## **2024 ACM/IEEE 15th**

# International Conference on Cyber-Physical Systems

(ICCPS)

## **ICCPS 2024**

#### **Table of Contents**

Message from the ICCPS 2024 Program Chairs x ICCPS 2024 Organizers xii
Session 1: Learning-Enabled CPS
Repairing Learning-Enabled Controllers While Preserving What Works 1 Pengyuan Lu (University of Pennsylvania, USA), Matthew Cleaveland (University of Pennsylvania, USA), Oleg Sokolsky (University of Pennsylvania, USA), Insup Lee (University of Pennsylvania, USA), and Ivan Ruchkin (University of Florida, USA)
Zero-One Attack: Degrading Closed-Loop Neural Network Control Systems using State-Time Perturbations 12
Stanley Bak (Stony Brook University, USA), Sergiy Bogomolov (Newcastle University, USA), Abdelrahman Hekal (Newcastle University, USA), Veena Krish (Stony Brook University, USA), Andrew Mata (Stony Brook University, USA), and Amir Rahmati (Stony Brook University, USA)
Attention-Based Real-Time Defenses for Physical Adversarial Attacks in Vision Applications
Session 2: CPS Security
Thinking Beyond Bus-off: Targeted Control Falsification in CAN  Ipsita Koley (Indian Institute of Technology Kharagpur, India), Sunandan Adhikary (Indian Institute of Technology Kharagpur, India), and Soumyajit Dey (Indian Institute of Technology Kharagpur, India)
Rampo: A CEGAR-Based Integration of Binary Code Analysis and System Falsification for Cyber-Kinetic Vulnerability Detection

Electricity Markets
Vineet Jagadeesan Nair (Massachusetts Institute of Technology, USA),
Priyank Srivastava (Indian Institute of Technology Delhi, India), and
Anuradha Annaswamy (Massachusetts Institute of Technology, USA)
Session 3: Reinforcement Learning for CPS
Optimal Runtime Assurance via Reinforcement Learning
Vulnerability Analysis for Safe Reinforcement Learning in Cyber-Physical Systems
FAIRO: Fairness-Aware Sequential Decision Making for Human-in-the-Loop CPS
Session 4: Middleware & Software for CPS
Session 4: Middleware & Software for CPS  Quantitative Safety-Driven Co-Synthesis of Cyber-Physical System Implementations
Quantitative Safety-Driven Co-Synthesis of Cyber-Physical System Implementations
Quantitative Safety-Driven Co-Synthesis of Cyber-Physical System Implementations
Quantitative Safety-Driven Co-Synthesis of Cyber-Physical System Implementations
Quantitative Safety-Driven Co-Synthesis of Cyber-Physical System Implementations

### **Session 5: Autonomous Vehicles & Transportation**

Sensor Data Transplantation for Redundant Hardware Switchover in Micro Autonomous Vehicles 13 Cailani Lemieux-Mack (Vanderbilt University), Kevin Leach (Vanderbilt University), and Kevin Angstadt (St. Lawrence University)	5
A Middle Way to Traffic Enlightenment	7
An Online Approach to Solving Public Transit Stationing and Dispatch Problem	7
Session 6: Verification & Control for CPS	
Robust Conformal Prediction for STL Runtime Verification Under Distribution Shift	9
An Online Planning Framework for Multi-Robot Systems with LTL Specification	0
Control over Low-Power Wide-Area Networks	2
Session 7: Human-Centric and Medical CPS	
FinA: Fairness of Adverse Effects in Decision-Making of Human-Cyber-Physical-System	2
Curating Naturally Adversarial Datasets for Learning-Enabled Medical Cyber-Physical Systems	2
Sydney Pugh (University of Pennsylvania, Philadelphia), Ivan Ruchkin (University of Florida, Gainesville), James Weimer (Vanderbilt University, Nashville), and Insup Lee (University of Pennsylvania, Philadelphia)	_
ε-Neural Thompson Sampling of Deep Brain Stimulation for Parkinson Disease Treatment	4

## **Session 8: Industrial Applications**

Towards Deterministic End-to-end Latency for Medical AI Systems in NVIDIA Holoscan	. 235
Control Corruption Without Firmware Infection: Stealthy Supply Chain Attacks via PLC	
Hardware Implants (MalTag)  Mingbo Zhang (Rutgers University) and Saman Zonouz (Georgia Tech)	. 247
Unsafe Events Detection in Smart Water Meter Infrastructure via Noise-Resilient Learning	. 259
Poster/Demo Session	
Demo Abstract: Playground, A Safe Building Operating System Xiaohan Fu (University of California San Diego, USA), Yihao Liu (Nanyang Technology University, Singapore), Jason Koh (Mapped, USA), Dezhi Hong (Amazon, USA), Rajesh Gupta (University of California San Diego, USA), and Gabe Fierro (Colorado School of Mines, USA)	. 271
Iterative Model Checking for Safety-Critical Problems in Cyber-Physical Systems	. 273
Poster Abstract of Digital-twin-based Decision Support During Personalized Robotic	
Rehabilitation  Yilun Chen (ShanghaiTech University, China), Zhuo Jian (ZD Medtech, China), Yixi Wang (ZD Medtech, China), and Zhihao Jiang (ShanghaiTech University, China)	. 275
Multi-Agent System for Optimizing Victim Tagging in Human/Autonomous Responder Teams  Maria Cardei (University of Virginia, USA) and Afsaneh Doryab  (University of Virginia, USA)	. 277
Achieving Real-Time Visual Tracking with Low-Cost Edge AI  Van Minh Do (Nanyang Technological University, Singapore), Meiqing Wu (Nanyang Technological University, Singapore), Siew-Kei Lam (Nanyang Technological University, Singapore), and Thambipillai Srikanthan (Nanyang Technological University, Singapore)	. 279
Poster Abstract: Landing-Type Aware Multi-Drone Route Generation for Last-Mile Delivery Service	. 281
JiHyun Kwon (DGIST, South Korea), BaekGyu Kim (DGIST, South Korea), Yi-Ying Chen (National Taiwan University, Taiwan), and Chung-Wei Lin (National Taiwan University, Taiwan)	

Poster Abstract: Signal Temporal Logic Compliant Motion Planning using Reinforcement	83
Learning	03
Adaptive Protection of Power Grids Against Stealthy Load Alterations	85
Poster Abstract: Assuring LLM-Enabled Cyber-Physical Systems	87
Poster Abstract: Neural Architecture Sizing for Autonomous Systems	89
Author Index	91