

# Conference Report

## 2018 Embedded Systems Week (ESWEEK) in Torino

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■ **EMBEDDED SYSTEMS WEEK** (ESWEEK) is the premier event covering all aspects of embedded systems and software. By bringing together three leading conferences (CASES, CODES+ISSS, and EMSOFT), a special Internet of Things (IoT) day, two symposia [The International Symposium on Networks-on-Chip (NOCS) and the International Symposium on Rapid System Prototyping (RSP)], and hot-topic workshops and tutorials, ESWEEK presents attendees with a wide range of topics unveiling state-of-the-art embedded software, embedded computer architectures, HW/SW architectures, and embedded system design. The joint IEEE CEDA-ESWEEK Opportunity Program as well as the ACM SIGBED Student Travel Grants enabled the participation of students from developing countries or those with a verified need.

ESWEEK 2018 took place in Torino, Italy, from 30 September to 5 October. As in 2017, ESWEEK 2018 implemented a journal-integrated publication model for the three conferences, CASES, CODES+ISSS, and EMSOFT, where all journal-track papers are published in the *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*. To this end, the three conferences conducted the review process in a journal-like, two-stage, peer-reviewed process with the opportunity of minor/major revision before a final decision. Acceptance rates have been about 24.7% for all conferences with a total number of 271 submissions to the journal track. In addition,

the ESWEEK Proceedings contain the 46 accepted work-in-progress papers as well as papers presented in special sessions.

The tutorials on Sunday preceded the conferences. They have been an excellent opportunity to get in-depth knowledge in new trends and hot topics. Five tutorials covered a wide scope, from embedded machine learning and approximate computing to trustworthy real-time kernels, run-time management for multi-/many-core systems, and schedulability analysis under uncertainty.

Thursday and Friday included the two symposia: NOCS and the RSP. In addition, five workshops were organized on the important topics of cyber-physical systems modeling (CyPhy), efficient neural processing (HENP), intelligent embedded systems (INTESA), embedded operating systems (EWiLi), and embedded systems education (WESE).

Tuesday was a special day on the topic of IoT, focusing on the newest developments from an embedded systems point of view. A sequence of three sessions, including “Edge Computing for IoT,” “Security and Efficiency of IoT Devices,” and “The Future of IoT security,” was exclusively devoted to this subject.

Highlights of the ESWEEK program were the three distinguished keynote talks by prominent leaders in academia and industry, covering most relevant trends for future embedded systems and providing deep insights into technology drivers. Thomas Henzinger, from the Institute of Science and Technology Austria, addressed the issue of formalizing properties of systems with continuous dynamics in

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his talk “The First-Order Logic of Signals,” which was dedicated to the memory of Oded Maler. Henzinger emphasized the challenging problem of formalizing properties of such systems and proposed signal first-order (SFO) logic as a specification language. It combines first-order logic with linear-real arithmetic and unary function symbols interpreted as piecewise linear signals. A very important property is that, while the satisfiability problem for SFO is undecidable, its membership and monitoring problems are decidable. Starting from this observation, an efficient monitoring procedure for SFO is proposed that has linear computation time in the size of the input trace.

In his keynote talk “Hitchhiker’s Guide to the IoT Galaxy Full of Security and Privacy Challenges” Ahmad-Reza Sadeghi, from the Technical University Darmstadt, started by illustrating with several examples the huge security and privacy challenges that we are facing due to the rapidly increasing population of enormously diverse devices interconnected over the IoT. Unfortunately, many of these devices present a lack of security by design and/or due to flawed implementation, which makes them easy targets for IoT botnet attacks and novel privacy threats. Standard security measures such as properly encrypted communication do not protect against these threats. Moreover, the existing intrusion-detection techniques are ineffective in detecting compromised IoT devices. The talk focused on new approaches aimed at the reliable detection of compromised devices based on their inherent communication behavior.

Jie Liu, from Microsoft AI Perception and Mixed Reality, presented the keynote talk “Outside-In Autonomous Systems (OIAS).” OIAS create smart environments that observe and understand space, people, and things from a bird’s eye perspective. For OIAS to work, people do not need to wear extra devices or change their natural behavior. Typical environments that can be augmented with various degrees of outside-in autonomy are retail stores, factory floors, or hospitals. In the keynote, several enabling techniques, such as computer vision and sensor fusion, were discussed. The autonomous retail store context has been used as an example to illustrate the current technology landscape and the challenges of bringing technologies from the lab to the real world.

The conference program concluded with the traditional panel on Wednesday afternoon, focusing on the “Future of CPS: Here to Stay or Another Fad?”. Top experts from academia and industry shared their views on this topic. There was an interesting debate among panelists and the audience about the nature of the CPS research area, its theoretical fundamentals, the main challenges, its industrial impact, and possible future developments.

**THE NEXT** ESWEEK will take place in New York, NY, on 13–18 October 2019. Visit <http://www.esweek.org/> for more details. ■

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