAZ*

Cyber Physical System for Data-Driven Modeling of Fused Filament Fabrication (FFF) Extrusion Process *Osama Habbal, Maximilian Ullrich, Dawood Al Nabhani, Pravansu Mohanty, Zhen Hu, Abdallah Chehade, Christopher Pannier*

Maximizing Secrecy Rate in Dual USVs System for Secure Underwater Wireless Communication with Unknown Eavesdropper *Heng Zhang, Lei Wu, Zhikai Zhang, Yubin Zhi, Hongran Li, Jian Zhang*

Task Scheduling Strategy Based on Resource Constraint in Edge Computing System *Ren Qing, Huanle Rao, Gangyong Jia, Youqing Xu, Wang Wei, GuoJie Xie*

Grand Suite 2

Intrusion Detection and Resilient Control

Chairs: Wassila Lalouani

STRIDE-based Methodologies for Threat Modeling of Industrial Control Systems *Thomas Rosenstatter, Olaf Saßnick, Christian Schäfer, Stefan Huber*

Integrated Safety and Security by Design in the IT/OT Convergence of Industrial Cyber-Physical Systems *Amirali Amiri, Gernot Steindl, Siegfried Hollerer*

Edge Multi-agent Intrusion Detection System Architecture for IoT Devices with Cloud Continuum *Gustavo Funchal, Tiago Pedrosa, Fernando De la Prieta, Paulo Leitao*

Explainable Intrusion Detection in Industrial Control Systems *Reham Eltom, wassila Lalouani*

Disruption of Commercial Solar Inverter System by TLS Proxy Man-in-the-Middle Attack *BoHyun Ahn, Alycia Jenkins, Joaquin Mass, Lauren Silva, Taesic Kim, Seungdeog Choi*

Broadway I

Autonomous Intelligent Systems

Fast NMPC Design for Image-Based Visual Servoing of Autonomous Underwater Vehicles *Hang Gu, Chao Shen*

Spacecraft Formation Orbit-Injection Trajectory Optimization for the Space Gravitational Wave Detection Mission *Hao Liang, Youpeng Xing, Zeyang Yin, Yuxin Liao*

Cooperative adaptive optimal output regulation of multi-agent systems with an application to connected and autonomous vehicles *Yuchen Dong, Weinan Gao*

Cooperative Path Following Control of Unmanned Surface Vehicles Using Model Predictive Control *Syed Hamza Ahmed, Minzhong Zhao, Huiping Li*

Consensus control of MASs with distributed dynamic event-triggered intermittent communication strategy *Meilin Li, Tieshan Li*

Grand Suite 1

Advances in Cyber-Physical Manufacturing

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	<p>Chairs: Christopher Pannier</p> <p>Prediction of Carbonation Capacity of SCMs Using Ensemble Learning Method Kangyi Cai, Jian Liu, Edward Mwanza, Mahelet G. Fikru, Hongyan Ma, Donald C. Wunsch II</p> <p>Accurate Prediction of CNC Machining Time for Milling Operations Using Neural Networks Xiao-Xing Chen, Wei-chen Lee</p> <p>Coatings Intelligence: Data-driven Automation for Chemistry 4.0 Sayed Hoseini, Gaoyuan Zhang, Dominik Polke, Alvin Surjana, Lasse Wagner, Christian Schmitz, Christoph Quix</p> <p>Advancing Machine-to-Machine Calibration for a Network of 3D Printers in Industrial Cyber- Physical Systems Dawood Al Nabhani, Osama Habbal, Maximilian Ullrich, Kennedy Williams, Pravansu Mohanty, Christopher Pannier</p> <p>Change Categories Based on Mutable Artifacts in PLC Control Software Projects Yizhi Wang, Birgit Vogel-Heuser, Eva-Maria Neumann, Michael Gnadlinger, Ziming Wen, Jan Wilch, Bernhard Rupprecht</p>
12:10-13:30	<p>Arch View Ballroom</p> <p>Lunch</p>
13:30-15:00	<p>Arch View Ballroom</p> <p>Industry Forum (II)</p> <p>Kevin Wise, Future Directions in Aerospace: Sustainability, Autonomy, and Learning For Control</p> <p>Christopher Vo, Unmanned Logistics at Sea: Challenges and Opportunities</p> <p>Di Wu, Navigating the Complexities of Cyber-Physical Energy Storage for Grid Deployment</p>
15:00-15:30	<p>Arch View Ballroom</p> <p>Break</p>
15:30-17:10	<p>Grand Suite 2</p> <p>Artificial Intelligence for Monitoring of Industrial Systems</p> <p>Chairs: Kang Lee</p> <p>Stable Soft Sensor Modeling for Industrial Systems Liang Cao, Yankai Cao, Bhushan Gopaluni</p> <p>Uncertainty Quantification of a Cyber-Physical System for Monitoring Aircraft Performance Lance Bays</p> <p>Positioning Cyber-Physical Systems and Digital Twins in Industry 4.0 Flávia Pires, Victória Melo, Jonas Queiroz, Antonio Paulo Moreira, Fernando De la Prieta, Elisabet Estevez, Paulo Leitao</p> <p>Hardware-In-The-Loop (HIL) Simulation-based Interoperability Testing Method of Smart Sensors in Smart Grids Eugene Song, Kang Lee</p> <p>Co-operative game for certification and continued conformance check of AI enabled CPS Ayan Banerjee, Aranyak Maity, Imane Lamrani, Sandeep Gupta</p>
	<p>Arch View Ballroom</p> <p>Special Session: Advances in Decision, Control, and Testing for Autonomous Intelligent Systems</p> <p>Chairs: Bosen Lian</p> <p>A Study of a Data-Driven Cyber-Physical Control System Using an</p>

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	<p>Assessment Mechanism <i>Zhifeng Li, Kei Hiraoka, TORU YAMAMOTO</i></p> <p>Two-Player Multiagent Graphical Games with Reinforcement Learning <i>Bosen Lian, Jilacheng Wu</i></p> <p>Deep reinforcement learning-based model predictive control of uncertain linear systems <i>Pengcheng Hu, Xinyuan Cao, Kunwu Zhang, Yang Shi</i></p> <p>Improved Line-of-Sight Path Following Control for Underactuated USVs with Unknown Parameters Using Q-learning <i>Danjie Zhu, Ya-Jun Pan, Tianye Wang, Shiwei Liu, Wenwen Pei</i></p> <p>Robust Data-driven Model Predictive Control via On-policy Reinforcement Learning for Robot Manipulators <i>Tianxiang Lu, Kunwu Zhang, Yang Shi</i></p>
	<p>Grand Suite 1</p> <p>Fault Detection and Monitoring for Energy and Power</p> <p>Chairs: Tapadhir Das</p> <p>Temporal Graph Convolutional Autoencoder based Fault Detection for Renewable Energy Applications <i>Murshedul Arifeen, Andrei Petrovski</i></p> <p>Non-Intrusive Load Monitoring-based Fuzzy Actor-Critic Reinforcement Learning for Smart Home Energy Management <i>Sima Hamedifar, Shichao Liu, George Xiao</i></p> <p>Context Aware Model Learning in Cyber Physical Systems <i>Aranyak Maity, Ayan Banerjee, Sandeep Gupta</i></p> <p>Telling Apart: ML Framework Towards Cyber Attack and Fault Differentiation in Microgrids <i>Tapadhir Das, Suman Rath, Shamik Sengupta</i></p> <p>Leveraging Structures in Fault Diagnosis for Lithium-Ion Battery Packs <i>Amir Farakhor, Di Wu, Yebin Wang, Huazhen Fang</i></p>
18:30-21:30	<p>Arch View Ballroom</p> <p>Banquet</p>

Wednesday, 15 May 2024

09:00-10:00	<p>Arch View Ballroom</p> <p>Plenary Talk</p> <p>TBD</p>
10:00-10:30	<p>Arch View Ballroom</p> <p>Break</p>
10:30-12:10	<p>Broadway II</p> <p>Advances in ICPS Architecture and Digitization</p> <p>Chairs: Martin Bär</p> <p>In-Situ Model Validation for Continuous Processes Using In-Network Computing <i>Ike Kunze, Dominik Scheurenberg, Liam Tirpitz, Sandra Geisler, Klaus Wehrle</i></p> <p>Generation of Digital Twins for Exchanging Information via Application Programming Interfaces <i>Nico Braunisch, Marko Ristin, Uwe Schmidt, Robert Lehmann, Martin Wollschlaeger, Hans Wernher van de Venn</i></p> <p>Digitalization of the Components of a Mini Factory with the Implementation of RAMI 4.0 Asset Administration Shell <i>Jyotsna Singh, Lakshay Mundeja, Armando Walter Colombo, Bilal Ahmad</i></p>

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A Novel Industry 4.0-compliant digitalization procedure for Reactive and Re-configurable ICPS within the context of Industrial Organisations *Martin Alejandro Bär, Armando Walter Colombo*
Development of a test automation framework based on a comparison of different approaches for test automation in the embedded systems area *Stefan Wilker, Stefan Arthofer, Thilo Sauter*

Grand Suite 2

Artificial Intelligence for ICPS

Chairs: Jian Liu

A Continual and Incremental Learning Approach for TinyML On-device Training Using Dataset Distillation and Model Size Adaption *Marcus Rüb, Philipp Tüchel, Axel Sikora, Daniel Mueller-Gritschneider*
Enhancing Cyber-Physical System Analysis with Structure-Aware Modular Neural Networks *Daniel Vranjes, Oliver Niggemann*
Multi-Modal Learning with Joint Image-Text Embeddings and Decoder Networks *Ajai Chemmananm, Bijoy Jose, Asif Moopan*
Survey of Hidden Markov Models (HMMs) for Sign Language Recognition (SLR) *Iwan Sandjaja, Ahmad Alsharova, Donald Wunsch II, Jian Liu*
Quantum-Inspired Machine Learning Framework using a Physics-based Ising Solver Chip *Ameya Khot, Taesic Kim, Alve Akash, Chris Kim, William Moy*

Broadway I

ICPS Emerging Applications

Chairs: Madjid Fathi-Torbaghan

Comparing Knowledge Source Integration Methods for Optimizing Healthcare Knowledge Fusion in Rescue Operation *Mubaris Nadeem, Madjid Fathi-Torbaghan*
Hardware Analysis for Low Cost Portable ECG Monitoring and Analysis System *Neena Goveas, Shashank Rana, Aditya Handur-Kulkarni, Shubhangi Gawali*
Analysing MLOps and its Applicability in the Maritime Domain through a Systematic Mapping Study *Andrei Raoul Morariu, Tanwir Ahmad, Bogdan Iancu, Jussi Poikonen, Jerker Björkqvist*
Quantization Effects of Deep Neural Networks on a FPGA platform *Daniel Pohl, Birgit Vogel-Heuser, Marius Krüger, Markus Echtler*
Designing Architecture in a Bridge Engineering Simulation *Nathan Hartzler, Mohammed Belkhouche*

Grand Suite 1

Optimal Control Design/Implementation for ICPS

Chairs: Jiajun Shen

Application of Event-based Cloud NMPC with Time Delay Compensation *Alvin Surjana, Elmar Ahle, Dirk Söffker*
Inverse Optimal Control with System Output *Zihao Liang, Shaoshuai Mou*
Development of an Open, Modular Controller for Training in Emergent Automation Technologies *João Potier, Miguel Arvana, Leandro Filipe, Fabio M-Oliveira, Andre Rocha, Jose Barata*
Model-free Resilient Controller Design based on Incentive Feedback Stackelberg Game and Q-learning *Jiajun Shen, Huazhen Fang, Morteza Hashemi, Fengjun Li*

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	A modified Bayesian approach for model calibration with interval random observed data <i>Wei Zhang</i>
12:10-13:30	Arch View Ballroom Lunch
13:30-15:00	Arch View Ballroom Industry Forum (III) Dave Cavalcanti, Time-Sensitive Computing and Communications: Requirements, Industry Standards and Challenges Angela Nicoara, IoT and Edge Computing Revolution: Challenges, Technologies and Future Trends David Wollman, Cyber-Physical Systems and Industrial Internet of Things Program Initiatives at NIST
15:00-15:30	Arch View Ballroom Break
15:30-17:10	Grand Suite 2 Advances in Autonomous Driving Chairs: Nikos Piperigkos HybridTE2: Hybrid Transformer-based End-to-End Learning for Autonomous Driving <i>HARITHA PRASAD RAYAKOTA, Pei-Chi Huang</i> Cooperative Plug-and-Play-KalmanNet for 4D situational awareness in autonomous driving <i>NIKOS PIPERIGKOS, Alexandros Gkillas, Christos Anagnostopoulos, Aris Lalos</i> A Real-time Explainable-by-design Super-Resolution Model for LiDAR SLAM <i>Alexandros Gkillas, Christos Anagnostopoulos, NIKOS PIPERIGKOS, Aris Lalos</i> An Inferential Control Approach for Autonomous Vehicle Motion Planning with Neural Network Dynamics <i>Iman Askari, Jiajun Shen, Huazhen Fang</i>
	Arch View Ballroom ICPS Ecosystems and Impacts Chairs: Didem Gurdur Broo Teaching programmable logic controllers: a hands-on and skill-building approach <i>Jesper Puggaard de Oliveira Hansen, Svend Hansson, Matthias Koenig</i> Grammar-Based Inductive Learning (GBIL) for Sign-Spotting in Continuous Sign Language Videos <i>Venkata Naga Sai Apurupa Amperayani</i> Cultivating Ecocentric Machines: Changing the Direction of the Anthropocentric Lineage in Intelligent Machines <i>Didem Gurdur Broo, Joshua Gellers, Henrik Skaug Sætra</i> Capability Skill Service Model as enabler for Intralogistics 4.0: A Review <i>Benjamin Blumhofer, Marco Simon, Alexandra Ritter, Laura-Marie Weil, Tatjana Legler, Martin Ruskowski</i> Digitalization of Industrial Inspection Assets through the Asset Administration Shell <i>Iury Michel Treuk, Alexandre Oliveira Júnior, Rui Lopes, Gonçalo Mota, Joaquim Mira Junior, Paulo Leitao</i>
	Grand Suite 1

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Artificial Intelligence-Driven Energy and Power Systems

Chairs: Hicham Chaoui

Deep Reinforcement Learning Based MPPT Control for Grid

Connected PV Systems *Kunal Vora, Shichao Liu, Himavarsha Dhulipati*

Artificial Neural Network Based Virtual Sensor for Distributed

Controlled DC Microgrids *Devakumar Annavaram, Sukumar Mishra*

Physics-Informed Neural Network for Inertia Estimation of Power

System with Inverter-Based Distributed Generation *Osarodion E.*

Egbomwan, Shichao Liu, Hicham Chaoui

Machine Learning-Driven Remaining Energy Prediction for Lithium-Ion

Batteries *Hao Tu, Huazhen Fang*

Online HVAC Optimization under Comfort Constraints via

Reinforcement Learning *Christian Stippel, Rafael Sterzinger, David Sengl,*

Aleksey Bratukhin, Markus Kobelrausch, Stefan Wilker, Thilo Sauter