

Conference Reports

The 2020 Embedded Systems Week (ESWEEK): A Virtual Event During a Pandemic

Tulika Mitra

National University of Singapore

Andreas Gerstlauer

The University of Texas at Austin

■ **EMBEDDED SYSTEMS WEEK** (ESWEEK) is a premier event covering all aspects of embedded systems and software. By bringing together all the three leading conferences (CASES, CODES+ISSS, and EMSOFT), a symposium (NOCS), and hot-topic workshops and tutorials, ESWEEK presents the attendees with a wide range of topics unveiling state-of-the-art embedded software, embedded architectures, and embedded systems design.

As in previous years, ESWEEK 2020 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 (TCAD). To this end, the three conferences conducted the review in a journal-style two-stage peer-review process with the opportunity of minor/major revision before final decision. Acceptance rates have been about 22%–27% for the different conferences with a total of 375 submissions to the journal track. This represented a more than 50% increase in submissions over the previous year amidst a pandemic (with a submission deadline in April in the middle of the first wave). In addition, the ESWEEK Proceedings contain 38 accepted Work-in-Progress (WiP) papers.

Given the COVID-19 situation, ESWEEK 2020 was held September 20–25 as a purely virtual event for the first

time in its history. All authors of accepted journal-track and WiP papers were asked to prerecord a 25 or 10 minutes video, respectively, of their presentations. These videos together with accepted papers were made available to registered attendees about two weeks before the conference. In addition to viewing the presentations and papers, attendees could interact with and post questions to the authors through the virtual conference platform before the conference. During the conference week, authors of accepted journal-track papers and attendees could additionally interact in live question & answer (Q&A) sessions using the video conferencing platform. The technical program on the main conference days (Monday, Tuesday, and Wednesday) consisted of 19 such regular technical sessions from the three conferences. Each session of 45 minutes thereby contained lightning talks for five journal-track papers followed by panel-style Q&A with the speakers in each session.

The main conference program from Monday through Wednesday was scheduled in a global 9:30 A.M.–1 P.M. New York time slot that was aimed at maximizing opportunities for attendance across most time zones. The live program on each day started with a 30-minute opening or awards session followed by a 1-hour keynote or panel, 90 minutes of technical sessions held in parallel tracks for the three conferences, and a final 30-minute session to allow further networking among the attendees.

The main conference days were preceded by tutorials on Sunday. Tutorials provided an excellent

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opportunity to get in-depth knowledge in the new trends and the hot topics. Four tutorials from academia, industry, and national research labs covered a wide range of topics from state-of-the-art hardware description and domain-specific modeling and specification languages to parallel system simulation and open-source realtime software development frameworks. All four tutorials included significant hands-on components that allowed participants to try out and get familiar with presented tools. Three of the four tutorials were delivered live during the same 9 A.M.–1 P.M. global time slot, and one tutorial consisted of pre-recorded lectures plus a live Q&A session on Sunday.

Thursday and Friday have been the days for the International Symposium on Networks-on-Chip (NOCS) as well as five workshops covering a wide range of important topics in embedded systems, specifically Rapid System Prototyping (RSP), Accelerating Artificial Intelligence for Embedded Autonomy (AAIEA), Highly Efficient Neural Processing (HENP), and Memory and Storage Computing (MSC).

Highlights of the ESWEEK program have been two distinguished keynote talks and a panel by prominent leaders in academia and industry, covering relevant trends for future embedded and cyber physical systems and providing deep insights into technology drivers. On Monday, Professor John A. Rogers from Northwestern University presented his keynote talk on “Skin-Like Wireless Wearables – From Premature Babies in the NICU to Patients with COVID-19.” In his keynote, Prof. Rogers introduced skin-like wireless wearables for continuous monitoring of physiological status with clinical-grade precision, designed for patient populations that range from premature babies in neonatal intensive care units to COVID-19 patients in the hospital and the home. On Tuesday, Dr. Prith Banerjee, Chief Technology Officer at ANSYS, in his keynoted titled “Digital Twins: Challenges and Opportunities in Various Industries” discussed the challenges and opportunities of digital twins to aid the design, analysis, build, manufacturing and operations phases of asset-intensive industries. Digital twins thereby consist of and establish a two-way information flow between the physical and virtual (simulated) worlds using IoT platforms. Finally, on Wednesday, the conference further included a traditional panel focusing on “Post COVID-19 Cyber Security – The Challenges and Solutions” in which top experts from around the globe shared their views on this highly relevant topic.

The conference program was framed by opening, awards, and networking sessions on each day.

The opening session on Monday provided the traditional overview of the conference week and the conference program. On Tuesday, the conference day started with the presentation of the “Test of Time” awards for each of the three conferences as well as a memorial for Prof. Wolfgang Rosenstiel, who had recently and tragically passed away. Finally, on Wednesday, the Best Paper Awards for the three conferences and other awards were presented. Each day was concluded by a networking session in which attendees could freely interact with each other and the conference organizers as well as Test of Time or Best Paper Award winners.

As the first ever purely virtual occurrence, ESWEEK 2020 presented new challenges and a new format. Overall, the conference turned out to be a successful event. The conference experienced a record high number of 718 attendees, with 80% of the attendees coming from nonmandatory nonauthor registrations who were charged a nominal registration fee of \$10/\$20 for virtual attendance. The live sessions during the conference week were generally very well attended. The technical paper sessions and tutorials had 30–50 people each with up to four sessions in parallel. On average, the videos and live streams of each technical paper session had 100 views from a very conservative estimate. Post-conference survey feedback from conference attendees included positive comments specifically about the opportunity for live interactions with authors and attendees. At the same time, the opportunity to attend the conference virtually allowed many people to participate who would otherwise not have been able to, and attendees suggested to include such options even for future physical, in-person ESWEEK events.

GIVEN THE CONTINUED uncertainty around COVID-19, the next ESWEEK is currently planned to continue as a virtual event October 10–15, 2021. We will, however, closely monitor the situation and if it improves significantly consider a hybrid in-person/virtual event in an appropriate physical location that will be announced well in advance. Please follow <http://www.esweek.org/> for more details and updates.

■ Direct questions and comments about this article to Andreas Gerstlauer, Department of Electrical and Computer Engineering, The University of Texas at Austin, Austin, TX 78712 USA; gerstl@ece.utexas.edu.