


# CPS-IoT Week 2019



**April 15 - 18**  
**Montreal, Canada**



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# Organizers

## Organizing Committee

<b>General Co-Chairs</b>	<b>Rasit Eskicioglu</b> , University of Manitoba, Canada <b>Xue (Steve) Liu</b> , McGill University, Canada
<b>Local Arrangement Co-Chairs</b>	<b>Yuhong Yan</b> , Concordia University, Canada <b>Xi (Alex) Chen</b> , Samsung, Canada
<b>Local Coordinators</b>	<b>Lijun Sun</b> , McGill University, Canada <b>Jun Yan</b> , Concordia University, Canada
<b>Workshop Chairs</b>	<b>Rong Zheng</b> , McMaster University, Canada <b>Qi Zhu</b> , Northwestern University, USA
<b>Publications Chairs</b>	<b>Gowri Sankar Ramachandran</b> , University of Southern California, USA <b>Jorge Ortiz</b> , Rutgers University, USA
<b>Web &amp; Social Media Chair</b>	<b>Yu Jiang</b> , Tsinghua University, China
<b>Industrial Liaison and Sponsorship Chairs</b>	<b>Xue Yang</b> , Intel, USA <b>Wenbo He</b> , McMaster University, Canada
<b>Publicity Chairs</b>	<b>Shijia Pan</b> , Carnegie Mellon University, USA <b>Vijay S. Rao</b> , Delft University of Technology, Holland
<b>Student Travel Award Chairs</b>	<b>Omprakash Gnawali</b> , University of Houston, USA <b>Tamim Sookoor</b> , Johns Hopkins University, USA
<b>Finance Chair</b>	<b>Wei Dong</b> , Zhejiang University, China

## Conference Organizers

<b>HSCC TPC Chairs</b>	<b>Pavithra Prabhakar</b> , Kansas State University, USA <b>Necmiye Ozay</b> , University of Michigan, USA
<b>ICCPS General Chairs</b>	<b>Xue Liu</b> , McGill University, Canada <b>Paulo Tabuada</b> , University of California at Los Angeles, USA
<b>ICCPS TPC Chairs</b>	<b>Miroslav Pajic</b> , Duke University, USA <b>Linda Bushnell</b> , University of Washington, USA
<b>IoTDI General Chairs</b>	<b>Klara Nahrstedt</b> , University of Illinois, USA <b>Olaf Landsiedel</b> , Kiel University, Germany & Chalmers University, Sweden
<b>IoTDI TPC Chairs</b>	<b>Gian Pietro Picco</b> , University of Trento, Italy <b>Prashant Shenoy</b> , University of Massachusetts, Amherst, USA
<b>IPSN General Chair</b>	<b>Rasit Eskicioglu</b> , University of Manitoba, Canada
<b>IPSN TPC Chairs</b>	<b>Luca Mottola</b> , Politecnico di Milano, Italy & RI.Se SICS, Sweden <b>Bodhi Priyantha</b> , Microsoft, USA
<b>RTAS General Chair</b>	<b>Rodolfo Pellizzoni</b> , University of Waterloo, Canada
<b>RTAS TPC Chair</b>	<b>Björn Brandenburg</b> , Max Plank Institute, Germany

## Steering Committee

<b>Chair</b>	<b>Jie Liu</b> , Harbin Institute of Technology, China
<b>Committee Members</b>	<b>James Anderson</b> , University of North Carolina at Chapel Hill, USA <b>Paulo Tabuada</b> , University of California at Los Angeles, USA <b>Insup Lee</b> , University of Pennsylvania, USA <b>George Pappas</b> , University of Pennsylvania, USA <b>Raj Rajkumar</b> , Carnegie Mellon University, USA <b>Jack Stankovic</b> , University of Virginia, USA

# Keynote Talks

Tuesday, April 16

## The Brain Fueling the Fourth Industrial Revolution

9:00 am-10:00 am | Room 221-Place du Canada



### Victor Bahl, Microsoft

There's a shift in the technology and business landscape that is gaining momentum. It is dramatically altering how data is created, ingested, processed and acted upon. Industries, ranging from manufacturing to space-exploration, healthcare to transportation, retail to telecommunications are infusing information technologies into their day-to-day processes and tasks. They are developing real-time control systems that use

sensors and actuators along with machine learning and artificial intelligence to create new functions, improve efficiency and reduce cost. At the center of this new world is edge computing.

I will explore this exciting new computing paradigm from the perspective of a researcher who has been working on this for over ten years. I will discuss the evolution of the intelligent edge, describe a few real-world applications, technologies and products that customers are willing to pay for. I will share with you the progress we have made and more importantly the lessons we have learned as we developed an edge-based, (hybrid-cloud) live video analytics system called Rocket. Rocket is deployed in a US city and it is used to reduce traffic-related fatalities and improve urban mobility. Video analytics will change lives and we are moving forward aggressively towards the democratization of this technology. Time permitting, I will peek into the future, who will be impacted and why. I will lay out some of technical and business challenges facing the large-scale adoption of edge-computing and the opportunities these challenges are creating.

### Speaker Biography

Victor Bahl is a distinguished scientist and director of mobility & networking research group in Microsoft. He serves on the Microsoft Research Redmond Lab leadership team managing over 200 researchers, engineers, and staff. He routinely advises Microsoft's CEO and his senior leadership team on strategy and long-term vision related to networked systems, cloud computing, data center infrastructure, mobile computing, and wireless systems. Dr. Bahl has published over 125 papers with over 47,000 citations. He has been granted over 160 patents and delivered 50+ keynotes and plenaries. For his seminal work in wireless systems and broadband access he has received four lifetime achievement awards for technical contributions and service. He has also been honored with two United States Federal Communications Commission awards, two national transportation awards, two test-of-time awards, three best paper awards, two distinguished alumni awards, a distinguished service award, and an IEEE outstanding leadership award. Under his direction, his group has had game-changing international impact on spectrum regulations and policies, and on Microsoft's cloud computing infrastructures including its data center networks, wide-area networks, edge computing and live video analytics. Dr. Bahl is the co-founder of ACM SIGMOBILE, ACM MobiSys, ACM GetMobile and several other important conferences. With his wife, he co-founded Computing For All, a non-profit dedicated to increasing and enhancing computer science education for students of all ages and from all backgrounds. Dr. Bahl is a Fellow of the ACM, IEEE, and AAAS.

# Keynote Talks

Wednesday, April 17

## The Siren Song of Temporal Synthesis

9:00 am-10:00 am | Room 221-Place du Canada



### Moshe Y. Vardi, Rice University

One of the most significant developments in the area of design verification over the last three decades is the development of algorithmic methods for verifying temporal specification of finite-state designs. A frequent criticism against this approach, however, is that verification is done after significant resources have already been invested in the development of the design. Since designs invariably contains errors, verification simply becomes part of the debugging process. The critics argue that the desired goal is to use temporal specification in the design development process in order to guarantee the development of correct designs. This is called temporal synthesis. In this talk I will review 60 years of research on the temporal synthesis problem, describe the automata-theoretic approach developed to solve this problem, and describe both successes and failures of this research program.

### Speaker Biography

Moshe Y. Vardi is the George Distinguish Service Professor in Computational Engineering, University, Professor, and Director of the Ken Kennedy Institute for Information Technology Institute at Rice University. He is the co-recipient of three IBM Outstanding Innovation Awards, the ACM SIGACT Goedel Prize, the ACM Kanellakis Award, the ACM SIGMOD Codd Award, the Blaise Pascal Medal, and the IEEE Computer Society Goode Award. He is the author and co-author of over 600 papers, as well as two books: "Reasoning about Knowledge" and "Finite Model Theory and Its Applications". He is a Fellow of the American Mathematical Society, the Association for the Advancement of Artificial Intelligence, the Association for Computing Machinery, the Association for the Advancement of Artificial Intelligence, the American Association for the Advancement of Science, the Institute for Electrical and Electronic Engineers, and the Society for Industrial and Applied Mathematics. He is a member of the US National Academies of Science and of Engineering, the American Academy of Arts and Science, the European Academy of Science, and Academia Europaea. He holds honorary doctorates from the Saarland University in Germany, Orleans University in France, UFRGS in Brazil, and University of Liege in Belgium. He is the Editor-in-Chief of the *Communications of the ACM*.

# Keynote Talks

Thursday, April 18

## (Low) Powering Real-Time Intelligence at the IoT Edge

9:00 am-10:00 am | Room 221-Place du Canada



### **Tulika Mitra, National University of Singapore**

Internet of Things (IoT), a network of billion computing devices embedded within physical objects, is revolutionizing our lives. The IoT devices at the edge are primarily responsible only for collecting and communicating the data to the cloud, where the computationally intensive data analytics takes place. However, the data privacy and the connectivity issues – in conjunction with the fast real-time response

requirement of certain IoT application – call for smart edge devices that should be able to support privacy-preserving, time-sensitive computation for machine intelligence on-site. But what does it take to bring real-time intelligence to the edge? I will present the computation challenges in edge-centric IoT and introduce hardware-software co-designed approaches to overcome these challenges. We will discuss the design of tiny accelerators that are completely software programmable and can speed up computation to realize the edge intelligence vision at ultra-low power budget. I will also demonstrate the promise of collaborative computation that engages heterogeneous processing elements in a synergistic fashion to achieve low-power, real-time edge computing.

### **Speaker Biography**

Tulika Mitra is a Professor of Computer Science at School of Computing, National University of Singapore (NUS). She received her PhD from State University of New York at Stony Brook. Her research interests span various aspects of design automation in the context of embedded real-time systems with focus on energy-efficient computing, heterogeneous computing, processor customization, and worst-case execution time analysis, optimizations. Her work takes a holistic systems research approach encompassing program analysis, compiler optimizations to operating systems and computer architecture. She has authored over hundred and fifty scientific publications and holds multiple US patents. Tulika currently serves as Senior Associate Editor of *ACM Transactions on Embedded Computing Systems*, Deputy Editor-in-Chief of *IEEE Embedded Systems Letters*, Associate Editor of *IEEE Design & Test* and *IEEE Micro*. She has served as Associate Editor of IEEE TCAD, organizing/program committee member of almost all major conferences in her domain including program chair of EMOSFT, CASES, and is the general chair-elect of Embedded Systems Week 2020.

# Technical Program Overview

## General Program

Monday, April 15		Tuesday, April 16	
7:00-8:30 am	<b>Registration</b> (Mezzanine)	8:00-9:00 am	<b>Registration</b> (Mezzanine)
8:30-10:00 am	<b>Workshop/Tutorial Session #1</b>	9:00-10:00 am	<b>Keynote: Victor Bahl</b> (Place du Canada)
10:00-10:30 am	<b>Coffee Break</b> (Parc Mont Royal B & C)	10:00-10:30 am	<b>Coffee Break</b> (Parc Mont Royal B & C)
10:30 am-12:00 pm	<b>Workshop/Tutorial Session #2</b>	10:30 am-12:30 pm	<b>Conference Session #1</b>
12:00-1:30 pm	<b>Lunch</b> (Place du Canada-Av. Laurier)	12:30-2:00 pm	<b>Lunch</b> (Place du Canada-Av. Laurier)
1:30-3:00 pm	<b>Workshop/Tutorial Session #3</b>	2:00-3:30 pm	<b>Conference Session #2</b>
3:00-3:30 pm	<b>Coffee Break</b> (Parc Mont Royal B & C)	3:30-4:00 pm	<b>Coffee Break</b> (Parc Mont Royal B & C)
3:30-5:00 pm	<b>Workshop/Tutorial Session #4</b>	4:00-5:30 pm	<b>Conference Session #3</b>
		5:30-8:30 pm	<b>Cocktail &amp; Demo/Poster Session</b> (Agora/Centre-Ville)
Wednesday, April 17		Thursday, April 18	
8:00-9:00 am	<b>Registration</b> (Mezzanine)	8:00-9:00 am	<b>Registration</b> (Mezzanine)
9:00-10:00 am	<b>Keynote: Moshe Y. Vardi</b> (Room 221-Place du Canada)	9:00-10:00 am	<b>Keynote: Tulika Mitra</b> (Room 221-Place du Canada)
10:00-10:30 am	<b>Coffee Break</b> (Parc Mont Royal B & C)	10:00-10:30 am	<b>Coffee Break</b> (Parc Mont Royal B & C)
10:30 am-12:30 pm	<b>Conference Session #4</b>	10:30 am-12:30 pm	<b>Conference Session #7</b>
12:30-2:00 pm	<b>Lunch</b> (Place du Canada-Av. Laurier)	12:30-2:00 pm	<b>Lunch</b> (Place du Canada-Av. Laurier)
2:00-3:30 pm	<b>Conference Session #5</b>	2:00-3:30 pm	<b>Conference Session #8</b>
3:30-4:00 pm	<b>Coffee Break</b> (Parc Mont Royal B & C)	3:30-4:00 pm	<b>Coffee Break</b> (Parc Mont Royal B & C)
4:00-5:30 pm	<b>Conference Session #6</b>	4:00-5:30 pm	<b>Conference Session #9</b>
5:30-6:00 pm	<b>Business Meeting</b>		
7:00-10:00 pm	<b>Banquet</b> (Place du Canada-Av. Laurier)		

## Conferences | Tuesday, April 16-Thursday April 18

**HSCC 2019 | ACM International Conference on Hybrid Systems: Computation and Control**  
Room 215-Av. Duluth

**ICCPs 2019 | ACM/IEEE International Conference on Cyber-Physical Systems**  
Room 213-Av. Van-Horne

**IPSN 2019 | ACM/IEEE International Conference on Information Processing in Sensor Networks**  
Room 217-Av. Viger

**IoTDI 2019 | ACM/IEEE Conference on Internet of Things Design and Implementation**  
Room 202-Rue Sainte-Catherine/Room 200-Rue Saint-Paul

**RTAS 2019 | IEEE Real-Time and Embedded Technology and Applications Symposium**  
Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

# Technical Program Overview

## Workshops | Monday, April 15

**ARCH | 6th International Workshop on Applied veRification for Continuous and Hybrid Systems**  
Room 206-Rue Saint-Denis

**CPS-IoTBench | 2nd Workshop on Benchmarking Cyber-Physical Systems and Internet of Things**  
Room 212-Rue Sherbrooke

**CPS-SR | 2nd Workshop on Cyber-Physical Systems Security and Resilience**  
Room 213-Av.Van-Horne

**DESTION | 1st Workshop on Design Automation for CPS and IoT**  
Room 320-Multiplication

**FOG-IoT | Fog Computing and the Internet of Things**  
Room 214-Rue McGill

**IoTSec | 2nd International Workshop on Security and Privacy for the Internet-of-Things**  
Room 210-Rue Mansfield

**MSCPES | 7th Workshop on Modeling and Simulation of Cyber-Physical Energy Systems**  
Room 202-Rue Sainte-Catherine

**MT-CPS | 4th Workshop on Monitoring and Testing for Cyber-Physical Systems**  
Room 208-Rue Crescent

**NGOSCPS | 1st Workshop on Next-Generation Operating Systems for Cyber-Physical Systems:  
On Beyond POSIX**  
Room 200-Rue Saint-Paul

**SCOPE | 4th International Science of Smart City Operations and Platforms Engineering in  
Partnership with Global City Teams Challenge**  
Room 322-Exclamation

**SM2N | 1st International Workshop on Smart Manufacturing Modeling and Analysis**  
Room 318-Arobase

**SNR | Symbolic-Numeric Methods for Reasoning about CPS and IoT**  
Room 204-Rue Notre-Dame

**SocialSens | 4th International Workshop on Social Sensing**  
Room 215-Av.Duluth

## Poster/Demo Session | Tuesday, April 16

The poster/demo session will take place between 5:30-8:00pm in Room Agora/Centre-Ville.

## Tutorials | Monday, April 15

**AADL | Schedulability Analysis of AADL Architecture Models**  
Room 306-Copier | All-Day

**SCPAMS-CRO | Security of Cyber-Physical Additive Manufacturing System – Challenges &  
Research Opportunities**  
Room 319-Paranthese | All-Day

## Competitions | Monday, April 15-Tuesday, April 16

**F1/10 | 4th F1/10 International Autonomous Racing Competition**  
Room 220-Square Dorchester/Room 218A-Parc Mont Royal A | April 15-16 (All-Day)

**AALC | armasuisse Aircraft Localization Competition**  
Room 321-Diese | April 15 (All-Day)

## Other Events | Monday, April 15

**IPSN PhD Forum**  
Room 217-Av.Viger | 1:30 pm-5:10pm



# Monday, April 15

## Workshops

### ARCH 2019: 6th International Workshop on Applied verification for Continuous and Hybrid Systems

Room 206-Rue Saint-Denis

Workshop Co-Chairs: Goran Frehse and Matthias Althoff

7:00-8:30 am | Registration

8:30 am | Invited Talk | Tools for Stochastic Hybrid Systems Quo Vadis  
Nathalie Cauchi

#### Session 1: Results of the ARCH Friendly Competition I

9:30 am | Piecewise Constant Dynamics

Goran Frehse

9:40 am | Continuous and Hybrid Systems with Linear Dynamics

Matthias Althoff

9:50 am | Nonlinear Dynamics

Fabian Immler

10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)

#### Session 2: Results of the ARCH Friendly Competition II and Contributed Papers

10:30 am | Stochastic Models

Alessandro Abate

10:40 am | Bounded Model Checking

Lei Bu

10:50 am | Falsification

Gidon Ernst

11:00 am | Hybrid Programs

Stefan Mitsch

11:10 am | AI Category

Taylor Johnson

11:20 am | Under the Hood of a Stand-Alone Lagrangian Reachability Tool

Sophie Gruenbacher, Jacek Cyranka, Md Ariful Islam, Max Tschaikowski, Scott Smolka, and Radu Grosu

11:40 am | Efficient n-to-n Collision Detection for Space Debris using 4D AABB Trees

Stanley Bak and Kerianne Hobbs

12:10-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)

#### Session 3: Benchmark Proposals, and Discussion on Benchmark Formats

1:30 pm | Invited Talk | Verification for Autonomous Cyber-Physical Systems with Machine Learning Components

Taylor Johnson

2:30 pm | Worst-Case Analysis of Digital Control Loops with Uncertain Input/Output Timing

Maximilian Gaukler and Peter Ulbrich

2:40 pm | Verification of Closed-Loop Systems with Neural Network Controllers

Diego Manzananas Lopez, Patrick Musau, Hoang Dung Tran, and Taylor Johnson

2:50 pm | Discussion on Benchmark Formats

3:00-3:30 pm | Coffee Break (Room 218-Parc Mont Royal B+C)

4:00 pm | Discussion on Repeatability Evaluation

# Monday, April 15

## **CPS-IoTBench 2019: 2nd Workshop on Benchmarking Cyber-Physical Systems and Internet of Things**

Room 212-Rue Sherbrooke

Workshop Chair: [Marco Zimmerling](#)

**7:00-8:30 am | Registration**

### **Session 1: Challenges with Benchmarking**

**8:30 am | Opening**

Marco Zimmerling and Ramona Marfievici

**8:35 am | Workshop Keynote | Dare to Share: Risks and Rewards of Artifact Sharing in Computer Science**

Christian Collberg

**9:35 am | Lessons Learned and Challenges on Benchmarking Publish-Subscribe IoT Platforms**

Ana Aguiar and Ricardo Morla

**10:00-10:30 am | Coffee Break** (Room 218-Parc Mont Royal B+C)

### **Session 2: Methodologies for Reproducibility**

**10:30 am | Towards a Methodology for Experimental Evaluation in Low-Power Wireless Networking**

Romain Jacob, Carlo Alberto Boano, Usman Raza, Marco Zimmerling, and Lothar Thiele

**10:55 am | The Impact of Decreasing Transmit Power Levels on FlockLab To Achieve a Sparse Network**

Matthew Bradbury, Arshad Jhumka, and Carsten Maple

**11:20 am | Invited Talk | Taming Performance Variability**

Alexander Maricq

**12:10-1:30 pm | Lunch** (Room 221-Place du Canada/Room 219-Av. Laurier)

### **Session 3: Benchmarking Tools and Methodologies**

**1:30 pm | HATBED: A Distributed Hardware Assisted Testbed for Non-Invasive Profiling of IoT Devices**

Li Yi, Junyan Ma, and Te Zhang

**1:55 pm | GenEE: A Benchmark Generator for Static Analysis Tools of Energy-Constrained Cyber-Physical Systems**

Christian Eichler, Peter Wagemann, and Wolfgang Schröder-Preikschat

**2:20 pm | Invited Talk | Planes, Trains, Apples, and Oranges – Reproducible Results and Fair Comparisons in Localization Research**

Pat Pannuto

**3:00-3:30 pm | Coffee Break** (Room 218-Parc Mont Royal B+C)

### **Session 4: The Present and Future of IoT Benchmarking**

**3:30 pm | Invited Talk | Cause and Effect Analysis for Low-Power Wireless Networks**

Hyung-Sin Kim

**4:10 pm | Invited Talk | IoTBench – Past, Present, and Future of a Community-Driven Benchmarking Initiative**

Markus Schuss and Romain Jacob

**4:40 pm | Open Discussion and Closing**

# Monday, April 15

## **CPS-SR 2019: 2nd Workshop on Cyber-Physical Systems Security and Resilience**

Room 213-Av. Van-Horne

Workshop Co-Chairs: Henrik Sandberg, Dejan Ničković, and Paul Smith

**7:00-8:30 am | Registration**

### **Session 1**

**8:45 am | Workshop Welcome**

D. Ničković, H. Sandberg, and P. Smith

**9:00 am | Workshop Keynote | Challenges in Avoiding Process Anomalies in Critical Infrastructure**

A. Mathur

**10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)**

### **Session 2**

**10:30 am | Edge Device Security for Critical Cyber Physical Systems**

S. Cejka, F. Knorr, and F. Kintzler

**11:00 am | Intrusion Detection of Networked Cyber-Physical Systems via Three-Level Deep Packet Inspection**

J. Li, W. Si, and X. Huang

**11:30 am | Secure and Resilient Rollout of Software Services in the Smart Grid**

E. Piatkowska, D. Umsonst, M. Chong, and P. Smith

**12:10-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)**

### **Session 3**

**1:30 pm | Panel Session: Hot Topics and Future Trends for CPS Security and Resilience**

**Panelists:**

- A. Mathur
- S. Fischmeister

**2:00 pm | Two-Way Coding and Attack Decoupling in Control Systems under Injection Attacks**

S. Fang, K. Johansson, M. Skoglund, H. Sandberg, and H. Ishii

**2:30 pm | State Consistencies for Cyber-Physical System Recovery**

F. Kong, O. Sokolsky, J. Weimer and I. Lee

**3:00-3:30 pm | Coffee Break (Room 218-Parc Mont Royal B+C)**

### **Session 4**

**3:30 pm | Synthesizing Stealthy Reprogramming Attacks on Cardiac Devices**

N. Paoletti, Z. Jiang, M. Islam, H. Abbas, R. Mangharam, S. Lin, Z. Gruber, and S. Smolka

**4:00 pm | Security of Networked Control Systems: A Game-Theoretic Approach**

M. Pirani, and H. Sandberg

**4:30 pm | Digital Implementation of Homomorphically Encrypted Feedback Control for Cyber-Physical Systems**

J. Tran, F. Farokhi, M. Cantoni, and I. Shames

**5:00 PM | Workshop Close**

# Monday, April 15

**DESTION 2019: 1st Workshop on Design Automation for CPS and IoT**  
Room 320-Multiplication  
Workshop Co-Chairs: [Alberto Sangiovanni-Vincentelli and Janos Sztipanovits](#)

7:00-8:30 am | Registration

## Session 1

8:30 am | Opening Remarks

8:45 am | [Workshop Keynote](#) | A Model-Based Design Workflow for a Robotic Car  
Testbed: From 0 to 60

Jonathan Sprinkle

9:30 am | [Invited Talk](#) | Design of Learning Enabled Societal Scale Systems  
Shankar Sastry, Lillian Ratliff, Roy Dong, and Eric Mazumdar

10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)

## Session 2

10:30 am | [Invited Talk](#) | Model-Based Design for CPS with Learning-Enabled  
Components

Charles Hartsell, Nagabhushan Mahadevan, Shreyas Ramakrishna, Abhishek Dubey,  
Theodore Bapty, Taylor Johnson, Xenofon Koutsoukos, Janos Sztipanovits, and Gabor Karsai

11:00 am | [Invited Talk](#) | Verified AI: A Design Automation Perspective  
Sanjit Seshia

11:30 am | [Demo](#) | Verisig – Verifying Safety Properties of Hybrid Systems with Neural  
Network Controllers

Radoslav Ivanov, James Weimer, Oleg Sokolsky, and Insup Lee

11:45 am | [Demo](#) | A Design Studio for Verification Tools

Tamas Kecskes, Patrik Meijer, Taylor Johnson, and Marcus Lucas

12:10-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)

## Session 3

1:30 pm | Simulation Integration Platforms for Cyber-Physical Systems

Himanshu Neema, Janos Sztipanovits, Cornelius Steinbrink, Thomas Raub, Bastian  
Cornelsen, and Sebastian Lehnhoff

2:00 pm | Multi-Layer Time Coherency in the Development of ADAS/AD Systems: Design  
Approach and Tooling

Werner Damm, Günter Ehmen, Kim Grüttner, Philipp Ittershagen, Björn Koopmann, Frank  
Poppen, and Ingo Stierand

2:30 pm | Autonomous Waypoints Planning and Trajectory Generation for Multi-Rotor  
UAVs

Yilan Li, Hossein Eslamiat, Ningshan Wang, Ziyi Zhao, Amit K. Sanyal, and Qinru Qiu

3:00-3:30 pm | Coffee Break (Room 218-Parc Mont Royal B+C)

## Session 4

3:30 pm | Design Optimization Techniques for Time-Critical Cyber Physical Systems

Yecheng Zhao, and Haibo Zeng

4:00 pm | Exploring Weakly-Hard Paradigm for Networked Systems

Chao Huang, Kacper Wardega, Wenchao Li, and Qi Zhu

4:30 pm | Closing Discussion

# Monday, April 15

## **FOG-IoT 2019: 2nd Workshop on Fog Computing and the Internet of Things**

Room 214-Rue McGill

Workshop Co-Chairs: [Paul Pop and Karl-Eric Arzén](#)

**7:00-8:30 am | Registration**

### **Session 1: Welcome and Keynote Talks**

**8:30 am | Welcome Message and Introduction to Fog-IoT 2019**

**8:40 am | Workshop Keynote | Towards Special-Purpose Edge Computing**

Prashant Shenoy

**9:20 am | Workshop Keynote | The Industrial Cloud – How Edge and 5G Will Change Automation as We Know It**

Johan Eker

**10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)**

### **Session 2: Security and Safety**

**10:30 am | Safety of Fog-Based Industrial Automation Systems**

Nitin Desai and Sasikumar Punnekkat

**10:50 am | Towards a Systematic Survey of Industrial IoT Security Requirements: Research Method and Quantitative Analysis**

Koen Tange, Michele De Donno, Xenofon Fafoutis, and Nicola Dragoni

**11:10 am | Multilayer Distributed Control over 5G Networks: Challenges & Security Threats**

Nils Vreman and Martina Maggio

**11:30 am | Edge Computing with Peer to Peer Interactions: Use Cases and Impact**

Vasileios Karagiannis, Alexandre Venito, Rodrigo Coelho, Michael Borkowski and Gerhard Fohler

**12:10-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)**

### **Session 3: Communication**

**1:30 pm | Adaptive Industrial IOT/CPS Messaging Strategies for Improved Edge Compute Utility**

Michael Nolan, Michael J. McGrath, Marcin Spoczynski, and Dáire Healy

**1:50 pm | Implementing Time-Triggered Communication over a Standard Ethernet Switch**

Eleftherios Kyriakakis, Jens Sparsø, and Martin Schoeberl

**2:10 pm | Compute Node Communication in the Fog: Survey and Research Challenges**

Vasileios Karagiannis

**2:30 pm | The Need for Deterministic Virtualization in Fog Computing and the Industrial Internet of Things**

Jan Ruh and Wilfried Steiner

**3:00-3:30 pm | Coffee Break (Room 218-Parc Mont Royal B+C)**

### **Session 4: Applications**

**3:30 pm | Personalized Augmented Reality via Fog-Based Imitation Learning**

Surin Ahn, Maria Gorlatova, Parinaz Naghizadeh, and Mung Chiang

**3:50 pm | Fogification of Industrial Robotic Systems: Research Challenges**

Shaik Salman, Vaclav Struhar, Alessandro Papadopoulos, Moris Behnam, and Thomas Nolte

**4:10 pm | Latency Prediction in 5G for Control with Deadtime Compensation**

Johan Ruuskanen, Haorui Peng, and Alexandre Martins

**4:30 pm | Towards Quality-of-Control-Aware Scheduling of Industrial Applications on Fog Computing Platforms**

Mohammadreza Barzegaran, Anton Cervin, and Paul Pop

# Monday, April 15

IoTSec

## IoTSec 2019: 2nd International Workshop on Security and Privacy for the Internet-of-Things

Room 210-Rue Mansfield

Workshop Co-Chairs: Gedare Bloom and Rakesh Bobba

8:30-8:45 am | Opening Remarks

### Session 1: Keynote

8:45 am | Workshop Keynote | Securing the IoT: Critical Research Challenges  
Sean Smith

10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)

### Session 2: Attacks in IoT Systems

Chair: Rakesh Bobba

10:30 am | Evaluating Practical Privacy Attacks for Building Data Anonymized by Standard Methods

Jens Hjort Schwee, Fisayo Caleb Sangogboye, and Mikkel Baun Kjærgaard

11:00 am | Are You Where You Think You Are?

Weicheng Chao, Yutong Wang, Zhipeng Xu, Xuyu Yi, and Fengyang Zhang

11:45 am | Closing Remarks

12:10-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)

MSCPES

## MSCPES 2019: 7th Workshop on Modeling and Simulation of Cyber-Physical Energy Systems

Room 202-Rue Sainte-Catherine

Workshop Co-Chairs: Peter Palensky and Anurag Srivastava

8:30-8:40 am | Opening

### Session 1

8:40 am | Analysis of Frequency Control in Microgrids with Multiple Phasor Measurement Unit Delays

S. Liu and X. Wang

9:00 am | Automated Parameter Identification and Calibration for the Itaipu Power Generation System using Modelica, FMI, and RaPId

M. Podlaski, L. Vanfretti, J. Pesente, and P. H. Galassi

9:20 am | A Digital Twin for Cyber-Physical Energy Systems

P. Pileggi, J. Verriet, J. Broekhuijsen, C. Van Leeuwen, W. Wijbrandi, and M. Konsman

9:40 am | Automatic Re-Synchronization Controller Analysis within a Multi-Domain Gas Turbine and Power System Model

L. Vanfretti, B. Mukherjee, and K. M. Moudgalya

10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)

### Session 2

10:30 am | Live Demo | Cyber-Physical Simulation

S. Li and L. Wihl

11:10 am | Collaborative Simulation of Heterogeneous Components as a Means Toward A More Comprehensive Analysis of Smart Grids

C. F. Mugombozi, R. Zgheib, T. Roudier, A. Kemmeugne, D. Rimorov, and I. Kamwa

11:30 am | Co-Simulating the Internet of Things in a Smart Grid use case scenario

J. Kölsch, C. Grimm, and A. Ratzke

# Monday, April 15

**11:50 am | An FMI-Compliant Co-Simulation Approach for Smart Grid ICT Assessments**  
E. Widl, M. Panagiotis-Timolewn, A. Davros, O. Gehrke, T. V. Jensen, G. Kiokes, and N. Hatzigiargyriou

**12:10-1:30 pm | Lunch** (Room 221-Place du Canada/Room 219-Av. Laurier)

## Session 3

**1:30 pm | Tutorial & Live Demo | Universal CPS Environment for Federation (UCEF)**  
T. Roth

**1:50 pm | Fully Distributed Co-Simulation: the ZerOBNL Framework**  
P. Puerto, E. Widl, and J. Page

**2:10 pm | Cross-Platform Comparison of Standard Power System Components used in Real Time Simulation**

B. Azimian, P. M. Adhikari, L. Vanfretti, and H. Hooshyar

**2:30 pm | Towards an Assisted Simulation Planning for Co-Simulation of Cyber-Physical Energy Systems**

J. S. Schwarz, C. Steinbrink, and S. Lehnhoff

**2:50 pm | Over Current Relay Modeling using Modelica with Cross-Verification against a Validated Model**

M. Navarro Catalan, and L. Vanfretti

**3:10-3:40 pm | Coffee Break** (Room 218-Parc Mont Royal B+C)

## Session 4

**3:40 pm | ExSol: Collaboratively Assessing Cybersecurity Risks for Protecting Energy Delivery Systems**

J. Lamp, C. R. Medrano, Z. Zhao, and G. J. Ahn

**4:00 pm | Modeling and Simulation of the Aurora Attack on Microgrid Point of Common Coupling**

M. F. M. Arani, A. A. Jahromi, D. Kundur, and M. Kassouf

**4:20 pm | Cyber-Physical Simulation Platform for Security Assessment of Transactive Energy Systems**

Y. Zhang, S. Eisele, A. Dubey, A. Laszka, and A. Srivastava

**4:40 pm | Web-Based Platform for Evaluation of Resilient & Transactive Smart-Grids**

H. Neema, H. Vardhan, C. Barreto, and X. Koutsoukos

**5:00 pm | Decision Support for Smart Grid: Using Reasoning to Contextualize Complex Decision Making**

E. Griffor, M. Balduccini, M. Huth, C. Vishik, D. Wollman, and P. Kamongi

**5:20 pm | Closing**

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**MT-CPS 2019: 4th Workshop on Monitoring and Testing for Cyber-Physical Systems**

Room 208-Rue Crescent

**Workshop Co-Chairs: Tommaso Dreossi and Akshay Rajhans**

**9:00 am: Welcome and Opening Remarks**

Akshay Rajhans

## Session 1: Theory

**9:00 am | Monitoring First-Order Properties of Real-Valued Signals**

Alexey Bakhirkin, Thomas Ferrère, Thomas A. Henzinger, and Dejan Ničković

# Monday, April 15

**9:20 am | Distributed Planning of Multi-Rotor Drone Fleets using the Smooth Robustness of Signal Temporal Logic**

Yash Vardhan Pant, Houssam Abbas, and Rahul Mangharam

**9:40 am | Online Parametric Timed Pattern Matching with Automata-Based Skipping**

Masaki Waga and Étienne André

**10:00-10:30 am | Coffee Break** (Room 218-Parc Mont Royal B+C)

## **Session 2: Statistics and Machine Learning**

**10:30 am | Evaluating Sampling Techniques for Testing Cyber-Physical Systems with Machine Learning**

Edward Kim, Shromona Ghosh, Tommaso Dreossi, Daniel Fremont, Sanjit Seshia, and Alberto Sangiovanni-Vincentelli

**10:50 am | Hybrid System Falsification Using Monte Carlo Tree Search**

Zhenya Zhang, Gidon Ernst, Sean Sedwards, Paolo Arcaini, and Ichiro Hasuo

**11:10 am | Using the Kolmogorov-Smirnov Statistic for Evaluating Test Generation Quality**

Benoit Barbot, Nicolas Basset, Thao Dang, and Ouri Maler

## **Work-in-Progress Lightning Round**

**11:30 am | A Dynamic Random Way to Test Path Planning Algorithms**

Xiao-Yi Zhang and Chao Huang

**11:40 am | Simulation-Based Test and Validation of Medical Cyber-Physical Systems for Critical and Perioperative Care.**

Farooq Gessa, Philip Asare, Dikendra Karki, Aaron Bray, Rachel Clipp, and Mark Poler

**11:50 am | Towards Testing Self-Adaptive Software for Cyber-Physical Systems**

Claudio Mandrioli and Martina Maggio

**12:00-1:30 pm | Lunch** (Room 221-Place du Canada/Room 219-Av. Laurier)

**1:30 pm | Oded Maler Memorial**

Dejan Ničković

## **Session 3: Tools**

**2:00 pm | Monitor Specification and Verified Runtime Monitoring of Component Models in Differential Dynamic Logic**

Stefan Mitsch

**2:20 pm | Real-Time Stream Monitoring with StreamLab**

Peter Faymonville, Bernd Finkbeiner, Malte Schledjewski, Maximilian Schwenger, Leander Tenstrup, and Hazem Torfah

**2:40 pm | Specification and Assessment of Temporal Requirements using Simulink Test**

Jean-Francois Kempf, Khoo Yit Phang, and Akshay Rajhans

**3:00-3:30 pm | Coffee Break** (Room 218-Parc Mont Royal B+C)

## **Session 4: Applications**

**3:30 pm | Rapidly-Exploring Random Trees for Testing Automated Driving Systems**

Cumhur Erkan Tuncali and Georgios Fainekos

**3:50 pm | A Fractional-Order MPC Framework for Electrical Neurostimulation in Epilepsy**

Orlando Romero and Sergio Pequito

**4:10 pm | A Digital Twin Approach to Online Monitoring in Industrial Internet of Things Applications**

Akshay Rajhans and Dan Lluch

**4:30 pm | Discussion and Wrap Up**

Akshay Rajhans



# Monday, April 15

## NGOSCPS 2019: 1st Workshop on Next-Generation Operating Systems for Cyber-Physical Systems: On Beyond POSIX

Room 200-Rue Saint-Paul

Workshop Chair: [Chris Gill](#)

7:00-8:30 am | Registration

### Session 1

8:30 am | Welcome and Introduction

Chris Gill

8:40 am | The Case for an Opinionated, Theory-Oriented Real-Time Operating System

Bjorn B. Brandenburg

9:00 am | Support for Limited-Preemptive Fixed-Priority Scheduling – An Evolutionary Step Still Facing Research Challenges

Reinder J. Bril

9:20 am | Requirements on Next-Generation Operating Systems for Automotive Systems

Arne Hamann, Dirk Ziegenbein, and Selma Saidi

10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)

### Session 2

10:30 am | Security Considerations for Next-Generation Operating Systems for Cyber-Physical Systems

Bryan C. Ward, Richard Skowrya, Samuel Jero, Nathan Burow, Hamed Okhravi, Howard Shrobe, and Roger Khazan

10:50 am | Processing Enhancement and Virtualization for Cyber-Physical Computations

Dionisio de Niz and Bjorn Andersson

11:10 am | Incorporating Physical Dynamics Into Systems Mechanisms

David Ferry

11:30 am | A Cyber-Physical OS for Enabling Spatio-Temporal Coordination at Geo-Distributed Scale

Sandeep D'souza and Ragunathan (Raj) Rajkumar

12:10-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)

### Session 3

1:30 pm | More or Less? A Discussion of the Abstraction Level of Future Operating Systems

Hendrik Borghorst, Michael Miller, and Olaf Spinczyk

1:50 pm | Software-Defined and Programmable CPS/IoT OS: Architecting the Next Generation of CPS/IoT Operating Systems

Aniruddha Gokhale, Yogesh Barve, Anirban Bhattacharjee, and Shweta Khare

2:10 pm | Component-Based OS Design for Dependable Cyber-Physical Systems

Gabriel Parmer, Runyu Pan, Yuxin Ren, Phani Kishore Gadepalli, and Wenyuan Shao

2:30 pm | Pluggable Components All the Way Down

Nils Asmussen, Michael Roitzsch, and Carsten Weinhold

3:00-3:30 pm | Coffee Break (Room 218-Parc Mont Royal B+C)

### Session 4

3:30 pm | A Case for Type-System Based Networked Security

Hudson Ayers, Armin Namavari, and Philip Levis

# Monday, April 15

NGOSCPs

**3:50 pm | Embedded OSs Must Embrace Distributed Computing**

Branden Ghena, Jean-Luc Watson, and Prabal Dutta

**4:10 pm | The Network as a Computer with IPv6 Segment Routing: A Novel Distributed Processing Model for the Internet of Things**

Andrea Mayer, Emanuele Altomare, Stefano Salsano, Francesco Lo Presti, and Clarence Filsfils

**4:30 pm | Closing and Next Steps**

Chris Gill

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**SCOPE 2019: 4th International Science of Smart City Operations and Platforms Engineering in partnership with Global City Teams Challenge**

Room 322-Exclamation

**Workshop Co-Chairs: Abhishek Dubey, Sokwoo Rhee, Sajal Das, and Keiichi Yasumoto**

**7:00-8:30 am | Registration**

**Session 1**

**08:30 am | Opening Remarks**

**08:45 am | Workshop Keynote | Smart and Connected Communities**

David Corman

**09:30 am | Global Cities Team Challenge: Experience and Lessons**

Sokwoo Rhee

**10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)**

**Session 2**

**Chair: Sokwoo Rhee**

**10:30 am | Toward Urban Vehicle Mobility Modeling in Japan**

Hirozumi Yamaguchi

**11:00 am | ASC: Actuation System for City-Wide Crowdsensing With Ride-Sharing Vehicular Platform**

Xinlei Chen, Susu Xu, Haohao Fu, Carlee Joe-Wong, Lin Zhang, Hae Young Noh, and Pei Zhang

**11:30 am | Towards Demand-Oriented Flexible Rerouting of Public Transit Under Uncertainty**

Saideep Nannapaneni and Abhishek Dubey

**12:10-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)**

**Session 3**

**Chair: Abhishek Dubey**

**1:30 pm | Studying the Effects of Weather and Roadway Geometrics on Daily Accident Occurrence using a Multilayer Perceptron Model**

Jeremiah Roland, Peter Way, and Mina Sartipi

**2:00 pm | AutoVAPS: an IoT-Enabled Public Safety Service on Vehicles**

Liangkai Liu, Xingzhou Zhang, Qingyang Zhang, Andrew Weinert, Yifan Wang, and Weisong Shi

**2:30 pm | Spatiotemporal Scenario Data-Driven Decision For the Path Planning of Multiple UASs**

Chenyuan He, Yan Wan, and Junfei Xie

**3:00-3:30 pm | Coffee Break (Room 218-Parc Mont Royal B+C)**

SCOPE

# Monday, April 15

SCOPE

## **Session 4**

**Chair: Yan Wan**

### **3:30 pm | A Testbed for a Smart Building: Design and Implementation**

Roja Eini, Lauren Linkous, Nasibeh Zohrabi, and Sherif Abdelwahed

### **4:00 pm | Principles for Designed-In Security and Privacy for Smart Cities**

Corey Dickens, Paul Boynton, and Sokwoo Rhee

### **4:30 pm | Data Integration Platform for Smart and Connected Cities**

Austin Harris and Mina Sartipi

SM2N

## **SM2N 2019: 1st International Workshop on Smart Manufacturing Modeling and Analysis**

**Room 318-Arobase**

**Workshop Co-Chairs: Kira Barton, Sibin Mohan, and Seta Bogosyan**

**7:00-8:30 am | Registration**

### **Session 1**

**8:30 am | Introduction/Welcome Remarks**

**9:00 am | Workshop Keynote | Cyber-Physical Manufacturing Systems**

Dawn Tilbury

**10:00-10:30 am | Coffee Break (Room 218-Parc Mont Royal B+C)**

### **Session 2**

**10:30 am | The Digital Twin in the Manufacturing Ecosystem of the Future**

James Moyne, Efe Balta, Ilya Kovalenko, Yassine Qamsane, and Kira Barton

**10:55 am | Towards Resilient and Reliable Distributed Automation for Smart Manufacturing Systems**

Vuk Lesi, Zivana Jakovljevic, and Miroslav Pajic

**11:20 am | Digital Twin for Manufacturing Systems**

Annie Zheng

**11:45 am | Digitally Threaded Automated Manufacturing**

Abhijit Chakraborty

**12:10-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)**

### **Session 3**

**1:30 pm | Panel Discussion: The Future of Work in Manufacturing**

**Panelists:**

- Chris Saldana
- Sridhar Kota
- Stefanie Mueller
- Dawn Tilbury

**3:00-3:30 pm | Coffee Break (Room 218-Parc Mont Royal B+C)**

# Monday, April 15

## SNR 2019: 5th International Workshop on Symbolic-Numeric Methods for Reasoning about CPS and IoT

Room 204-Rue Notre-Dame

Workshop Co-Chairs: Sriram Sankaranarayanan and Sadeqh Soudjani

### Session 1

**08:30 am | Invited talk | Symbolic-Numeric Methods in Reasoning about the Design of Future Air Traffic Management**

Henk Blom

**09:30 am | Enhancing Analysis of Cyber-Physical Systems Through Stochastic Optimization**

Alireza Inanlouganji, Shakiba Yaghoubi, Georgios Fainekos, and Giulia Pedrielli

**10:00-10:30 am | Coffee Break** (Room 218-Parc Mont Royal B+C)

### Session 2

**10:30 am | Correct-by-Design Robust Control for Stochastic Systems via Approximate Simulation Relations**

Sofie Haesaert and Sadeqh Soudjani

**11:00 am | Compositional Finite Abstractions for Large-Scale Stochastic Switched Systems**

Abolfazl Lavaei and Majid Zamani

**11:30 am | Sampling-Free Enforcement of Non-Gaussian Chance Constraints via Fourier Transforms**

Abraham P. Vinod, Vignesh Sivaramakrishnan and Meeko Oishi

**12:10-1:30 pm | Lunch** (Room 221-Place du Canada/Room 219-Av. Laurier)

### Session 3

**1:30 pm | Invited Talk | Machine Learning for Cyber-Physical Systems**

Sebastian Trimpe

**2:30 pm | Neural State Classification for Hybrid Systems**

Dung Phan, Nicola Paoletti, Timothy Zhang, Radu Grosu, Scott A. Smolka, and Scott D. Stoller

**3:00-3:30 pm | Coffee Break** (Room 218-Parc Mont Royal B+C)

### Session 4

**3:30 pm | Preview of Predictive Monitoring for Signal Temporal Logic with Probabilistic Guarantees**

Xin Qin and Jyotirmoy Deshmukh

**4:00 pm | Limit Reachability for Model-Free Reinforcement Learning of Omega-Regular Objectives**

Ashutosh Trivedi, Ernst Moritz Hahn, Mateo Perez, Sven Schewe, Fabio Somenzi, and Dominik Wojtczak

**4:30 pm | Correct-by-Construction Policies for POMDPs**

Nils Jansen, Sebastian Junges, Joost-Pieter Katoen, Tim Quatmann, Bernd Becker, Ralf Wimmer, and Leonore Winterer

**5:00 pm | Closing Remarks**

# Monday, April 15

## **SocialSens 2019: 4th International Workshop on Social Sensing**

Room 215-Av.Duluth

Workshop Chair: Radu Marculescu

**8:30 am | Welcome by Chairs**

**8:45 am | Workshop Keynote | Social Cyber-Security Dynamics**

Kathleen M. Carley

**10:00-10:30 am | Coffee Break** (Room 218-Parc Mont Royal B+C)

### **Session 1: Social Networks and Social Sensing**

**Chair: Akhil Mathur**

**10:30 am | Maximizing Influence Diffusion over Evolving Social Networks**

Xudong Wu, Luoyi Fu, Jingfan Meng, and Xinning Wang

**10:50 am | Improving QoE in Multi-Layer Social Sensing: A Cognitive Architecture and Game Theoretic Model**

Alessandro Di Stefano, Marialisa Scata, Aurelio La Corte, and Pietro Lio

**11:10 am | Detection in Reddit Political Discussion**

Sofia Hurtado, Poushali Ray, and Radu Marculescu

**11:30 am | Offline Consequences of Echo Chambers**

Nynke M. D. Niezink

**12:00-1:30 pm | Lunch** (Room 221-Place du Canada/Room 219-Av. Laurier)

### **Session 2: Human-in-the-Loop and Social-Environment Interaction**

**Chair: Rong Zheng**

**1:30 pm | HeteroSense: An Occupancy Sensing Framework for Multi-Class Classification for Activity Recognition and Trajectory Detection**

Anooshmita Das, Fisayo Caleb Sangogboye, Emil Stubbe Kolvig Raun and Mikkel Baun Kjaergaard

**1:50 pm | CarbonKit: Designing A Personal Carbon Tracking Platform**

Laura Guzman, Stephen Makonin and Alex Clapp

**2:10 pm | A Human-in-the-Loop Cyber-Physical Approach for Students Performance Assessment**

J. Fernandes, D. Raposo, S. Sinche, N. Armando, J. Sa Silva, A. Rodrigues, L. Macedo, H. Gonçalo Oliveira, and F. Boavida

**2:30 pm | A Vision for Adaptive and Generalizable Audio-Sensing Systems**

Akhil Mathur, Fahim Kawsar, Nadia Berthouze, and Nicholas D. Lane

**3:00-3:30 pm | Coffee Break** (Room 218-Parc Mont Royal B+C)

### **Session 3: IoT Issues and Discussions**

**Chair: Giovanni Beltrame**

**3:30 pm | Trustworthy Authentication for IoT with Human-and-Environment-in-the-Loop**

Jinsong Han, Feng Lin, Wenbo Shen, and Kui Ren

**3:40 pm | Challenges and Opportunities in IoT Data Markets**

Zhenzhe Zheng, Weichao Mao, Fan Wu, and Guihai Chen

**3:50 pm | Panel: Social Sensing: A Synergy between Computer and Social Sciences**

**Panelists:**

- Kathleen Carley
- Stephen Makonin
- Derek Ruths
- Xue Liu
- Emma Spiro

# Monday, April 15

## Tutorials

### **AADL: Schedulability Analysis of AADL Architecture Models**

Room 306-Copier | April 15

Speakers: Frank Singhoff and Pierre Dissaux

### **SCPAMS-CRO: Security of Cyber-Physical Additive Manufacturing System – Challenges & Research Opportunities**

Room 319-Parentese | April 15

## Competitions

### **F1/10: 4th F1/10 International Autonomous Racing Competition**

Room 220-Square Dorchester/Room 218A-Parc Mont Royal A | Two-Day Event

Race Director: Madhur Behl

#### **Day 1: Practice Session**

8:30-9:30 am | Teams Paddock Area Setup (Room 218A-Parc Mont Royal - A)

9:30-10:00 am | Opening Remarks (Room Square Dorchester)

10:00 am-6:00 pm | Practice Session + Lunch (Track in Room 222-Square Dorchester)

12:00-1:30 pm | Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)

6:00-6:30 pm | Drivers Briefing (Closing)

### **AALC: armasuisse Aircraft Localization Competition**

Room 321-Diese | April 15

Organizers: Matthias Schäfer, Vincent Lenders, Mauro Leonardi, Martin Strohmeier, and Fabio Ricciato

Program details to be announced onsite.

## IPSN PhD Forum

### **IPSN PhD Forum**

Room 217-Av.Viger

Forum Chairs: Matteo Ceriotti and Hamed Yousefi

#### **Panelists:**

- Anthony Rowe
- Olga Saukh
- Ambuj Varshney
- Fahim Kawsar

1:30 pm | Welcome

#### **Session 1**

1:40 pm | Parameter-Aware Energy Models for Embedded-System Components

Daniel Friesel

2:00 pm | Interactive and Incremental Machine Learning Approaches for Heterogeneous Sensor Data Fusion

Agnes Tegen

2:20 pm | Physics-Guided Information Acquisition and Learning with Constrained Sensing Capability in Urban Infrastructure Systems

Susu Xu

2:40 pm | Towards Millimeter Wave Sensing for Smart Applications

Zhicheng Yang

3:00-3:30 pm | Coffee Break (Room 218-Parc Mont Royal B+C)

# Monday, April 15

## **Session 2**

**3:30 pm | Wearable IoT Devices for Health Monitoring**

Ganapati Bhat

**3:50 pm | Towards Privacy-Preserving Sensor Data Sharing with On-Device Applications**

Mohammad Malekzadeh

**4:10 pm | Local Differential Privacy for Big IoT Data**

Fatima Zahra Errounda

**4:30 pm | Vibrational Biometrics-Based Key Generation System for Body Area Network**

Qi Lin

**4:50 pm | Secure Communication Protocol for Smart Transportation based on Vehicular Cloud**

Trupil Limbasiya

# Tuesday, April 16

8:00-9:00 am

Registration (Mezzanine)

9:00-10:00 am

**Keynote: The Brain Fueling the Fourth Industrial Revolution**  
**Victor Bahl, Microsoft**  
(Room 221-Place du Canada)

10:00-10:30 am

Coffee Break (Room 218-Parc Mont Royal B+C)

10:30 am-12:30 pm

Conference Session #1

## Session 1: Reachability

Room 215-Av.Duluth

Session Chair: Ian Mitchell

10:30 am | Falsification of Hybrid Systems using Symbolic Reachability and Trajectory Splicing

Sergiy Bogomolov, Goran Frehse, Amit Gurung, Dongxu Li, Georg Martius, and Rajarshi Ray

11:00 am | Inner and Outer Reachability for the Verification of Control Systems

Eric Goubault and Sylvie Putot

11:30 am | Numerical Verification of Affine Systems with up to a Billion Dimensions

Stanley Bak, Hoang Dung Tran, and Taylor T. Johnson

12:00 pm | SReachTools: A MATLAB Stochastic Reachability Toolbox

Abraham P. Vinod, Joseph D. Gleason, and Meeko M. K. Oishi

12:15 pm | JuliaReach: A Toolbox for Set-Based Reachability

Sergiy Bogomolov, Marcelo Forets, Goran Frehse, Kostiantyn Potomkin, and Christian Schilling

## Session 1: CPS Security I

Room 213-Av.Van-Horne

Session Chair: Oleg Sokolsky

10:30 am | Introductory Remarks

10:40 am | Availability Attacks on Computing Systems through Alteration of Environmental Control: Smart Malware Approach

Keywhan Chung, Zbigniew Kalbarczyk, and Ravishankar Iyer

11:10 am | Synthesizing Stealthy Reprogramming Attacks on Cardiac Devices

Nicola Paoletti, Zhihao Jiang, Md Ariful Islam, Houssam Abbas, Rahul Mangharam, Shan Lin, Zachary Gruber, and Scott Smolka

11:40 am | TACAN: Transmitter Authentication through Covert Channels in Controller Area Networks

Xuhang Ying, Giuseppe Bernieri, Mauro Conti, and Radha Poovendran

12:10 pm | Preventing Battery Attacks on Electrical Vehicles Based on Data-Driven Behavior Modeling

Liuwang Kang and Haiying Shen

HSCC

ICCPs



# Tuesday, April 16

IPSN

## Session 1: Location Tracking

Room 217-Av.Viger

Session Chair: Olga Saukh

10:30 am | 3D-OmniTrack: 3D Tracking with COTS RFID Systems

Chengkun Jiang, Yuan He, Songzhen Yang, Junchen Guo, and Yunhao Liu

11:00 am | Chorus: UWB Concurrent Transmissions for GPS-Like Passive Localization of Countless Targets

Pablo Corbalán, Gian Pietro Picco, and Sameera Palipana

11:30 am | SnapLoc: An Ultra-Fast UWB-Based Indoor Localization System for an Unlimited Number of Tags

Bernhard Großwindhager, Michael Stocker, Michael Rath, Carlo Alberto Boano, and Austria Kay Römer

12:00 pm | Tracking from One Side – Multi-Person Passive Tracking with WiFi Magnitude Measurement

Chitra R. Karanam, Belal Korany, and Yasamin Mostofi

IoTDI

## Session 1: IoT for Buildings

Room 202-Rue Sainte-Catherine/Room 200-Rue Saint-Paul

Session Chair: Xiaofan (Fred) Jiang

10:30 am | Introductory Remarks

11:00 am | Anonymizing Building Data for Data Analytics in Cross-Organizational Settings

Jens Hjort Schwee, Fisayo Caleb Sangogboye, and Mikkel Baun Kjærgaard

11:30 am | DeviceMien: Network Device Behavior Modeling for Identifying Unknown IoT Devices

Jorge Ortiz, Catherine H. Crawford, and Franck Le

12:00 pm | A Domain Adaptation Technique for Fine-Grained Occupancy Estimation in Commercial Buildings

Tianyu Zhang and Omid Ardakanian

RTAS

## TCRTS Award Ceremony

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

Session Chair: Rodolfo Pellizzoni

10:30 am | 2018 TCRTS Outstanding Technical Achievement and Leadership Award Acceptance Speech

James H. Anderson

## Session 1: Multicore and GPUs

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

Session Chair: Hyoseung Kim

11:20 am | Deterministic Memory Hierarchy and Virtualization for Modern Multi-Core Embedded Systems

Tomasz Kloda, Marco Solieri, Renato Mancuso, Nicola Capodiecì, Paolo Valente, and Marko Bertogna

# Tuesday, April 16

RTAS

**11:40 am | Accurate ILP-Based Contention Modeling on Statically Scheduled Multicore Systems**

Xavier Palomo, Enrico Mezzetti, Jaume Abella, Reinder J. Bril, and Francisco J. Cazorla

**12:00 pm | Fractional GPUs: Software-Based Compute and Memory Bandwidth Reservation for GPUs**

Saksham Jain, Iljoo Baek, Shige Wang, and Ragunathan (Raj) Rajkumar

**12:30-2:00 pm**

**Lunch** (Room 221-Place du Canada/Room 219-Av. Laurier)

**2:00-3:30 pm**

**Conference Session #2**

HSCC

**Session 2: Temporal Logics**

**Room 215-Av.Duluth**

**Session Chair: Lu Feng**

**2:00 pm | Revisiting Timed Logics with Automata Modalities**

Hsi-Ming Ho

**2:30 pm | Interface-Aware Signal Temporal Logic**

Thomas Ferrere, Dejan Ničković, Alexandre Donze, Hisahiro Ito, and James Kapinski

**3:00 pm | Temporal Logic Robustness for General Signal Classe**

Houssam Abbas, Yash Vardhan Pant, and Rahul Mangharam

ICCPs

**Session 2: Control Design, Analysis, and Implementation**

**Room 213-Av.Van-Horne**

**Session Chair: Radu Grosu**

**2:00 pm | HyPLC: Hybrid Programmable Logic Controller Program Translation for Verification**

Luis Garcia, Stefan Mitsch, and Andre Platzer

• ***ICCPs Best Paper Award Finalist***

**2:30 pm | PGCD: Robot Programming and Verification with Geometry, Concurrency, and Dynamics**

Gregor Banušić, Rupak Majumdar, Marcus Pirron, Anne-Kathrin Schmuck, and Damien Zufferey

**3:00 pm | Programming Event Processors with ThingFlow**

Jeffrey Fischer and Rupak Majumdar

IPSN

**Session 2: Configuration and Calibration**

**Room 217-Av.Viger**

**Session Chair: Branco Kusy**

**2:00 pm | Can a Phone Hear the Shape of a Room?**

Oliver Shih and Anthony Rowe

**2:30 pm | LongShoT: Long-Range Synchronization of Time**

Ceferino Gabriel Ramirez, Anton Sergeev, Assya Dyussenova, and Bob Iannucci

**3:00 pm | SmartDashCam: Automatic Live Calibration for DashCams**

Gopi Krishna Tummala, Tanmoy Das, Prasun Sinha, and Rajiv Ramnath

# Tuesday, April 16

## Session 2: Edge Computing and Resource Management

Room 202-Rue Sainte-Catherine/Room 200-Rue Saint-Paul

Session Chair: Valerie Issarny

**2:00 pm | HeteroEdge: Taming the Heterogeneity of Edge Computing System in Social Sensing**

Daniel Zhang, Md Tahmid Rashid, Xukun Li, Nathan Vance, and Dong Wang

**2:30 pm | Using Virtualized Task Isolation to Improve Responsiveness in Mobile and IoT Software**

Neil Klingensmith and Suman Banerjee

**3:00 pm | An Execution Model for Serverless Functions at the Edge**

Adam Hall and Umakishore Ramachandran

## Session 2: Systems and Applications I

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

Session Chair: Shahriar Nirjon

**2:00 pm | Doorpler: A Radar-Based System for Low Power, Real-Time Zone Occupancy Sensing**

Avinash Kalyanaraman, Elahe Soltanaghaei, and Kamin Whitehouse

**2:20 pm | PIFA: An Intelligent Phase Identification and Frequency Adjustment Framework for Time-Sensitive Mobile Computing**

Xia Zhang, Xusheng Xiao, Liang He, Yun Ma, Yangyang Huang, Xuanzhe Liu, Wenyao Xu, and Cong Liu

**2:40 pm | Deterministic Futexes: Addressing WCET and Bounded Interference Concerns**

Alexander Zuepke and Robert Kaiser

**3:00 pm | Chaos: A System for Criticality-Aware, Multi-Core Coordination**

Phani Kishore Gadepalli, Gregor Peach, Gabriel Parmer, Joseph Espy, and Zach Day

**3:30-4:00 pm**

Coffee Break (Room 218-Parc Mont Royal B+C)

**4:00-5:30 pm**

Conference Session #3

## Session 3: Decidability and Complexity

Room 215-Av.Duluth

Session Chair: Jana Tumova

**4:00 pm | On the Decidability of Reachability in Linear Time-Invariant Systems**

Nathanaël Fijalkow, Joel Ouaknine, Amaury Pouly, Joao Sousa Pinto, and James Worrell

**4:30 pm | On the Decidability of Linear Bounded Periodic Cyber-Physical Systems**

Ruggero Lanotte, Massimo Merro, and Fabio Mogavero

**5:00 pm | Facetal Abstraction for Non-Linear Dynamical Systems Based on Delta-Decidable SMT**

Nikola Benes, Lubos Brim, Jana Dražanová, Samuel Pastva, and David Šafránek

# Tuesday, April 16

## Posters

### StochHy - Automated Verification and Synthesis of Stochastic Processes

Nathalie Cauchi and Alessandro Abate

### Formal Methods for Computing Hyperbolic Invariant Sets for Nonlinear Systems

Guillaume O. Berger and Raphaël M. Jungers

### Predictive Monitoring for Signal Temporal Logic with Probabilistic Guarantees

Xin Qin and Jyotirmoy Deshmukh

### Invariant, Viability, and Discriminating Kernel Under-Approximation via Zonotope Scaling

Ian Mitchell, Jacob Budzis, and Andriy Bolyachevets

### Structured Reward Functions using STL

Anand Balakrishnan and Jyotirmoy Deshmukh

### Moore-Machine Filtering for Timed and Untimed Pattern Matching

Masaki Waga and Ichiro Hasuo

### Encrypted Control System with Quantizer

Masako Kishida

### Equalized Recovery: Weakening Invariance for Control and Estimation

Kwesi Rutledge, Sze Zheng Yong, and Necmiye Ozay

### Combining LTL Monitoring with Model Invalidation for Improved Fault Detectability Analysis for Hybrid Systems

Liren Yang and Necmiye Ozay

### Safety Control with Preview Automaton

Zexiang Liu and Necmiye Ozay

### Safety Characterization in Hybrid Inclusions using Barrier Functions

Mohamed Adlene Maghenem and Ricardo Sanfelice

### Relational Differential Dynamic Logic

Juraj Kolčák, Ichiro Hasuo, Jérémy Dubut, Shin-Ya Katsumata, David Sprunger, and Akihisa Yamada

## Demos

### Sherlock – A Tool for Verification of Neural Network Feedback Systems

Souradeep Dutta, Xin Chen, Susmit Jha, Sriram Sankaranarayanan, and Ashish Tiwari

### SReachTools: A MATLAB Stochastic Reachability Toolbox

Abraham P. Vinod, Joseph Gleason, and Meeko Oishi

## Session 3: Work-in-Progress, Demo and Poster Presentations

Room 213-Av.Van-Horne

Session Chair: [James Weimer](#)

## Works-in-Progress

### Control of Water Distribution Networks using Convex Approximations

Shen Wang, Ahmad F. Taha, Nikolaos Gatsis, and Marcio H. Giacomoni

### Deep Intelligent Network for Device-Free People Tracking

Yang Zhao, Ming-Ching Chang, and Peter Tu

### On the Need for Sensor and Actuator Placement Algorithms in Nonlinear Systems

Sebastian Nugroho and Ahmad F. Taha

## **Hierarchical Taxi Dispatch System with Local Coordination among Micro-Level Components**

Sota Takashima, Naomi Kuze, and Toshimitsu Ushio

## **Towards Approximate Opacity of Cyber-Physical Systems**

Xiang Yin and Majid Zamani

## **Feature Characterization for CPS Software Reuse**

Nayreet Islam and Akramul Azim

## **FPGA-Based Amoeba-Inspired SAT Solver for Cyber-Physical Systems**

Anh Hoang Ngoc Nguyen, Masashi Aono, and Yuko Hara-Azumi

## **A Multilevel Cybersecurity and Safety Monitor for Embedded Cyber-Physical Systems**

Smitha Gautham, Georgios Bakirtzis, Matthew T. Leccadito, Robert H. Klenke, and Carl R. Elks

## **Interactive Explanation for Planning-Based Systems**

Ellin Zhao and Roykrong Sukkerd

## **Data-Based Model of Metro Scheduling for Passenger Wait-Time Optimization with Constraints**

Minji Kim, Hee Jung Yoon, Sang Hyuk Son, and Yongsoon Eun

## **String Stability of Commercial Adaptive Cruise Control Vehicles**

George Gunter, Yanbing Wang, Derek Gloudemans, Raphael Stern, Daniel Work, Maria Laura Delle Monache, Rahul Bhadani, Matt Bunting, Roman Lysecky, Jonathan Sprinkle, Benjamin Seibold, and Benedetto Piccoli

## **Implementation of Demand Response for a Block of Buildings for Active Participation in the Electricity Market**

Ramanunni Parakkal Menon, Jessen Page, and Frederic Amblard

## **Bounding Network-Induced Delays for Time-Critical Services in Avionic Systems Using Measurements and Network Calculus**

Huan Yang, Liang Cheng, and Xiaoguang Ma

## **Posters**

### **Consistency and Synchronization for Workflows in Cyber-Physical Systems**

Ronny Seiger and Uwe Assmann

### **Towards an Emotionally-Aware Smart Wheelchair**

Ariadna Estrada and Ian M. Mitchell

### **Toward Multi-Task Support and Security Analyses in PLC Program Translation for Verification**

Luis Garcia, Stefan Mitsch, and Andre Platzer

## **Demos**

### **MATLAB/Simulink Benchmark Suite for ROS-Based Self-Driving System**

Shota Tokunaga, Noriyuki Ota, Yoshiharu Tange, Keita Miura, and Takuya Azumi

### **Contract-Based Hierarchical Resilience Framework for Cyber-Physical Systems**

Daniel Jun Xian Ng, Arvind Easwaran, and Sidharta Andalam

### **Event Stream Abstraction Using nfer**

Sean Kauffman and Sebastian Fischmeister

### **iAdhere: A Voice Interactive Assistant to Improve Adherence to Medical Treatments**

Sirat Samyoun, Md Abu Sayeed Mondol, Ifat A. Emi, and John A. Stankovic

### **Incident Management and Analysis Dashboard for Fire Departments**

Geoffrey Pettet, Ayan Mukhopadhyay, Chinmaya Samal, Abhishek Dubey, and Yevgeniy Vorobeychik

# Tuesday, April 16

ICCPs

## Cyber-Physical Systems Virtual Organization: Active Resources

Stephen Rees, Tamas Kecskes, Patrik Meijer, Taylor Johnson, Katie, Paulo Tabuada, and Marcus Lucas

## A CPS Toolchain for Learning-Based Systems

Charles Hartsell, Nagabhushan Mahadevan, Shreyas Ramakrishna, Abhishek Dubey, Theodore Bapty, and Gabor Karsai

## Security Analysis for CITS-SOC using Sensor Data from Connected Vehicles

Takafumi Harada, Keita Hasegawa, Yuichiro Dan, Tomoaki Washio, and Yoshihito Oshima

## Pseudorange Measurement Outlier Detection for Navigation with Cellular Signals

Zaher Kassas, Mahdi Maaref, and Joe Khalife

## A Benchmarking Framework for Control and Optimization of Smart Stormwater Networks

Sara P. Rimer, Abhiram Mullapudi, Sara C. Troutman, and Branko Kerkez

IPSN

## Session 3: Deployments

### Room 217-Av.Viger

Session Chair: [Shijia Pan](#)

### 4:00 pm: Event-Triggered Natural Hazard Monitoring with Convolutional Neural Networks on the Edge

Matthias Meyer, Timo Farei-Campagna, Akos Pasztor, Reto Da Forno, Tonio Gsell, Jérôme Faillettaz, Andreas Vieli, Samuel Weber, Jan Beutel, and Lothar Thiele

### 4:30 pm: 1-Minute Poster/Demo Madness (50 minutes, Co-Hosted by IPSN & IoTDI)

#### Posters

#### Privacy-Preserving Control Message Dissemination for PVCPS

Kai Li, Yousef Emami, and Eduardo Tovar

#### Synchronous Automatic Training for Wearable Sensors via Knowledge Distillation

Yuanyuan Bao, Yang Li, Liqiu Ma, and Wai Chen

#### A Maximal Correlation Embedding Method for Multilabel Human Context Recognition

Lu Li, Yang Li, Xiangxiang Xu, and Lin Zhang

#### Array Resource Allocation Based on KKT Optimization for Radar and Communication Integration

Zhenkai Zhang, Guangyao Zhu, and Mohamad Farzan Sabahi

#### SoftLoRa – A LoRa-Based Platform for Accurate and Secure Timing

Chaojie Gu, Rui Tan, and Jun Huang

#### Vehicle Dispatching for Sensing Coverage Maximization in Mobile Crowdsensing Systems

Susu Xu, Xinlei Chen, Xidong Pi, Carlee Joe-Wong, Pei Zhang, and Hae Young Noh

#### Unsupervised Anomaly Detection via Generative Adversarial Networks

Hanling Wang, Mingyang Li, Fei Ma, Shao-Lun Huang, and Lin Zhang

#### I2C Considered Wasteful: Saving Energy with Host-Controlled Pull-Up Resistors

Daniel Friesel and Olaf Spinczyk

#### Evaluation of a LoRa Mesh Wireless Networking System Supporting Time-Critical Transmission and Data Lost Recovery

Chi-Wen Liang, Yung-Lin Wu, Cheng-Yu Shi, Shu-Min Lu, and Huang-Chen Lee

#### Gait Health Monitoring Through Footstep-Induced Floor Vibrations

Jonathon Fagert, Mostafa Mirshekari, Shijia Pan, Pei Zhang, and Hae Young Noh

IPSN & IoTDI

## **An Automated Real-Time and Affordable Airborne Pollen Sensing System**

Nam Cao, Olga Saukh, and Lothar Thiele

## **Multi-Channel Software-Based MAC Protocol for UWSNs**

Ahmed Al Guqhaiman, and Edward Chow

## **On-Device Training from Sensor Data on Batteryless Platforms**

Bashima Islam, Yubo Luo, Seulki Lee, and Shahriar Nirjon

## **IoT Enabled Wi-Fi Indoor Positioning System Using Raster Maps**

Muhammad Usman Ali, Soojung Hur, and Yongwan Park

## **Carrier Scheduling in IoT Networks with Interoperable Battery-Free Backscatter Tags**

Carlos Pérez-Penichet and Thiemo Voigt

## **IoT-Enabled Traffic Analysis: A Case Study**

Linna Wu, Huan Li, Feng Ren and Lizhuo Zhang

## **Wireless Access to Ultimate Virtual Reality 360-Degree Video**

Huanle Zhang, Zhicheng Yang, and Prasant Mohapatra

## **A SimPy-Based Simulation Testbed for Smart-City IoT Applications**

Neha Karanjkar, Poorna Chandra Tejasvi, and Bharadwaj Amrutur

## **Supporting Fog/Edge-Based Cognitive Assistance IoT Services for the Visually Impaired**

Shashank Shekhar, Ajay Chhokra, Hongyang Sun, Aniruddha Gokhale, Abhishek Dubey, and Xenofon Koutsokos

## **IoT Testbed for Dynamic Management of Fine dust in Indoor Environments**

Jongkwon Son, Myung-Eun Kim, and Young-Sung Son

## **Neural Sensor Translation**

Md Abu Sayeed Mondol and John A. Stankovic

## **BESI: Behavior Learning and Tracking with Wearable and In-Home Sensors – A Dementia Case-Study**

Ridwan Alam, Nutta Homdee, Sean Wolfe, James Hayes, and John Lach

## **Demos**

### **The Dual Processor Platform Architecture**

Jan Beutel, Roman Trueb, Reto Da Forno, Markus Wegmann, Tonio Gsell, Romain Jacob, Michael Keller, Felix Sutton, and Lothar Thiele

### **Low Power, Portable and Infrastructure Light Indoor UWB Ranging Solution**

Nicola Maccoir, Matteo Ridolfi, Jan Bauwens, Bart Joris, Ben Vanherbruggen, Jen Rossey, Jeroen Hoebeke, and Eli De Poorter

### **Fast Feedback Control and Coordination with Mode Changes for Wireless Cyber-Physical Systems**

Fabian Mager, Dominik Baumann, Romain Jacob, Lothar Thiele, Sebastian Trimpe, and Marco Zimmerling

### **A Testbed for Long-Range LoRa Communication**

Roman Trüb, Reto Da Forno, Tonio Gsell, Jan Beutel, and Lothar Thiele

### **A Sensor-Fusion Approach System for Detecting Early Extravasation of Infant Intravenous Infusion**

Jheng-Sing Lin, Che-Wei Kuo, Wei-Chen Huang, and Huang-Chen Lee

### **TotTernary – A Wearable Platform for Social Interaction Tracking**

Andreas Biri, Pat Pannuto, and Prabal Dutta

# Tuesday, April 16

IPSN & IoTDI

## **SnapLoc: An Ultra-Fast UWB-Based Indoor Localization System for an Unlimited Number of Tags**

Stocker Michael, Bernhard Großwindhager, Carlo Alberto Boano, and Kay Römer

## **How Many Climb the Matterhorn?**

Matthias Meyer, Timo Farei-Campagna, Akos Pasztor, Reto Da Forno, Jan Beutel, and Lothar Thiele

## **Introducing Collaborative Reception to Low-Power Wide-Area Networking**

Adwait Dongare, Anh Luong, Artur Balanuta, and Anthony Rowe

## **Desk Buddy: An Office Activity Detection System**

Amelie Bonde, Shijia Pan, Hae Young Noh, and Pei Zhang

## **A Long-Lifetime Sensor Platform for A Reliable Internet of Things**

Neal Jackson, Joshua Adkins, and Prabal Dutta

## **Secure Pairing via Video and IMU Verification**

Carlos Ruiz, Shijia Pan, Hae Young Noh, Pei Zhang, and Jun Han

## **Heterogeneous Social Sensing Edge Computing System for Deep Learning Based Disaster Response**

Daniel (Yue) Zhang and Dong Wang

## **IoT-Enabled Highway Safety Pre Warning System**

Feng Ren, Lizhuo, and Zhang Huan Li

## **Participatory Design Fiction for Innovation in Everyday Wearable IoT Systems**

Helen Oliver

## **DDFlow Visualized Declarative Programming for Heterogeneous IoT Networks on Heliot Testbed Platform**

Joseph Noor, Sandeep Singh Sandha, Luis Garcia, and Mani Srivastava

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## **Session 3: Brief Presentations**

**Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame**

**Session Chair: Mitra Nasri**

**4:00 pm: Work-In-Progress and Demo Presentations**

## **Work-in-Progress (WiP)**

### **Experience Report: Lightweight Implementation of a Controller Area Network to Ethernet Gateway**

Florian Pözlbauer and Allan Teng

### **Time-Aware Deep Intelligence on Batteryless Platforms**

Bashima Islam, Seulki Lee, and Shahriar Nirjon

### **SpotON: Just-in-Time Active Event Detection on Energy Autonomous Sensing Systems**

Yubo Luo and Shahriar Nirjon

### **A Unified Runtime Framework for Weakly-hard Real-time Systems**

Hyunjong Choi and Hyoseung Kim

### **Memory Mapping Analysis for Automotive Systems**

Robert Höttger, Lukas Krawczyk, Burkhard Igel, and Olaf Spinczyk

### **QRONOS: Towards Quality-Aware Responsive Real-Time Control Systems**

Peter Ulbrich and Maximilian Gaukler

### **AUTOSAR Runnable Scheduling for Automobile Control Application's Optimal Performance**

Daeho Choi, Wootae Jeon, and Jong-Chan Kim

RTAS



# Tuesday, April 16

RTAS

## Tools and Systems Demos

**Demo Abstract: Testbed for Practical Considerations in Mixed-Criticality System Design**  
Vijaya Kumar Sundar and Arvind Easwaran

**On Solving the IoT Development Silo Problem**  
Michael C. Brogioli, William Games, and Richard Moats

**Static Program Placement Platform for Embedded Multi-Core Multi-Cluster Systems**  
Seiya Maeda, Yuya Maruyama, and Takuya Azumi

**Fractional GPUs: Software-based Compute and Memory Bandwidth Reservation for GPUs**  
Saksham Jain, Iljoo Baek, Shige Wang, and Ragnathan (Raj) Rajkumar

**Participatory Design Fiction for Innovation in Everyday Wearable IoT Systems**  
Helen Oliver

**DDFlow Visualized Declarative Programming for Heterogeneous IoT Networks on Heliot Testbed Platform**  
Joseph Noor, Sandeep Singh Sandha, Luis Garcia, and Mani Srivastava

Competitions

**F1/10: 4th F1/10 International Autonomous Racing Competition**  
Room 220-Square Dorchester/Room 218A-Parc Mont Royal A | Two-Day Event  
Race Director: [Madhur Behl](#)

### Day 2: Race Day

**08:30-9:30 am | Track Setup** (Room 220-Square Dorchester)

**10:00:10:30 am | Autonomous Drivers Briefing** (Room 220-Square Dorchester)

**10:30 am-12:30 pm | Warm-up Session: Car inspection, timing system recheck** (Room 220-Square Dorchester)

**12:30-2:00 pm | Lunch** (Room 221-Place du Canada/Room 219-Av. Laurier)

**2:00-5:00 pm | Track available for brief warm up / mapping** (Room 220-Square Dorchester)

- Time trials begin - Heat 1
- Head to head practice

**5:30-7:00 pm | Final Race** (Room 220-Square Dorchester/Room 218A-Parc Mont Royal - A)

- Time trial final heat (30-40 minutes)
- Head to head racing (30-40 minutes)

**7:00 pm | Closing Remarks** (Room 220-Square Dorchester)

**5:30-8:00 pm**      **Cocktail with CPS-IoT Week Joint Poster Demo Session**  
Room Agora/Centre-Ville

# Wednesday, April 17

8:00-9:00 am Registration (Mezzanine)

9:00-10:00 am **Keynote: The Siren Song of Temporal Synthesis**  
**Moshe Y. Vardi, Rice University**  
(Room 221-Place du Canada)

10:00-10:30 am **Coffee Break** (Room 218-Parc Mont Royal B+C)

10:30 am-12:30 pm **Conference Session #4**

## Session 4: Stability and Invariance

Room 215-Av.Duluth

Session Chair: Majid Zamani

10:30 am | **Characterizations of Safety in Hybrid Inclusions via Barrier Functions**  
Mohamed Maghenem and Ricardo Sanfelice

11:00 am | **On Topological Entropy and Stability of Switched Linear Systems**  
Guosong Yang, Joao Hespanha, and Daniel Liberzon

11:30 am | **Robust Invariant Sets Generation for State-Constrained Perturbed Polynomial Systems**  
Bai Xue, Qiuye Wang, Naijun Zhan, and Martin Fraenzle

12:00 pm | **A Complete Characterization of the Ordering of Path-Complete Methods**  
Matthew Philippe and Raphaël Jungers

## Session 4: Wireless & Control in CPS

Room 213-Av.Van-Horne

Session Chair: Arvind Easwaran

10:30 am | **Optimal Dynamic Scheduling of Wireless Networked Control Systems**  
Yehan Ma, Jianlin Guo, Yebin Wang, Ankush Chakrabarty, Heejin Ahn, Philip Orlik, and Chenyang Lu

11:00 am | **Sampling Rate Optimization for IEEE 802.11 Wireless Control Systems**  
Dohwan Kim, Yuchang Won, Seunghyeon Kim, Yongsoon Eun, Kyung-Joon Park, and Karl H. Johansson

11:30 am | **Feedback Control Goes Wireless: Guaranteed Stability over Low-Power Multi-Hop Networks**  
Fabian Mager, Dominik Baumann, Romain Jacob, Lothar Thiele, Sebastian Trimpe, and Marco Zimmerling

• **ICCPS Best Paper Award Finalist**

12:00 pm | **Age-of-Information vs. Value-of-Information Scheduling for Cellular Networked Control Systems**  
Onur Ayan, Mikhail Vilgelm, Markus Klügel, Sandra Hirche, and Wolfgang Kellerer

HSCC

ICCPS

# Wednesday, April 17

IPSN

## Session 4: AI Related

Room 217-Av.Viger

Session Chair: Lu Su

10:30 am | Transferring Activity Recognition Models for New Wearable Sensors with Deep Generative Domain Adaptation

Ali Akbari and Roozbeh Jafari

11:00 am | Mic2Mic: Using Consistent Generative Adversarial Networks to Overcome Microphone Variability in Speech Systems

Akhil Mathur, Anton Isopoussu, Fahim Kawsar, Nadia Berthouze, and Nicholas D. Lane

11:30 am | SoundSemantics: Exploiting Semantic Knowledge in Text for Embedded Acoustic Event Classification

Md Tamzeed Islam and Shahriar Nirjon

12:00 pm | SGSF: A Small Groups Based Serial Fusion Method

Nian Wang, Zhe Zhang, Tingting Li, Jing Xiao, and Li Cui

IoT/DTI

## Session 4: Wireless and Networking for IoT

Room 202-Rue Sainte-Catherine/Room 200-Rue Saint-Paul

Session Chair: Umakishore Ramachandran

10:30 am | On The Feasibility of Estimating Soluble Sugar Content using Millimeter-Wave  
Zhicheng Yang, Parth H. Pathak, Mo Sha, Tingting Zhu, Junai Gan, Pengfei Hu, and Prasant Mohapatra

11:00 am | Challenges in using Time Slotted Channel Hopping with Ultra Wideband Communications

Charlier Maximilien, Bruno Quoitin, and David Hauweele

11:30 am | Implementation of LPWAN over White Spaces for Practical Deployment

Mahbubur Rahman, Dali Ismail, Venkata P. Modekurthy, and Abusayeed Abusayeed

12:00 pm | Network Service Dependencies in Commodity Internet-of-Things Devices

Poonam Yadav, Qi Li, Anthony Brown, and Richard Mortier

RTAS

## Session 4: Security and Differential Timing Analysis

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

Session Chair: Bryan Ward

10:30 am | A Novel Side-Channel in Real-Time Schedulers

Chien-Ying Chen, Sibin Mohan, Rodolfo Pellizzoni, Rakesh B. Bobba, and Negar Kiyavash

10:50 am | On the Limitations and Vulnerabilities of Schedule Randomization against Schedule-Based Attacks

Mitra Nasri, Thidapat (Tam) Chantem, Gedare Bloom, and Ryan M. Gerdes

11:10 am | Characterizing Dominant Program Behavior Using the Execution-Time Variance of the Call Structure

Tushar Kumar, Kangqi Ni, and Santosh Pande

11:40 am | Breakout Session/Collaboration Time

# Wednesday, April 17

12:30-2:00 pm

Lunch (Room 221-Place du Canada/Room 219-Av. Laurier)

2:00-3:30 pm

Conference Session #5

HSCC

## Session 5: Special Session on Safe autonomy, AI and ML for CPS I

Room 215-Av.Duluth

Session Chair: Georgios Fainekos

2:00 pm | Neural Network Verification via SMT Solving

Guy Katz

2:30 pm | Formal Verification of Neural Network Controlled Autonomous Systems

Xiaowu Sun, Haitham Khedr, and Yasser Shoukry

ICCPs

## Session 5: CPS Security II

Room 213-Av.Van-Horne

Session Chair: Mohammad Al Faruque

2:00 pm | Managing the Security-Energy Tradeoff in Distributed Cyber-Physical Systems

Anh-Duy Vu, Ramy Medhat, and Borzoo Bonakdarpour

2:30 pm | Encrypted LQG using Labeled Homomorphic Encryption

Andreea Alexandru and George Pappas

• ICCPs Best Paper Award Finalist

3:00 pm | Two-Way Coding in Control Systems Under Injection Attacks: From Attack Detection to Attack Correction

Song Fang, Karl Henrik Johansson, Mikael Skoglund, Henrik Sandberg, and Hideaki Ishii

IPSN

## Session 5: Energy Management and Low-Power Systems

Room 217-Av.Viger

Session Chair: Bodhi Priyantha

2:00 pm | Getting More Out of Energy-Harvesting Systems: Energy Management under Time-Varying Utility with Preact

Kai Geissdoerfer, Raja Jurdak, Brano Kusy, and Marco Zimmerling

2:30 pm | Capacity over Capacitance for Reliable Energy Harvesting Sensors

Neal Jackson, Joshua Adkins, and Prabal Dutta

3:00 pm | BackCam: Wireless Computer Vision Using Commodity Devices

Colleen Josephson, Lei Yang, Pengyu Zhang, and Sachin Katti

IoTDI

## Session 5: Privacy for IoT

Room 202-Rue Sainte-Catherine/Room 200-Rue Saint-Paul

Session Chair: Mo Sha

2:00 pm | Mobile Sensor Data Anonymization

Mohammad Malekzadeh, Richard G. Clegg, Andrea Cavallaro, and Hamed Haddadi

2:30 pm | On Lightweight Privacy-Preserving Collaborative Learning for Internet-of-Things Objects

Linshan Jiang, Rui Tan, Xin Lou, and Guosheng Li

# Wednesday, April 17

IoT/DTI

**3:00 pm | TargetFinder: Privacy Preserving Target Search through IoT Cameras**  
Youssef Khazbak, Junpeng Qiu, Tianxiang Tan, and Guohong Cao

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## Session 5: Parallel Tasks

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

Session Chair: Mohamed Hassan

**2:00 pm | Bundled Scheduling of Parallel Real-Time Tasks**  
Saud Wasly and Rodolfo Pellizzoni

**2:20 pm | RT-Gang: Real-Time Gang Scheduling Framework for Safety Critical Systems**  
Waqar Ali and Heechul Yun

**2:40 pm | Energy-Efficient Real-Time Scheduling of DAGs on Clustered Multi-Core Platforms**  
Zhishan Guo, Ashikahmed Bhuiyan, Di Liu, Aamir Khan, Abusayeed Saifullah, and Nan Guan

**3:00 pm | Calculating Response Time Bounds for OpenMP Task Systems with Conditional Branches**  
Jinghao Sun, Nan Guan, Jingchang Sun, and Yaoyao Chi

**3:30-4:00 pm** Coffee Break (Room 218-Parc Mont Royal B+C)

**4:00-5:30 pm** Conference Session #6

RTAS

HSCC

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## Session 6: Special Session on Safe Autonomy, AI, and ML for CPS II

Room 215-Av.Duluth

Session Chair: Jyotirmoy Deshmukh

**4:00 pm | Reachability Analysis for Neural Feedback Systems using Regressive Polynomial Rule Inference**  
Souradeep Dutta, Xin Chen, and Sriram Sankaranarayanan

**4:30 pm | Verifying Safety Properties of Hybrid Systems with Neural Network Controllers**  
Radoslav Ivanov, James Weimer, Rajeev Alur, George Pappas, and Insup Lee Verisig

**5:00 pm | Gray-Box Adversarial Testing for Control Systems with Machine Learning Components**  
Shakiba Yaghoubi and Georgios Fainekos

**5:15 pm | Discussion**  
All attendees

ICCPs

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## Session 6: CPS Applications I

Room 213-Av.Van-Horne

Session Chair: Rahul Mangharam

**4:00 pm | Augmenting In-Situ with Mobile Sensing for Adaptive Monitoring of Water Distribution Networks**  
Praveen Venkateswaran, Mahima Agumbe Suresh, and Nalini Venkatasubramanian

**4:30 pm | Robustness Evaluation of Computer-Aided Clinical trials for Medical Devices**  
Kuk Jin Jang, Yash Vardhan Pant, Bo Zhang, James Weimer, and Rahul Mangharam

# Wednesday, April 17

ICCPs

**5:00 pm | Tagging Wearable Accelerometers in Camera Frames through Information Translation between Vision Sensors and Accelerometers**

Ali Akbari, Peiming Liu, Bobak J. Mortazavi, and Roozbeh Jafari

**5:30 pm | An Online Decision-Theoretic Pipeline for Responder Dispatch**

Geoffrey Pettet, Ayan Mukhopadhyay, Chinmaya Samal, Abhishek Dubey, and Yevgeniy Vorobeychik Vorobeychik

IPSN & IoTDI

**Panel Session: The Good, The Bad & The Ugly of AI for IoT & Sensor Network**  
**Room 217-Av.Viger**

**Chair: Klara Nahrstedt**

**4:00 pm | Panel Discussion (Co-Hosted by IPSN & IoTDI)**

**Panelist:**

- Lucy Cherkasova
- Dirk Elias
- Tasuku Ishigooka
- Jie Liu
- Guoliang Xing

RTAS

**Session 6: Networks**

**Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame**

**Session Chair: Rakesh Bobba**

**4:00 pm | CertiCAN: A Tool for the Coq Certification of CAN Analysis Results**

Pascal Fradet, Xiaojie Guo, Jean-François Monin, and Sophie Quinton

**4:20 pm | Optimal Priority Assignment for Scheduling Mixed CAN and CAN-FD Frames**

Taeju Park and Kang G. Shin

**4:40 pm | Fault-Resilient Real-Time Communication Using Software-Defined Networking**

Kilho Lee, Minsu Kim, Hayeon Kim, Jinkyu Lee, Hoon Sung Chwa, and Insik Shin

**5:00 pm | DistributedHART: A Distributed Real Time Scheduling System for WirelessHART Networks**

Venkata Prashant Modekurthy and Abusayeed Saifullah, and Sanjay Madria

**5:30-6:00 pm**

**Business Meeting**

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

**6:00-6:30 pm**

**SIGBED Members Meeting**

Room 213-Av.Van-Horne

**7:00-10:00pm**

**CPS-IoT Week Banquet**

Room 221-Place du Canada/Room 219-Av. Laurier

# Thursday, April 18

8:00-9:00 am	Registration (Mezzanine)
9:00-10:00 am	Keynote:(Low) Powering Real-Time Intelligence at the Edge Tulika Mitra, National University of Singapore (Room 221-Place du Canada)
10:00-10:30 am	Coffee Break (Room 218-Parc Mont Royal B+C)
10:30 am-12:30 pm	Conference Session #7

## Session 7: Verification

Room 215-Av.Duluth

Session Chair: Taylor T Johnson

### 10:30 am | A New Simulation Metric to Determine Safe Environments and Controllers for Systems with Unknown Dynamics

Shromona Ghosh, Somil Bansal, Alberto Sangiovanni-Vincentelli, Sanjit A. Seshia, and Claire Tomlin

### 11:00 am | Formal Verification of Weakly-Hard Systems

Chao Huang, Wenchao Li, and Qi Zhu

### 11:30 am | Verification and Synthesis of Interconnected Embedded Control Systems under Timing Contracts

Mohammad Al Khatib and Majid Zamani

### 12:00 pm | Evrostos: The rLTL Verifier

Tzannis Anevlavis, Daniel Neider, Matthew Phillippe, and Paulo Tabuada

### 12:15 pm | TIRA: Toolbox for Interval Reachability Analysis

Pierre-Jean Meyer, Alex Devonport, and Murat Arcak

## Session 7: CPS Application II (Power Grid & Mobile)

Room 213-Av.Van-Horne

Session Chair: Georgios Fainekos

### 10:30 am | Localizing Loads in Microgrids Using High-Precision Voltage Phase

Maxim Buevich and Anthony Rowe

### 11:00 am | Assessing and Mitigating Impact of Time Delay Attack: A Case Study for Power Grid Frequency Control

Xin Lou, Cuong Tran, Rui Tan, David K.Y. Yau, and Zbigniew T. Kalbarczyk

### 11:30 am | Cyber-Physical Modeling of GPS Receivers for Power Efficient Localization Systems

Claudio Mandrioli, Alberto Leva, Bo Bernhardsson, and Martina Maggio

### 12:00 pm | Environment-Aware Estimation of Battery State-of-Charge for Mobile Devices

Liang He, Youngmoon Lee, Eugene Kim, and Kang Shin

HSCC

ICCPs

# Thursday, April 18

IPSN

## Session 7: Mobile and Sensing Systems and Applications

Room 217-Av.Viger

Session Chair: Jie Liu

10:30 am | Quantle: Fair and Honest Presentation Coach in Your Pocket  
Olga Saukh and Balz Maag

11:00 am | DeltaVR: Achieving High-Performance Mobile VR Dynamics through Pixel Reuse  
Yong Li and Wei Gao

11:30 am | TennisEye: Tennis Ball Speed Estimation using a Racket-Mounted Motion Sensor  
Hongyang Zhao, Shuangquan Wang, Gang Zhou, and Woosub Jung

12:00 pm | H2B: Heartbeat-Based Secret Key Generation Using Piezo Vibration  
Qi Lin, Weitao Xu, Jun Liu, Abdelwahed Khamis, Wen Hu, Mahbub Hassan, and Aruna Seneviratne

IoTDI

## Session 7: Systems Issues for IoT

Room 202-Rue Sainte-Catherine/Room 200-Rue Saint-Paul

Session Chair: Abusayeed Saifullah

10:30 am | APEX: Automatic Precondition Execution with Isolation and Atomicity in Internet-of-Things  
Qian Zhou and Fan Ye

11:00 am | A Cooperative Multi-Agent Deep Reinforcement Learning Framework for Real-Time Residential Load Scheduling  
Chi Zhang, Sanmukh R. Kuppannagari, Chuanxiu Xiong, Rajgopal Kannan, and Viktor K. Prasanna

11:30 am | VERID: Towards Verifiable IoT Data Management  
Xin Li, Minmei Wang, Shouqian Shi, and Chen Qian

12:00 pm | D2TLS: Delegation-Based DTLS for Cloud-Based IoT Services  
Eunsang Cho, Minkyung Park, Hyunwoo Lee, Junhyeok Choi, and Ted "Taekyoung" Kwon

RTAS

## Session 7: Scheduling and Synchronization

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

Session Chair: Renato Mancuso

10:30 am | Improving a Compositional Timing Analysis Framework for Weakly-Hard Real-Time Systems  
Leonie Köhler and Rolf Ernst

10:50 am | Job-Class-Level Fixed Priority Scheduling of Weakly-Hard Real-Time Systems  
Hyunjong Choi, Hyoseung Kim and Qi Zhu

11:10 am | Thermal-Aware Servers for Real-Time Tasks on Multi-Core GPU-Integrated Embedded Systems  
Seyemehdi Hosseinimotlagh and Hyoseung Kim



# Thursday, April 18

RTAS

11:30 am | **Self-Aware Scheduling for Mixed-Criticality Component-Based Systems**  
Johannes Schlatow, Mischa Möstl, and Rolf Ernst

11:50 am | **Multiprocessor Synchronization of Periodic Real-Time Tasks Using Dependency Graphs**  
Junjie Shi, Niklas Ueter, Georg von der Brueggen, and Jian-Jia Chen

12:30-2:00 pm | **Lunch** (Room 221-Place du Canada/Room 219-Av. Laurier)

2:00-3:30 pm | **Conference Session #8**

HSCC

## Session 8: Control Synthesis

Room 215-Av.Duluth

Session Chair: Raphaël Jungers

2:00 pm | **Mixed-Integer Formulations for Optimal Control of Piecewise-Affine Systems**  
Tobia Marcucci and Russ Tedrake

2:30 pm | **Efficiency through Uncertainty: Scalable Formal Synthesis for Stochastic Hybrid Systems**  
Nathalie Cauchi, Luca Laurenti, Morteza Lahijanian, Alessandro Abate, Marta Kwiatkowska, and Luca Cardelli

3:00 pm | **pFaces: An Acceleration Ecosystem for Symbolic Control**  
Mahmoud Khaled and Majid Zamani

3:15 pm | **HSCC Business Meeting**

ICCPs

## Session 8: Learning for CPS

Room 213-Av.Van-Horne

Session Chair: Madhur Behl

2:00 pm | **Reduced Variance Deep Reinforcement Learning with Temporal Logic Specifications**  
Qitong Gao, Davood Hajinezhad, Yan Zhang, Yiannis Kantaros and Michael Zavlanos

2:30 pm | **Towards Safe Machine Learning for CPS: Infer Uncertainty from Training Data**  
Xiaoze Gu and Arvind Easwaran

3:00 pm | **Data-Driven Perception of Neuron Point Process with Unknown Unknowns**  
Ruochen Yang, Gaurav Gupta, and Paul Bogdan

IPSN

## Session 8: Communication Theory and Signal Processing

Room 217-Av.Viger

Session Chair: Marco Zimmerling

2:00 pm | **Automated Estimation of Link Quality for LoRa: A Remote Sensing Approach**  
Silvia Demetri, Marco Zúñiga, Gian Pietro Picco, Fernando Kuipers, Lorenzo Bruzzone, and Thomas Telkamp

2:30 pm | **Cross-Sender Bit-Mixing Coding**  
Steffen Bondorf, Binbin Chen, Jonathan Scarlett, Haifeng Yu, and Yuda Zhao

# Thursday, April 18

IPSN

**3:00 pm | Recovering Bits from Thin Air: Demodulation of Bandpass Sampled Noisy Signals for Space IoT**

Sujay Narayana, R. Muralishankar, R. Venkatesha Prasad, and Vijay S. Rao

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## Session 8: Industrial IoT

Room 202-Rue Sainte-Catherine/Room 200-Rue Saint-Paul

Session Chair: Guoliang Xing

IoT/DTI

**2:00 pm | Cracking the Channel Hopping Sequences in IEEE 802.15.4e-Based Industrial TSCN Network**

Xia Cheng, Junyang Shi, and Mo Sha

**2:30 pm | Reliable Industrial IoT-Based Distributed Automation**

Vuk Lesi, Zivana Jakovljevic, and Miroslav Pajic

**3:00 pm | QUILT: Quality Inference from Living Digital Twins in IoT-Enabled Manufacturing Systems**

Sujit Rokka Chhetri, Sina Faezi, Arquimedes Canedo, and Mohammad Al Faruque

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## Session 8: Systems and Applications II

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

Session Chair: Robert Kaiser

RTAS

**2:00 pm | Virtualization on TrustZone-Enabled Microcontrollers? Voilà!**

Sandro Pinto, Hugo Araújo, Daniel Oliveira, José Martins, and Adriano Tavares

**2:20 pm | Re-Thinking CNN Frameworks for Time-Sensitive Autonomous-Driving Applications: Addressing an Industrial Challenge**

Ming Yang, Joshua Bakita, Thanh Vu, Shige Wang, F. Donelson Smith, James H. Anderson, and Jan-Michael Frahm

**2:40 pm | Proving Real-Time Capability of Generic Operating Systems by System-Aware Timing Analysis.**

Simon Schuster, Peter Wägemann, Peter Ulbrich, and Wolfgang Schröder-Preikschat

**3:00 pm | Achieving Stagnation-Free Intermittent Computation with Boundary-Free Adaptive Execution**

Jongouk Choi, Hyunwoo Joe, Yongjoo Kim, and Changhee Jung

**3:30-4:00 pm**

**Coffee Break** (Room 218-Parc Mont Royal B+C)

**4:00-5:30 pm**

**Conference Session #9**

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## Session 9: Oded Maler – Barbaric Science from a Captive Poet

Room 215-Av.Duluth

Session Chair: Dejan Ničković

HSCC

**4:00 pm | Our Work with Oded Maler and His Impact**

Manfred Morari

**4:30 pm | Formal Models of Hybrid Systems: The Early Years**

Rajeev Alur

# Thursday, April 18

HSCC

**5:00 pm | Reachability in Hybrid Systems: 25 Years of Optimism**  
Eugène Asarin

**5:30 pm | Why Considering Nonstandard Semantics for Hybrid Systems and How to Reconcile It with Superdense Time Semantics?**  
Albert Benveniste

**6:00 pm | Simulation-Based and Data-Driven Reasoning for Cyber-Physical Systems**  
Jyotirmoy Deshmukh

**6:30 pm | Building Trusted Systems from Untrusted Components**  
Bruce Krogh

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## Session 9: Smart Transportation

Room 213-Av.Van-Horne

Session Chair: Yasser Shoukry

**4:00 pm | Decentralized Optimal Merging at an Intersection: A Control Barrier Function Approach**  
Wei Xiao, Calin Belta, and Christos Cassandras

**4:30 pm | Real-Time Distance Estimation and Filtering of Vehicle Headways for Smoothing of Traffic Waves**

Rahul Bhadani, Matt Bunting, Jonathan Sprinkle, Benjamin Seibold, Raphael Stern, Shumo Cui, Benedetto Piccoli, and Dan Work

**5:00 pm | Simulation to Scaled City: Zero-Shot Policy Transfer for Traffic Control via Autonomous Vehicles**

Kathy Jang, Eugene Vinitsky, Logan Beaver, Behdad Chalaki, Ben Remer, Andreas Malikopoulos, and Alexandre Bayen

ICCPs

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## Session 9: Network and System Architectures and Protocols

Room 217-Av.Viger

Session Chair: Romain Jacob

**4:00 pm | ALICE: Autonomous Link-Based Cell Scheduling for TSCH**  
Seohyang Kim, Hyung-Sin Kim, and Chongkwon Kim

**4:30 pm | WIDE: Physical-Level CTC via Digital Emulation**  
Xiuzhen Guo, Yuan He, Jia Zhang, and Haotian Jiang

**5:00 pm | Collaborative Wideband Signal Decoding using Non-Coherent Receivers**

Roberto Calvo-Palomino, Héctor Cordobés, Fabio Ricciato, Domenico Giustiniano, and Vincent Lenders

IPSN

IoT/DTI

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## Session 9: Short Papers

Room 202-Rue Sainte-Catherine/Room 200-Rue Saint-Paul

Session Chair: Rui Tan

**4:00 pm | Access Control with Delegation for Smart Home Applications**  
Tam Le and Matt W. Mutka

# Thursday, April 18

IoT/DTI

**4:20 pm | DDFlow: Visualized Declarative Programming for Heterogeneous IoT Networks**  
Joseph Noor, Hsiao-Yun Tseng, Luis Garcia, and Mani Srivastava

**4:40 pm | SMChain: A Scalable Blockchain Protocol for Secure Metering Systems in Distributed Industrial Plants**

Gang Wang, Zhijie Jerry Shi, Mark Nixon, and Song Han

**5:00 pm | A Human-Centered Wearable Sensing Platform with Intelligent Automated Data Annotation Capabilities**

Roger Solis, Arash Pakbin, Ali Akbari, Bobak J. Mortazavi, and Roozbeh Jafari

**5:20 pm | User-Centric Context Inference for Mobile Crowdsensing**

Yifan Du, Valerie Issarny, and Francoise Sailhan

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## Session 9: Outstanding Papers

Room 206-Rue Sainte-Denis/Room 204-Rue Notre-Dame

Session Chair: [Björn Brandenburg](#)

**4:00 pm | Holistic Resource Allocation for Multicore Real-Time Systems**

Meng Xu, Linh Thi Xuan Phan, Hyon-Young Choi, Yuhan Lin, Haoran Li, Chenyang Lu, and Insup Lee

**4:30 pm | Denial-of-Service Attacks on Shared Cache in Multicore: Analysis and Prevention**

Michael Bechtel and Heechul Yun

**5:00 pm | RTNF: Predictable Latency for Network Function Virtualization**

Saeed Abedi, Neeraj Gandhi, Henri Maxime Demoulin, Yang Li, Yang Wu, and Linh Thi Xuan Phan

**5:30 pm | Chair's closing remarks**

RTAS

# General Information

## About Montréal

Montréal is a beautiful city renowned for its international flavour and inspiring diversity. Located on an island in the St. Lawrence River, it is home to approximately 1.6 million residents and the largest bilingual workforce in Canada. It is the largest French-speaking city outside France and a perfect blend of European energy and North American efficiency. One of the world's top convention cities, there's something for everyone here. You'll find a friendly population, world-famous gastronomy, and an atmosphere of celebration! Visit <https://www.mtl.org/en> for more details.

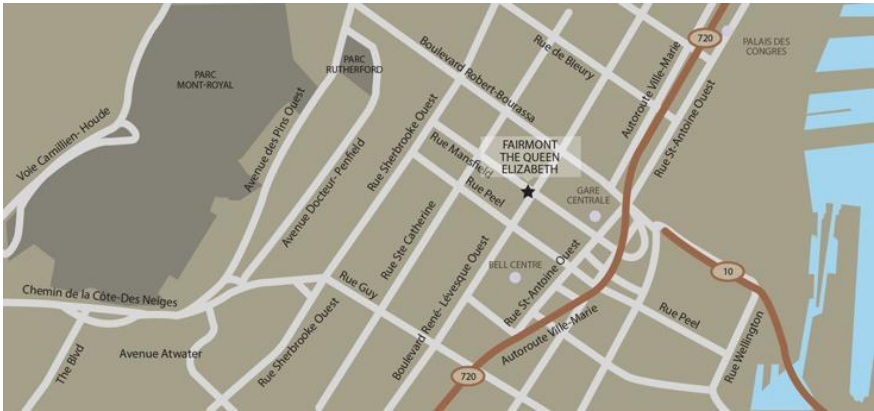
## Venue

### Fairmont the Queen Elizabeth

900 Rene Levesque Blvd. W, Montréal, Québec, Canada, H3B 4A5

The closest airport to Fairmont the Queen Elizabeth is the Montréal-Pierre Elliott-Trudeau International Airport (YUL) located 14 miles (22 km) from the hotel.

For directions and parking information, please visit: <https://www.fairmont.com/queen-elizabeth-montreal/map/mapanddirections/>



## Internet Access

Free guest WiFi will be available to attendees within the venue.

Network SSID: *Fairmont\_Meeting*

PIN/Password: *mtl123*

(code is not case sensitive)

## Coffee Breaks and Lunch Buffets

Lunch and coffee breaks will be provided free of charge to conference attendees Monday through Thursday.

**Coffee Break:** Room 218-Parc Mont Royal B+C

**Lunch Buffet:** Room 221-Place du Canada/Room 219-Av. Laurier

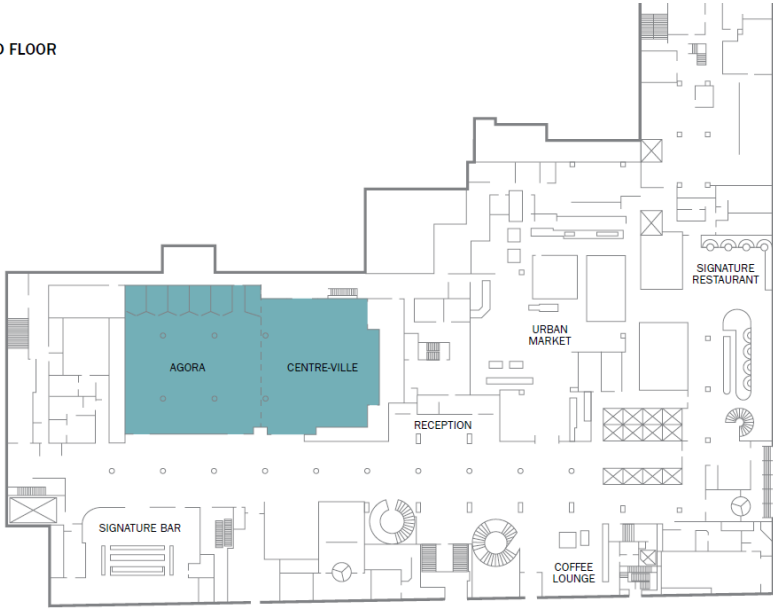
## Banquet

The CPS-IoT Week 2019 banquet will be held at **7:00-10:00 pm, April 17, 2019** in **Room 221-Place du Canada/Room 219-Av. Laurier** of Fairmont the Queen Elizabeth.

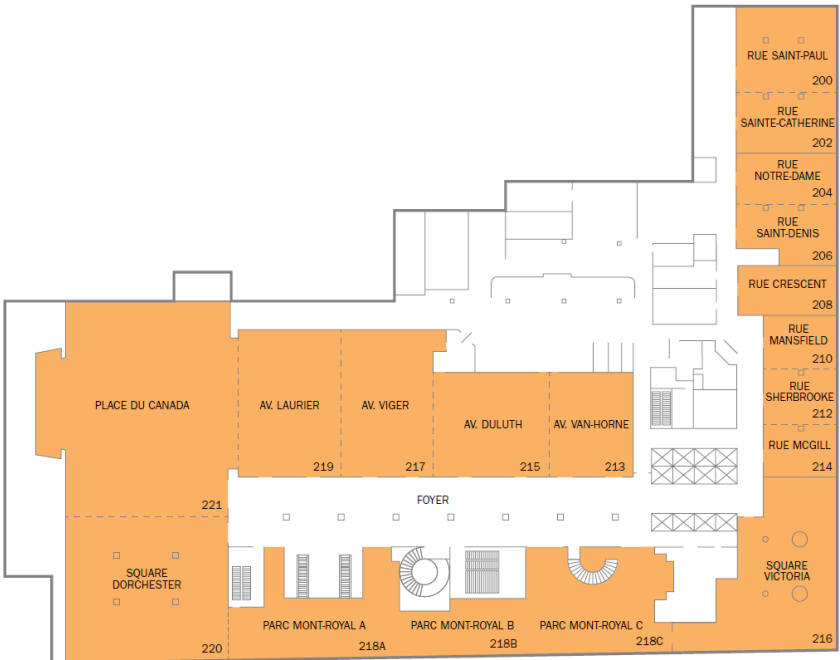
# General Information

## Floor Plan

GROUND FLOOR

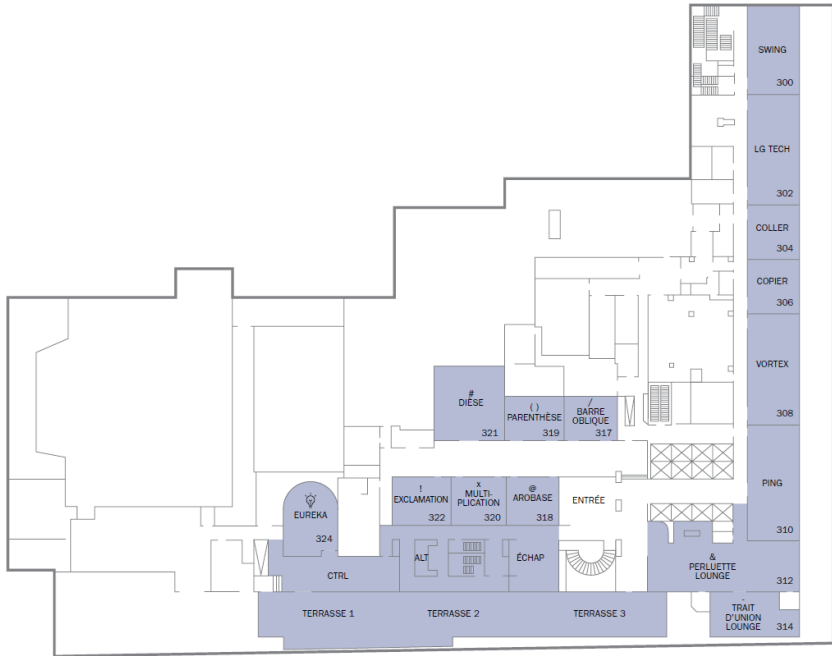


CONVENTION FLOOR



# General Information

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# CPS-IoT Week 2019

April 15 - 18  
Montreal, Canada



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra



TOYOTA



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Crafting the Core

**KANSAS STATE UNIVERSITY**

Department of Computer Science

