

International Conference on Embedded Wireless Systems and Networks (EWSN) 2019

Beijing, China

25-27 February 2019

Proceedings

Edited by

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Message from the General Chairs

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Welcome to EWSN 2019, the International Conference on Embedded Wireless Systems and Networks, held during February 25-27 in Beijing, China. Originally established as the European Conference on Wireless Sensor Networks in 2004, EWSN has been the major European outlet for sensor networks research and a yearly gathering point for the research community. This year, EWSN will be held out of Europe for the first time. Starting from sensor networks, research has expanded over the years into other related fields such as Internet of Things, where the focus is on providing Internet connectivity to embedded systems, or Cyber-Physical Systems where the focus is on the inclusion of networked control aspects. Yet, all these areas share the focus on wirelessly networked embedded systems. To reflect this broadened field, the acronym EWSN now expands to International Conference on Embedded Wireless Systems and Networks.

The main conference will be composed of several elements, among which research papers are the most prominent. The conference program contains 18 papers, selected from 79 submissions from all over the world via a rigorous review process. Each paper was assigned at least 5 reviewers from the Technical Program Committee (TPC). The review process included a rebuttal process, which allowed the authors to see and (optionally) respond to the reviews before the final decision was made. After rebuttals, reviewers discussed online the merits of the papers, using the HotCRP conference management system. This process converged to a decision for the majority of the papers. For the remaining ones, a “virtual TPC meeting” was then held via conference call on November 28, 2018, during which 10 papers were discussed, and half of them accepted. The TPC chairs are deeply grateful to the TPC members for their work and dedication, and especially to those that made themselves available for the conference call.

These research submissions are complemented by keynote talks by internationally renowned speakers. Prof. John A. Stankovic from the University of Virginia will be giving the opening talk of the main conference, sharing his experience and vision on the research challenges and solutions for Internet of Trillions of Things (IOTT) and Cyber Physical Systems (CPS). Dr. Xian-Sheng Hua of Alibaba Group will discuss the challenges and practices of large scale visual intelligence in the real world.

As part of the main program, we will also have an

exciting poster and demo sessions with a total of 37 accepted contributions, including 26 posters and 11 demos. Each poster and demo submission was peer-reviewed by two or three reviewers to ensure quality and scope. We would like to thank all program committee members of the poster and demo tracks for their timely and thorough reviews. All posters and demos will be displayed in the afternoon of the first day of the main conference. They will be also presented during a lively 1-minute madness session.

Following the success of the dependability competition, which was introduced in EWSN 2016, we organize the fourth edition of this event during EWSN 2019. The dependability competition brings together researchers and practitioners from both academia and industry working in the area of wirelessly networked embedded systems in order to compare the performance of their solutions under the same settings. In contrast to the previous three editions, this year’s dependability competition introduces two distinct categories (data collection and dissemination) and involves multiple traffic loads, the transmission of packets with different length, as well as different sets of source and destination nodes. Ten international teams composed of 43 people from 9 different countries (70% from academia and 30% from industry) have striven this year to provide the most reliable, timely, and energy-efficient networking solution for low-power wireless systems operating in environments rich with radio interference. The winners of each category will be presented at the main conference.

This year, EWSN introduces the concept of a PhD Forum to its program. The Forum has been structured as a series of short presentations by the students, followed by collective discussions. “Speed mentoring” sessions conclude the Forum to let the students obtain individual feedback and advice. Participating students will also present a poster during the main conference to leverage further interaction with EWSN attendees.

Finally, the main conference is complemented by six affiliated workshops — CoWireless, CISC, 6LoWPAN, WSRRWSN, LPNET, and DFSD — which span across the focus areas of low power wide area networking, heterogeneous IoT, security and resilience, fog computing, as well as crowd intelligence in smart city applications.

EWSN has been held in cooperation with ACM SIGBED since 2016 and, starting this year, also with ACM SIGMOBILE. This link with ACM SIGs not only gives us the

highest recognition of our community but also ensures that the proceedings will be electronically available in the ACM Digital Library. We wish to thank the publication chairs, Christian Renner and Yuanqing Zheng that, together with Meghan Haley, the representative from Junction Publishing, managed the publication process smoothly and efficiently.

Organizing EWSN 2019 has been an effort that would have not been possible without the help and support of a large number of people. We are very grateful to the workshop chairs Mo Li and Marco Zimmerling, the poster and demo chairs Rui Tan, Dong Li, Zhichao Cao, Hongkai Wen,

the PhD Forum chairs Lothar Thiele and Thiemo Voigt, and the Industry Liaison Chair Xiaohua Tian. The competition chairs Carlo Alberto Boano and Markus Schuss spent weeks ensuring the testbed was ready for the competition. Also deserve special thanks Fan Li, Liang Liu, and Jiliang Wang, who took the huge workload of being local organizers. We are also grateful to our publicity chairs Octav Chipara, JeongGil Ko, Olga Saukh, Fu Xiao, our registration chair Zhenge Guo, and our web chair Xipeng Ma.

We are looking forward to hosting EWSN 2019 in Beijing.

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Keynote Address

Research Challenges and Solutions for IOTT/CPS

John A. Stankovic
University of Virginia



ABSTRACT

As the Internet of Things (IOT) matures and supports increasingly sophisticated applications, the research needs for IOT also expand considerably. This talk discusses several major research challenges for the future IOT where trillions of devices are connected to the Internet; call it the Internet of Trillions of Things (IOTT). Research topics covered include new systems of systems problems, the impact of massive scaling, and IOTT for healthcare. Smart cities are used to present examples of new system of system research issues and their solutions. Scaling and long time maintenance problems give rise to the need for runtime validation. Why this is important and how to accomplish this is presented. We use the Internet of Healthcare Things to identify the realisms that must be addressed in real home deployments. We also discuss the problems and solutions for using speech as a major sensing modality for smart healthcare based on an emo2vec (an extension to word2vec) and LSTMs. The list of topics is not meant to be comprehensive, but does address some of the main research issues in IOTT/CPS.

PRESENTER

Professor John A. Stankovic is the BP America Professor in the Computer Science Department at the University of Virginia. He served as Chair of the department for 8 years. He is a Fellow of both the IEEE and the ACM. He has been awarded an Honorary Doctorate from the University of York for his work on real-time systems. He won the IEEE Real-Time Systems Technical Committee's Award for Outstanding Technical Contributions and Leadership. He also received the IEEE Technical Committee on Distributed Processing's Distinguished Achievement Award (inaugural winner). He has seven Best Paper awards, including one for ACM SenSys 2006. Stankovic has an h-index of 115 and over 57,000 citations. In 2015 he was awarded the Univ. of Virginia Distinguished Scientist Award, and in 2010 the School of Engineering's Distinguished Faculty Award. He also received a Distinguished Faculty Award from the University of Massachusetts. He has given more than 40 Keynote talks at conferences and many Distinguished Lectures at major Universities. He also served on the National Academy's Computer Science Telecommunications Board. He was the Editor-in-Chief for the IEEE Transactions on Distributed and Parallel Systems and was founder and co-editor-in-chief for the Real-Time Systems Journal. His research interests are in real-time systems, wireless sensor networks, smart and connected health, cyber physical systems, and the Internet of Things. Prof. Stankovic received his PhD from Brown University.

Keynote Address

Challenges and Practices of Large Scale Visual Intelligence in the Real-World

Xian-Sheng Hua
VP/Distinguished Engineer of Alibaba Group



ABSTRACT

Visual intelligence is one of the key aspects of Artificial Intelligence. Considerable technology progresses along this direction have been made in the past a few years. However, how to incubate the right technologies and convert them into real business values in the real-world remains a challenge. In this talk, we will analyze current challenges of visual intelligence in the real-world and try to summarize a few key points that help us successfully develop and apply technologies to solve real-world problems. In particular, we will introduce a few successful examples, including “City Brain”, “Luban (visual design)”, from the problem definition/discovery, to technology development, to product design, and to realizing business values.

PRESENTER

Xian-Sheng Hua is now a VP/Distinguished Engineer of Alibaba Group, leading the Artificial Intelligence Center of Alibaba Cloud and City Brain Lab of DAMO Academy. Dr. Hua is an IEEE Fellow and ACM Distinguished Scientist. He received his B.S. degree in 1996, and the Ph.D. degree in applied mathematics in 2001, both from Peking University, Beijing, China. He joined Microsoft Research Asia in 2001, as a Researcher. He was a Principal Research and Development Lead in Multimedia Search for the Microsoft search engine, Bing, from 2011 to 2013. He was a Senior Researcher with Microsoft Research Redmond Redmond from 2013 to 2015. He has authored or coauthored more than 200 research papers and has filed more than 90 patents. His research interests include big multimedia data search, advertising, understanding, and mining, as well as pattern recognition and machine learning. Dr. Hua served or is now serving as an Associate Editor for the IEEE Trans. on Multimedia and ACM Transactions on Intelligent Systems and Technology. He served as a Program Co-Chair for IEEE ICME 2013, ACM Multimedia 2012, and IEEE ICME 2012. He was one of the recipients of the 2008 MIT Technology Review TR35 Young Innovator Award for his outstanding contributions on video search. He was the recipient of the Best Paper Awards at ACM Multimedia 2007, and Best Paper Award of the IEEE Trans. on CSVT in 2014. Dr. Hua will be serving as general co-chair of ACM Multimedia 2020.