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Organizers

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General co-Chairs
Radu Marculescu, Carnegie Mellon University, USA
Raj Rajkumar, Carnegie Mellon University, USA

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Jack Stankovic, University of Virginia, USA
Feng Zhao, Haier, China
Raj Rajkumar, Carnegie Mellon University, USA
Humans have been influencing the DNA of plants and animals for thousands of years through selective breeding. Yet it is only over the last 3 decades or so that we have gained the ability to manipulate the DNA itself and directly alter its sequences through the modern tools of genetic engineering. This led to the efficient production of protein products and the development of novel gene therapies, and revolutionized biotechnology and biomedicine. It has also ushered in the new era of synthetic biology where several new gene arrangements with interacting protein products can be constructed in living cells. This makes possible the synthetic construction of new genetic circuits with improved or entirely new function. The promise of the field is that circuits thus built can be composed into devices and systems, with unlimited expansion potential.

Among the possible applications enabled by synthetic biology is the design and engineering of feedback control systems that steer the dynamic behavior of living cells in real time. Such controllers can be implemented on a computer and interfaced with living cells especially engineered to sense control inputs and respond to them. Alternatively the control systems may themselves be genetically engineered into living cells as networks of biomolecules that achieve feedback function when interfaced with endogenous networks. We refer to the set of methods to design and build such control systems and the resulting technology as Cybergenetics—a genetics era realization of Norbert Wiener’s cybernetics vision. In this talk, we present our ideas on the design and synthesis of cybergenetic control systems and discuss the main theoretical and practical challenges in their design and implementation. We also explain the potential impact such cybergenetic systems can have on industrial biotechnology and medical therapy.
Wei Zhao  
President of the University of Macau  

Major Challenges for IoT Development  
The Internet of Things (IoT) is an emerging paradigm that seamlessly integrates a large amount of smart objects, interlinking the physical and the cyber worlds and keeping them in a tight and continuous interaction. Consequently, the IoT is expected to become a global networking infrastructure for cyber-physical systems. As such, the IoT is an exciting, broad, and nascent area spanning a multitude of scientific research communities as well as several areas of applied industrial research and development. With the introduction of this exciting new paradigm, a variety of new problems and challenges present themselves. Traditional resolutions used to address the Internet are insufficient to solve these unprecedented issues. In this talk, we will discuss four major technical challenges for IoT development; namely, sensing devices and systems, interconnecting technologies, addressing and search schemes, and effective data sharing methods.

Claire Tomlin  
Charles A. Desoer Chair in the College of Engineering, Professor, Electrical Engineering and Computer Sciences, UC Berkeley  

Towards safe learning in semi-autonomous systems  
A great deal of research in recent years has focused on learning in autonomous systems. In many applications, guarantees that specifications are satisfied throughout the learning process are paramount. For the safety specification, we present a controller synthesis technique based on the computation of reachable sets, with fast computation using a new decoupling procedure. We then present a toolbox of methods combining reachability with data-driven techniques inspired by machine learning, to enable performance improvement while maintaining safety. We illustrate these “safe learning” methods on our UAV experimental platforms at Berkeley.
Technical Program Overview

CPS Week 2017 venue is the David L. Lawrence Convention Center in downtown Pittsburgh, PA. Most events will be on the third floor, which features the Spirit of Pittsburgh Ballroom, 38 meeting rooms and 2 terraces. See floorplan on page 21.

Conferences | Tuesday, April 18-Thursday to April 20

**HSCC 2017 | Rooms 306/307**
20th ACM International Conference on Hybrid Systems: Computation and Control

**ICCPS 2017 | Rooms 304/305**
8th ACM/IEEE International Conference on Cyber-Physical Systems

**IoTDI 2017 | Rooms 315/316**
2nd IEEE International Conference on Internet-of-Thing Design and Implementation

**IPSN 2017 | Rooms 310/311**
16th ACM/IEEE International Conference on Information Processing in Sensor Networks

**RTAS 2017 | Rooms 302/303**
23rd IEEE Real-Time and Embedded Technology and Applications Symposium

Workshops | Friday, April 21

**ARCH 2017**
4th Applied Verification for Continuous and Hybrid Systems
(CMU Campus, Monday, April 17)

**CMAAS 2017**
2nd Workshop on Certifiable Multicore Avionics and Automotive Systems

**CPSR-SG 2017**
2nd Workshop on Cyber-Physical Security and Resilience in Smart Grids

**CySWATER 2017**
3rd International Workshop on Cyber-Physical Systems for Smart Water Networks

**MSCPES 2017**
Workshop on Modeling and Simulation of Cyber-Physical Energy Systems

**MT-CPS 2017**
2nd Workshop on Monitoring and Testing of Cyber-Physical Systems

**SCAV 2017**
1st International Workshop on Safe Control of Connected and Autonomous Vehicles

**SCOPE 2017**
2nd Workshop on Science of Smart City Operations and Platforms Engineering

**SelPhyS 2017**
Self-Awareness in Cyber-Physical Systems

**SocialSens 2017**
2nd International Workshop on Social Sensing
Poster/Demo Session
The poster/demo session will take place **Tuesday, April 18th, 5:30pm-8:00pm**, in the Gallery (third floor of the convention center). Posters may be displayed beginning that morning.

Localization Competition
The Localization Competition will take place **Wednesday, April 19th**, on the fourth floor, rooms 401-405. Setup for the competition during Tuesday, April 18th.

**General Program**

<table>
<thead>
<tr>
<th>Time</th>
<th>Tuesday, April 18</th>
<th>Wednesday, April 19</th>
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<tbody>
<tr>
<td>8:00-9:00 am</td>
<td>Breakfast/registration (Gallery)</td>
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<tr>
<td>9:00–10:00 am</td>
<td>Keynote: Mustafa Khammash (Spirit of Pittsburgh Ballroom B)</td>
<td>Keynote: Wei Zhao (Spirit of Pittsburgh Ballroom B)</td>
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<tr>
<td>10:00–10:30 am</td>
<td>Coffee Break (Gallery)</td>
<td>Coffee Break (Gallery)</td>
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<tr>
<td>10:30 am–12:10 pm</td>
<td>Conference Sessions #1</td>
<td>Conference Sessions #4</td>
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<tr>
<td>12:10–1:30 pm</td>
<td>Lunch (Spirit of Pittsburgh Ballroom A)</td>
<td>Lunch (Spirit of Pittsburgh Ballroom A)</td>
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<tr>
<td>1:30–3:10 pm</td>
<td>Conference Sessions #2</td>
<td>Conference Sessions #5</td>
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<td>3:10–3:40 pm</td>
<td>Coffee Break (Gallery)</td>
<td>Coffee Break (Gallery)</td>
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<tr>
<td>3:40–5:20 pm</td>
<td>Conference Sessions #3</td>
<td>Conference Sessions #6</td>
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**Evening Activities**

<table>
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<tr>
<th>Time</th>
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<tr>
<td>8:00-9:00 am</td>
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<td>9:00–10:00 am</td>
<td>Keynote: Claire Tomlin (Spirit of Pittsburgh Ballroom B)</td>
<td>Workshop Sessions #1</td>
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<tr>
<td>10:30 am–12:10 pm</td>
<td>Conference Sessions #7</td>
<td>Workshop Sessions #2</td>
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<tr>
<td>12:10–1:30 pm</td>
<td>Lunch (Spirit of Pittsburgh Ballroom A)</td>
<td>Lunch (Gallery)</td>
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<tr>
<td>1:30–3:10 pm</td>
<td>Conference Sessions #8</td>
<td>Workshop Sessions #3</td>
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<tr>
<td>3:10–3:40 pm</td>
<td>Coffee Break (Gallery)</td>
<td>Coffee Break (Gallery)</td>
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<tr>
<td>3:40–5:20 pm</td>
<td>Conference Sessions #9</td>
<td>Workshop Sessions #4</td>
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1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Tuesday, April 18

8:00-9:00 am  Breakfast/registration (Gallery)

9:00-10:00 am  **Keynote: Cybergenetics (Spirit of Pittsburgh Ballroom B)**  
Mustafa Khammash, Professor of Control Theory and Systems Biology, Department of Biosystems Science and Engineering, Swiss Federal Institute of Technology, Zurich

10:00-10:30 am  Coffee Break (Gallery)

10:30 am-12:10 pm  Conference Sessions #1

1. **Session 1: Verification I**  |  **Session Chair: Antoine Girard**  |  **Rooms 306/307**  
Forward inner-approximated reachability of non-linear continuous systems  
Eric Goubault, Sylvie Putot

On the Polytope Escape Problem for Linear Dynamical Systems  
Joel Ouaknine, Joao Sousa Pinto, James Worrell

SMC: Satisfiability modulo Convex Optimization  
Yasser Shoukry, Pierluigi Nuzzo, Alberto L. Sangiovanni-Vincentelli, Sanjit A. Seshia, George J. Pappas, Paulo Tabuada

Sapo: A Tool for the Reachability Computation and Parameter Synthesis of Polynomial Dynamical Systems  
Tommaso Dreossi

2. **Session 1: Control Synthesis**  |  **Session Chair: Mohammad Al Faruque**  |  **Rooms 304/305**  
Sampling-based Control Synthesis for Multi-Robot Systems under Global Temporal Specifications  
Yiannis Kantaros, Michael M. Zavlanos

Formal Synthesis of Distributed Optimal Traffic Control Policies  
Sadra Sadraddini, Janos Rudan, Calin Belta

Multi-Objective Optimal Control with Safety as a Priority  
Kendra Lesser, Alessandro Abate

Enhancing Tolerance to Unexpected Jumps in GR(1) Games  
Sumanth Dathathri, Scott C. Livingston, Richard M. Murray

3. **Session 1: Information Centric Networking for Things**  |  **Session Chair: Tarek Abdelzaher**  |  **Rooms 315/316**  
Breaking out of the Cloud: Local Trust Management and Rendezvous in Named Data Networking of Things  
Wentao Shang, Zhehao Wang, Alexander Afanasyev, Jeff Burke, Lixia Zhang

Secure Information Sharing among Autonomous Vehicles  
Muktadir Chowdhury, Ashlesh Gawande, Lan Wang

ADN: An Information Centric Networking Architecture for the Internet of Things  
J. J. Garcia-Luna-Aceves

CoMPES: A Command Messaging Service for IoT Policy Enforcement in a Heterogeneous Network  
Jared Hall, Razib Iqbal

1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Detailed Technical Program

12:10-1:30 pm  Lunch

1:30-3:10 pm  Conference Sessions #2

**Session 1: Mobility & Privacy  |  Session Chair: Mi Zhang  |  Rooms 310/311**

- **Coresets for Differentially Private k-Means Clustering and Applications to Privacy in Mobile Sensor Networks**
  Dan Feldman, Chongyuan Xiang, Ruihao Zhu, Daniela Rus

- **MinHash Hierarchy for Privacy Preserving Trajectory Sensing and Query**
  Jiaxin Ding, Chien-chun Ni, Mengyu Zhou, Jie Gao

- **Density-Aware Compressive CrowdSensing**
  Xiaohong Hao, Liwen Xu, Nicholas D. Lane, Xin Liu, Thomas Moscibroda

- **ProLoc: Resilient Localization with Private Observers Using Partial Homomorphic Encryption**
  Amr Alnwar, Yasser Shoukry, Supriyo Chakraborty, Paul Martin, Paulo Tabuada, Mani Srivastava

**Session 1: Operating Systems  |  Session Chair: Sibin Mohan  |  Rooms 302/303**

- **TimerShield: Protecting High-Priority Tasks from Low-Priority Timer Interference**
  Pratyush Patel, Manohar Vanga, Björn Brandenburg

- **Building Real-Time Embedded Applications on QduinoMC: A Web-connected 3D Printer Case Study**
  Zhuoqun Cheng, Richard West, Ying Ye

- **Making Android Run on Time**
  Yin Yan, Karthik Dantu, Steve Ko, Jan Vite, Lukasz Ziarek

- **SysWCET: Whole-System Response-Time Analysis for Fixed-Priority Real-Time Systems**
  Christian Dietrich, Peter Wägemann, Peter Ulbrich, Daniel Lohmann

**Session 2: Probabilistic models and methods  |  Session Chair: Pavithra Prabhakar  |  Rooms 306/307**

- **Forward stochastic reachability analysis for uncontrolled linear systems using Fourier transforms**
  Abraham Vinod, Baisravan Homchaudhuri, Meeko Oishi

- **Controller Synthesis for Reward Collecting Markov Processes in Continuous Space**
  Sadegh Soudjani, Rupak Majumdar

- **Reachability Computation for Switching Diffusions: Finite Abstractions of Continuous Models**
  Luca Laurenti, Alessandro Abate, Luca Bortolussi, Marta Kwiatkowska, Luca Cardelli, Milan Ceska

- **Statistical Verification of the Toyota Powertrain Control Verification Benchmark**
  Nima Roohi, Yu Wang, Matthew West, Geir Dullerud, Mahesh Viswanathan

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*HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.*
Tuesday, April 18

1:30-3:10 pm  Conference Sessions #2, continued

1Session 2: Energy and Power  |  Session Chair: Paul Bogdan  |  Rooms 304/305
Battery State-of-Health Estimation for Mobile Devices
Liang He, Eugene Kim, Kang Shin, Guozhu Meng and Tian He

SunShade: Enabling Software-defined Solar-Powered Systems
Akansha Singh, Stephen Lee, David Irwin, Prashant Shenoy

Distributed Placement of Power Generation Resources in Uncertain Environments
Gaurav Gupta, Paul Bogdan

Session 2: Managing Things in Physical and Social Spaces  |  Session Chair: Xiaofan (Fred) Jiang  |  Rooms 315/316
SeleCon: Scalable IoT Device Selection and Control Using Hand Gestures
Amr Alanwar, Moustafa Alzantot, Bo-Jhang Ho, Paul Martin, Mani Srivastava

Gait-Watch: A Context-aware Authentication System for Smart Watch Based on Gait Recognition
Weitao Xu, Yiran Shen, Yongtuo Zhang, Neil Bergmann, Wen Hu

Empowering End Users for Social Internet of Things
Ji Eun Kim, Xiangmin Fan, Daniel Mosse

StoryLine: On Physical Event Demultiplexing and Tracking in Social Spaces
Shiguang Wang, Prasanna Giridhar, Hongwei Wang, Lance Kaplan, Tien Pham, Aylin Yener, Tarek Abdelzaher

Session 2: Information From Noise  |  Session Chair: Wenyao Xu  |  Rooms 310/311
Natural Timestamping Using Powerline Electromagnetic Radiation
Yang Li, Rui Tan, David K. Y. Yau

SCAN: Learning Associations between Noisy Sensor Sets
Xiaoxuan Lu, Hongkai Wen, Sen Wang, Andrew Markham, Niki Trigoni

Seyed Ali Rokni, Hassan Ghasemzadeh

Session 2: Allocation, Scheduling, and Analysis  |  Session Chair: Gedare Bloom  |  Rooms 302/303
QoS-aware Flash Memory Controller
Bryan Kim, Sang Lyul Min

Scope-aware Useful Cache Block Analysis for Data Cache Related Preemption Delay
Wei Zhang, Fan Gong, Lei Ju, Nan Guan, Zhiping Jia

Offline Equivalence: A Non-Preemptive Scheduling Technique for Resource-Constrained Embedded Real-Time Systems
Mitra Nasri, Björn Brandenburg

Practical Task Allocation for Software Fault-Tolerance and Its Implementation in Embedded Automotive Systems
Anand Bhat, Soheil Samii, Raj Rajkumar

1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Detailed Technical Program

3:10-3:40 pm  Coffee Break (Gallery)

3:40-5:20 pm  Conference Session 3

Session 3: Invariance and Entropy  |  Session Chair: Indranil Saha  |  Rooms 306/307
Optimal Bit Rate for State Estimation of Switched Nonlinear Systems
Hussein Sibai, Sayan Mitra
Path-Complete Graphs and Common Lyapunov Functions
David Angeli, Matthew Philippe, Nikolaos Athanasopoulos, Raphaël Jungers
Invariance Feedback Entropy of Non-deterministic Control Systems
Matthias Rungger, Majid Zamani

Session 3: Panel: Funding and Research Opportunities on IoT  |  Moderator: Octav Chipara  |  Rooms 315/316
Derya Cansever, Communications-Electronics Research, Development and Engineering Center (CERDEC)
David Corman, National Science Foundation (NSF)
David Kuehn, Federal Highway Administration (FHWA), Department of Transportation
Niranjan Suri, Army Research Laboratory (ARL)

Session 3: Neighbor Discovery & Poster/Demo Madness  |  Session Chair: Hae Young Noh  |  Rooms 310/311
Mutually Assisted Slotless Neighbor Discovery Protocols
Philipp H. Kindt, Daniel Yunge, Gerhard Reinerth, Samarjit Chakraborty
BLEnd: Practical Continuous Neighbor Discovery for Bluetooth Low Energy
Christine Julien, Chenguang Liu, Amy L. Murphy, Gian Pietro Picco

Session 3: Many-core and WiP/Demo  |  Session Chair: Rodolfo Pellizzoni, WiP/Demo Chairs: Dorin Maxim and Cong Liu  |  Rooms 302/303
Partitioning and Analysis of the Network-on-Chip on a COTS Many-Core Platform
Matthias Becker, Borislav Nikolic, Dakshina Dasari, Benny Akesson, Vincent Nelis, Moris Behnam, Thomas Nolte
Efficient Latency Guarantees for Mixed-criticality Networks-on-Chip
Sebastian Tobuschat, Rolf Ernst

Work in Progress (WiP) and Demo Sessions (as part of Session 3).

5:30-8:00 pm  Cocktail/demo + poster (Gallery)
8:30-10:00pm  TPC dinner (offsite)

1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
### Wednesday, April 19

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>8:00-9:00 am</td>
<td>Breakfast/registration (Gallery)</td>
</tr>
<tr>
<td>9:00-10:00 am</td>
<td><strong>Keynote: Major Challenges for IoT Development (Spirit of Pittsburgh Ballroom B)</strong> Wei Zhao, President of the University of Macau</td>
</tr>
<tr>
<td>10:00-10:30 am</td>
<td>Coffee Break (Gallery)</td>
</tr>
<tr>
<td>10:30 am-12:10 pm</td>
<td>Conference Sessions #4</td>
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</tbody>
</table>

**Session 4: Control I - Synthesis and Scheduling | Session Chair: Necmiye Ozay | Rooms 306/307**
- Robust Abstractions for Control Synthesis: Robustness Equals Realizability for Linear-Time Properties
  - Jun Liu
- Formal Synthesis of Stabilizing Controllers for Switched Systems
  - Pavithra Prabhakar, Miriam García Soto
- Convex Interpolation Control with Formal Guarantees for Disturbed and Constrained Nonlinear Systems
  - Bastian Schürmann, Matthias Althoff
- Scheduling of embedded controllers under timing contracts
  - Mohammad Al Khatib, Antoine Girard, Thao Dang

**Session 3: Modeling and Analysis | Session Chair: Miroslav Pajic | Rooms 304/305**
- Constructing Compact Causal Mathematical Models for Complex Dynamics
  - Yuankun Xue, Paul Bogdan
- Analyzing Neighborhoods of Falsifying Traces in Cyber-Physical Systems
  - Ram Das Diwakaran, Sriram Sankaranarayanan, Ashutosh Trivedi
- Abstraction Based Reachability Analysis for Finite Branching Stochastic Hybrid Systems
  - Wenji Zhang, Pavithra Prabhakar, Balasubramaniam Natarajan
- A Gaussian Process Regression Approach to Model Aircraft Engine Fuel Flow Rate
  - Yashovardhan Sushil Chati, Hamsa Balakrishnan

**Session 4: Wireless Everywhere | Session Chair: Mo Sha | Rooms 315/316**
- DaRe: Data Recovery through Application Layer Coding for LoRaWANs
  - Paul Marcelis, Vijay Rao, R. Venkatesha Prasad
- Adaptive Software-Defined Visible Light Communication Networks
  - Stefan Schmid, Benjamin von Deschwanden, Stefan Mangold, Thomas Gross
- ImageBeacon: Broadcasting Color Images over Connectionless Bluetooth LE Packets
  - Chong Shao, Shahriar Nirjon
- ATHOME: Automatic Tunable Wireless Charging for Smart Home
  - Zheng Dong, Yu Gu, Lingkun Fu, Jiming Chen, Tian He, Cong Liu

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1 HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Detailed Technical Program

**Session 4: Computer Vision | Session Chair: Shahriar Nirjon | Rooms 310/311**
Panoptes: Servicing Multiple Applications Simultaneously using Steerable Cameras  
Shubham Jain, Marco Gruteser, Paramvir Bahl

**3D Through-Wall Imaging with Unmanned Aerial Vehicles Using WiFi**  
Chitra Karanam, Yasamin Mostof

**VideoMec: A Metadata-Enhanced Crowdsourcing System for Mobile Videos**  
Yibo Wu, Guohong Cao

**Argus: Realistic Target Coverage by Drones**  
Ahmed Saeed, Ahmed Abdelkader, Mouhymen Khan, Azin Neishaboori, Khaled Harras, Amr Mohamed

**Session 4: Probabilistic WCET | Session Chair: Rob Davis | Rooms 302/303**
EPC Enacted: Integration in an Industrial Toolbox and Use Against a Railway Application  
Enrico Mezzetti, Mikel Fernandez, Alen Bardizbanyan, Irune Agirre, Jaume Abella, Tullio Vardanega, Francisco Cazorla

**Probabilistic Real-Time Guarantees: There is life beyond the i.i.d. assumption**  
Bernardo Villalba Frias, Luigi Palopoli, Luca Abeni, Daniele Fontanelli

**Valid Application of EVT in Timing Analysis by Randomising Execution Time Measurements**  
George Lima, Iain Bate

**Revising Measurement-Based Probabilistic Timing Analysis**  
Luca Santinelli, Fabrice Guet, Jerome Morio

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12:10-1:30 pm  Lunch

1:30-3:10 pm  Conference Sessions #5

**Session 5 : 20th Anniversary Talk | Rooms 306/307**
Convex and Combinatorial Optimization for Dynamic Robots in the Real World  
Russ Tedrake

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1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Wednesday, April 19

1:30-3:10 pm  Conference Sessions #5, continued

1Session 4: Resilience  |  Session Chair: Bruno Sinopoli  |  Rooms 304/305
VirtualDrone: Virtual Sensing, Actuation, and Communication for Attack-Resilient Unmanned Aerial Systems
Man-Ki Yoon, Bo Liu, Naira Hovakimyan, Lui Sha

Resilient Linear Classification: An Approach to Deal with Attacks on Training Data
Sangdon Park, James Weimer, Insup Lee

Resilient Sensor Placement for Fault Localization in Water Distribution Networks
Waseem Abbas, Lina Sela Perelman, Saurabh Amin, Xenofon Koutsoukos

Session 5: Securing IoT (IoTDI/IPSN Joint Session)
Session Chair: Rasit Eskicioglu  |  Spirit of Pittsburgh Ballroom B

Kryptein: A Compressive-Sensing-Based Encryption Scheme for the Internet of Things (IPSN)
Wanli Xue, Chengwen Luo, Guohao Lan, Rajib Rana, Wen Hu, Aruna Seneviratne

A Toolkit for Construction of Authorization Service Infrastructure for the Internet of Things (IoTDI)
Hokeun Kim, Eunsuk Kang, Edward A. Lee, David Broman

PitchIn: Eavesdropping via Intelligible Speech Reconstruction using Non-Acoustic Sensor Fusion (IPSN)
Jun Han, Albert Jin Chung, Patrick Tague

An IoT Data Communication Framework for Authenticity and Integrity (IoTDI)
Xin Li, Huazhe Wang, Ye Yu, Chen Qian

Session 5: Cache and Memory Management  |  Session Chair: Bjorn A. Andersson
Rooms 302/303
vCAT: Dynamic Cache Management using CAT Virtualization
Meng Xu, Linh Thi Xuan Phan, Hyon-Young Choi, Insup Lee

Allowing Shared Libraries while Supporting Hardware Isolation in Multicore Real-Time Systems
Namhoon Kim, Micaiah Chisholm, Nathan Otterness, Jim Anderson, F. Donelson Smith

Predictable cache coherence for multi-core real time systems
Mohamed Hassan, Anirudh Kaushik, Hiren Patel

A Requests Bundling DRAM Controller for Mixed-Criticality Systems
Danlu Guo, Rodolfo Pellizzoni

3:10-3:40 pm  Coffee Break (Gallery)

1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Detailed Technical Program

3:40-5:20 pm  Conference Sessions #6

1 Session 6: Verification II | Session Chair: André Platzer | Rooms 306/307
Coupling Policy Iterations with Piecewise Quadratic Lyapunov Functions
Assale Adje

Robust Model Checking of Timed Automata under Clock Drifts
Nima Roohi, Pavithra Prabhakar, Mahesh Viswanathan

Safety Verification of Nonlinear Hybrid Systems Based on Invariant Clusters
Hui Kong, Sergiy Bogomolov, Yu Jiang, Thomas Henzinger

HyLAA: A Tool for Computing Simulation-Equivalent Reachability for Linear Systems
Stanley Bak, Parasara Sridhar Duggirala

1 Session 5: Privacy, Fault Tolerance, and Security | Session Chair: Xenofon Koutsoukos | Rooms 304/305
Privacy-Enhanced Architecture for Occupancy-based HVAC Control
Ruoxi Jia, Roy Dong, Shankar Sastry, Costas Spanos

A Submodular Optimization Approach to Controlled Islanding under Cascading Failure
Zhipeng Liu, Andrew Clark, Phillip Lee, Linda Bushnell, Daniel Kirschen, Radha Poovendran

Application and System-Level Software Fault Tolerance Through Full System Restarts
Fardin Abdi Taghi Abad, Rohan Tabish, Matthias Rungger, Majid Zamani, Marco Caccamo

Hardware Module-based Message Authentication in Intra-Vehicle Networks
Eric Wang, William Xu, Suhas Sastry, Songsong Liu, Kai Zeng

Panelists:
Sonja Glavaski (Department of Energy)
Jack Stankovic (University of Virginia)
Wei Zhao (University of Macau)

Session 6: Wireless | Session Chair: Abusayeed Saifullah | Rooms 302/303
Distributed Dynamic Packet Scheduling for Handling Disturbances in Real-Time Wireless Networks
Tianyu Zhang, Tao Gong, Chuancai Gu, Huayi Ji, Song Han, Qingxu Deng, X. Sharon Hu

Synchronization Quality of IEEE 802.1AS in Large-Scale Industrial Automation Networks
Marina Gutiérrez, Wilfried Steiner, Radu Dobrin, Sasikumar Punnekkat

Pulsar: A Wireless Propagation-Aware Clock Synchronization Platform
Adwait Dongare, Anthony Rowe, Patrick Lazik, Niranjini Rajagopal

5:30-6:00 pm  Business meeting
6:30-10:30pm  Banquet (History Center)

1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Thursday, April 20

8:00-9:00 am  Breakfast/registration (Gallery)

9:00-10:00 am  Keynote: Towards safe learning in semi-autonomous systems (Spirit of Pittsburgh Ballroom B) Claire Tomlin, Charles A. Desoer Chair in the College of Engineering, Professor, Electrical Engineering and Computer Sciences, UC Berkeley

10:00-10:30 am  Coffee Break (Gallery)

10:30 am-12:10 pm  Conference Sessions #7

1 Session 7: Control II  |  Session Chair: Jyotirmoy Deshmukh  |  Rooms 306/307
Dynamic Periodic Event-Triggered Control for Linear Systems
D.P. Borgers, V.S. Dolk, W.P.M.H. Heemels

On a class of maximal invariance inducing control strategies for large collections of switched systems
Petter Nilsson, Necmiye Ozay

Sound and Automated Synthesis of Digital Stabilizing Controllers for Continuous Plants
Alessandro Abate, Iury Bessa, Dario Cattaruzza, Lucas Cordeiro, Cristina David, Pascal Kesseli, Daniel Kroening

1 Session 6: Coordination  |  Session Chair: George Pappas  |  Rooms 304/305
A Merging Protocol for Self-Driving Vehicles
Shunsuke Aoki, Ragunathan Rajkumar

GreenDrive: A Smartphone-based Intelligent Speed Adaptation System With Real-time Traffic Signal Prediction
Yiran Zhao, Shen Li, Shaohan Hu, Lu Su, Shuochao Yao, Huajie Shao, Tarek Abdelzaher

Drona: A Framework for Safe Distributed Mobile Robotics
Ankush Desai, Indranil Saha, Jianqiao Yang, Shaz Qadeer, Sanjit A. Seshia

Provably-correct coordination of large collections of agents with counting temporal logic constraints
Yunus Emre Sahin, Petter Nilsson, Necmiye Ozay

Session 7: Short Papers  |  Session Chair: Abusayeed Saifullah  |  Rooms 315/316

Session 7: UI & OS, Wild & Crazy Ideas  |  Session Chair: Brad Campbell  |  Rooms 310/311
SurfaceVibe: Vibration-Based Tap & Swipe Tracking on Ubiquitous Surfaces
Shijia Pan, Ceferino Gabriel Ramirez, Mostafa Mirshekari, Jonathon Fagert, Albert Chung, Chih Chi Hu, John Paul Shen, Hae Young Noh, Pei Zhang

HarvOS: Efficient Code Instrumentation for Transiently-powered Embedded Devices
Naveed Bhatti, Luca Mottola

Open Mic / Wild & Crazy Ideas (11:20 am – 12:05 pm)
Detailed Technical Program

Session 7: Applications and Tools | Session Chair: Shahriar Nirjon | Rooms 302/303
Real-Time Fine Grained Occupancy Estimation using Depth Sensors on ARM Embedded Platforms
Sirajum Munir, Ripudaman Singh Arora, Craig Hesling, Juncheng Li, Jonathan Francis, Charles Shelton, Christopher Martin, Anthony Rowe, Mario Berges

A Case Study on Achieving Fair Data Age Distribution in Vehicular Communications
Xinhai Zhang, Xinwu Song, Lei Feng, Lei Chen, Martin Törngren

Benchmark Generation for Timing Analysis
Peter Wägemann, Tobias Distler, Christian Eichler, Wolfgang Schröder-Preikschat

Periodic Task Mining in Embedded System Traces
Oleg Iegorov, Reinier Torres and Sebastian Fischmeister

12:10-1:30 pm Lunch

1:30-3:10 pm Conference Sessions #8

1 Session 8: Temporal Logics | Session Chair: Sicun Gao | Rooms 306/307
A Small Gain Theorem for Parametric Assume-Guarantee Contracts
Eric Kim, Murat Arcak, Sanjit A. Seshia

Relaxed decidability and the robust semantics of Metric Temporal Logic
Houssam Abbas, Matthew O’Kelly, Rahul Mangharam

Sampling-based approximate optimal control under temporal logic constraints
Jie Fu, Ivan Papusha, Ufuk Topcu

Abnormal Data Classification Using Time-Frequency Temporal Logic
Luan Nguyen, James Kapinski, Xiaoqing Jin, Jyotirmoy Deshmukh, Ken Butts, Taylor Johnson

1 Session 7: Vehicle Routing & Activity Monitoring | Session Chair: James Weimer | Rooms 304/305
Data-Driven Distributionally Robust Vehicle Balancing Using Dynamic Region Partitions
Fei Miao, Shuo Han, Abdeltawab M. Hendawi, Mohamed E. Khalefa, John Stankovic, George Pappas

Markov Decision Process Routing Games
Daniel Calderone, Shankar Sastry

QuActive: A Quality of Activities Monitoring and Notification System
Ifat A Emi, Md. Abu Sayeed Mondol, John A. Stankovic

Personalization without User Interruption: Boosting Activity Recognition in New Subjects Using Unlabeled Data
Ramin Fallahzadeh, Hassan Ghasemzadeh

1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Thursday, April 20

1:30-3:10 pm  Conference Sessions #8, continued

**IoTDI**

**Session 8: IoT Systems: from Devices to Cloud**  |  **Session Chair: Aniruddha Gokhale**  |  **Rooms 315/316**
SafeWatch: A Wearable Hand Motion Tracking System for Improving Driving Safety
Chongguang Bi, Jun Huang, Guoliang Xing, Landu Jiang, Xue Liu, Minghua Chen

Enabling Micro-level Demand-Side Grid Flexibility in Resource Constrained Environments
Diego Ponce de Leon Barido, Stephen Suffian, Javier Rosa, Eric Brewer, Daniel Kammen

Where’s The Bear? -- Automating Wildlife Image Processing Using IoT and Edge Cloud Systems
Andy Rosales Elias, Nevena Golubovic, Chandra Krintz, Rich Wolski

CityGuard: A Watchdog for Safety-Aware Conflict Detection and Resolution in Smart Cities
Meiyi Ma, Sarah Masud Preum, John Stankovic

**Session 8: Localization**  |  **Session Chair: Dimitrios Lymberopoulos**  |  **Rooms 310/311**
Fast and Robust GPS Fix Using One Millisecond of Data
Pascal Bissig, Manuel Eichelberger, Roger Wattenhofer

Calibration-free Network Localization with Non-Line-of-Sight Ultra-Wideband Measurements
Carmelo Di Franco, Amanda Prorok, Nikolay Atanasov, Benjamin Kempke, Prabal Dutta, Vijay Kumar, George J. Pappas

Localization Competition Results (2:20 – 3:10 pm)

**RTAS**

Session 8: Parallelism  |  **Session Chair: Heechul Yun**  |  **Rooms 302/303**
Parcus: Energy-aware and Robust Parallelization of AUTOSAR Legacy Applications
Sebastian Kehr, Eduardo Quinones, Dominik Langen, Bert Boeddeker, Guenter Schaefer

An Evaluation of the NVIDIA TX1 for Supporting Real-time Computer-Vision Workloads
Nathan Otterness, Ming Yang, Sarah Rust, Eunbyung Park, Jim Anderson, F. Donelson Smith, Alex Berg, Shige Wang

Timing-Anomaly Free Dynamic Scheduling of Task-Based Parallel Applications
Petros Voudouris, Per Stenstrom, Risat Mahmud Pathan

A Reliable and Predictable Scratchpad-Centric OS for Multi-Core Embedded Systems
Rohan Tabish, Renato Mancuso, Saud Wasy, Sujit S Phatak, Rodolfo Pellizzoni and Marco Caccamo

3:10-3:40 pm  Coffee Break (Gallery)

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1HSCC and ICCPS afternoon sessions run at 1:30–3:20 pm and 3:50–5:30 pm.
Detailed Technical Program

3:40-5:20 pm    Conference Sessions #9

**Session 9: Constrained Systems | Session Chair: Jun Liu | Rooms 306/307**

- **Piecewise–differentiable trajectory outcomes in mechanical systems subject to unilateral constraints**
  Andrew M. Pace, Samuel A. Burden

- **Structural Analysis of Multi-Mode DAE Systems**
  Albert Benveniste, Benoit Caillaud, Hilding Elmqvist, Khalil Ghorbal, Martin Otter, Marc Pouzet

- **Bipedal Robotic Running with DURUS-2D: Bridging the Gap between Theory and Experiment**
  Wenlong Ma, Shishir Kolathaya, Eric Ambrose, Christian Hubicki, Aaron Ames

**Session 9: Industrial Perspectives on IoT (Invited Talks) | Session Chair: Chenyang Lu | Rooms 315/316**

- **IoT - Blurring the Lines Between Operations and Information Technologies**
  Eric Rotvold, Distinguished Technologist, Emerson Process Management

- **Do We Really Need Standards in IoT?**
  Sun Chan, IoT Software Chief Architect, Huawei Technologies

- **Role of Spatiotemporal Big-data: An IoT Industry Perspective**
  Raghu Ganti, Research Staff Member, IBM Research
General Information

About Pittsburgh

One of the most livable cities, Pittsburgh is home to over 86,000 students from 10 colleges and universities. Among mid-sized metros, the American Institute of Economic Research ranks it No. 3 for students.

Pittsburgh has a lot of attractions to offer including, The Andy Warhol Museum, Bayernhof Museum, The Duquesne Incline, etc. The Huffington Post has praised Pittsburgh as “a modern mecca of culture and education, and a hidden gem.” Visit www.visitpittsburgh.com for more details.

Venue

David L. Lawrence Convention Center (DLCC)
1000 Ft. Duquesne Blvd., Pittsburgh, PA 15222

The DLCC is very easy to get to by bus, train or driving. For directions and parking information, please visit www.pittsburghcc.com/visiting.php
Internet Access

Free WiFi will be available to attendees while in the Convention Center.
SSID: CPSWEEK2017
Password: cpswk2017

Breakfast, Lunch, and Coffee Break

A light breakfast, lunch, and coffee breaks will be provided free of charge to conference attendees Tuesday through Thursday. Breakfast and coffee service will be provided in the Gallery. Lunch will be served in the Spirit of Pittsburgh Ballroom A.

Venue Neighborhood and Banquet Location

The banquet will be held on the evening of Wednesday, April 19th, 6:30 pm-10:30 pm, at the Senator John Heinz History Center located at 1212 Smallman Street.

Floor Plan

The five conferences, ten workshops, keynote speeches, poster/demo session, meals, and breaks will be located on the third floor of the David L. Lawrence Convention Center (DLCC).
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