CyPress: 4th Workshop on Software Techniques for Cyber-Physical Systems

CASCON 2024

Toronto ON. Canada

Kostas Kontogiannis, York University, Canada

kkontog@yorku.ca

Daniel Amyot, University of Ottawa, Canada

damyot@uottawa.ca

John Mylopoulos, University of Ottawa, Canada

jm@cs.toronto.edu

Abstract

Cyber-Physical Systems (CPSs) refer to systems comprising of software components, physical components and social entities which monitor, control, and coordinate processes within a physical environment. CPSs apply to a wide range of mission-critical applications that span from the intelligent management of logistics in complex supply chains, advanced manufacturing systems and smart contracts, all the way to autonomous systems, and systems that support the smart interactions between humans and machines (M2H), or between machines (M2M). In this respect, the engineering of CPSs goes beyond existing Software Engineering concepts, tools and techniques because of the very nature of CPSs that spans three realms (cyber, physical, social) and therefore need to address requirements that span these realms.

The workshop aims to bring together leading researchers, as well as experts from software and hardware companies and technology receptors to discuss and debate the latest developments in engineering Cyber-Physical Systems.

Workshop Theme

The workshop areas lie within the intersection of Software Engineering (SE), Systems Management, AI, and Control Theory, building upon emerging international Research and Development efforts intended to produce models, development tools and runtime platforms for CPSs. The workshop theme focuses on the recent developments and open research challenges in six main thematic areas namely specification and modeling, DevOps processes and models, data management and analytics, infrastructure and event handling, run-time adaptivity, and finally security, trust, and traceability. Use cases to be discussed include, but not limited to, model-driven techniques, collaborative agents in M2M and M2H interactions, intelligent web tasking, smart contracts, preventive maintenance, as well as security, and regulatory compliance.

The workshop will touch upon key infrastructure technologies related to distributed data-base technologies, cloud systems, digital-twins, frameworks for adaptive systems, component security and compliance, as well as the use of AI and smart contracts in engineering intelligent systems. These technologies cover a wide spectrum of the state-of-the-art in designing and deploying systems that

exhibit intelligent behavior and interact with both the Physical and Cyber worlds. In this respect, we believe that the workshop will provide the springboard for interesting discussions and fostering new research ideas to researchers who work on service computing, distributed systems, adaptive systems, data management systems, and on the applications of AI for monitoring and securing large scale systems.

Secured speakers so far include: Arno Jacobsen (UofT), Tet Yeap (U. Ottawa), Iluju Kiringa (U. Ottawa), Mohammad Zuklernine (Queen's U.), Miriam Capretz (Western U.).

Workshop Structure

The workshop will be structured first, around research presentations (20 mins) followed by a discussions and second, around a panel (30 mins) structured around the latest developments in infrastructure technologies to engineer CPSs. The workshop is intended to be a half day workshop.