DCPS: The First CPSWeek Workshop on Declarative Cyber-Physical Systems, Hofburg, Vienna, Austria, Tuesday, April 12, 2016

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DCPS 2016: The First CPSWeek Workshop on
Declarative Cyber-Physical Systems

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TECHNICAL PROGRAM

7:45am Registration starts

10:00am-11:00pm Keynote:

Models, Over-approximations and Robustness
Eugenio Moggi

11:00pm-12:00pm Session 1:

P-FRP Task Scheduling: A Survey
Xingliang Zou, Albert Cheng and Yu Jiang

Real-time Capabilities in Functional Languages
Jeffrey Murphy, Bhargav Shivkumar and Lukasz Ziarek

12:00pm-1:30pm Lunch

1:30pm-3:30pm Session 2:

Architecture for Logic Programming with Arrangements of Finite-State Machines
Vlad Estivill-Castro, Rene Hexel and Alberto Ramirez-Regalado

Dependability Assessment of Networked Embedded Software Systems
Kaliappa Ravindran

Open Discussions on Declarative CPS

3:30pm-4:00pm Coffee/Tea

4:00pm-6:00pm CPSWeek Poster Session

6:00pm-8:00pm CPS Community Forum
Welcome to the First CPSWeek DCPS Workshop, which takes place at the Hofburg in Vienna, Austria, on April 12, 2016. Declarative programming (functional, logic, rule-based, constraints, dataflow, and visual) has several advantages over imperative programming. For example, using the functional reactive programming (FRP) paradigm over the imperative programming style found in languages such as C/C++/C# and Java for implementing embedded and real-time software allows the programmer to intuitively describe safety-critical behaviors of the system, thus lowering the chance of introducing bugs in the design phase. Its stateless nature of execution does not require the use of synchronization primitives like mutexes and semaphores, thus reducing the complexity in programming. However, accurate response time analysis of FRP-based controllers remains a largely unexplored problem. Furthermore, efficient runtime architectures and execution platforms for FRP and programs implemented in other declarative languages are nearly absent.

To address this and other relevant issues for the emerging declarative programming paradigm for real-time and cyber-physical systems, this timely CPSWeek Workshop serves as a forum for presenting work and exchanging ideas in the programming, response time analysis, scheduling, verification, execution, and performance evaluation of embedded controllers and CPS components implemented as declarative programs.

The technical program includes 4 peer-reviewed papers, a keynote speech by Eugenio Moggi from the Universita di Genova, Italy, and a discussion session on declarative CPS. DCPS 2016 is made possible by the hard work of many people: members of the Program Committee, the authors who submitted their work, and all the attendees. Altogether, we assembled a technical program with high quality, depth and breadth that is a showcase of the most recent trends in this emerging field. Enjoy the First CPSWeek DCPS Workshop!

Albert M. K. Cheng, DCPS 2016 PC Chair
Program Committee

Program Chair: Albert M. K. Cheng, University of Houston (USA)

Bjorn A. Andersson, Software Engineering Institute at Carnegie Mellon University (USA)
Stefan Andrei, Lamar University (USA)
Gopal Gupta, University of Texas at Dallas (USA)
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Yu Jiang, Heilongjiang University (China)
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German Vidal, Technical University of Valencia (Spain)
Wang Yi, Uppsala University (Sweden)
Lukasz (Luke) Ziarek, University at Buffalo, The State University of New York (USA)
Keynote:

Models, Over-approximations and Robustness

Eugenio Moggi, Università di Genova

Abstract:

Hybrid systems, and related formalisms, have been successfully used to model Cyber-Physical Systems. However, mathematical models are always a simplification of the system they are meant to describe, and one must aware of this mismatch, when using these models to analyze a system.

In safety analysis it is acceptable to use over-approximations of the system behavior, indeed they are the bread and butter of counterexample guided abstraction refinement (CEGAR). We propose a notion of system behavior robust wrt arbitrary small over-approximations, and argue that it is particularly appropriate for safety analysis.