International Conference on Embedded Wireless Systems and Networks (EWSN) 2017

Uppsala, Sweden 20-22 February 2017

Proceedings

Edited by

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Message from the General Chair

Per Gunningberg Uppsala University

Thiemo Voigt Uppsala University and SICS

Welcome to EWSN 2017, the International Conference on Embedded Wireless Systems and Networks, held during February 20-22 in Uppsala, Sweden. Originally established as the European Workshop 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. Starting from sensor networks, research has expanded over the years into other related fields such as Internet of Things (IoT), where the focus is on providing Internet connectivity to embedded systems, or Cyber-Physical Systems (CPS) where the focus is on 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 has morphed into International Conference on Embedded Wireless Systems and Networks.

Following the success of the dependability competition of EWSN 2016 we again organise this event. During an exciting day, 10 international teams will compete in providing the most reliable networking solution in the same environment with a strong interference. The teams come both from academia as well as industry with some teams that are mixed. The winner will be presented at the main conference.

On the first day, our two workshops on emerging topics, NextMote and MadCom, will take place. NextMote is dedicated to novel hardware, software and the challenges of IoT. MadCom focuses on unconventional methods to communicate data wirelessly. Two keynote speakers, Prof. Kia Höök and Prof. Xia Zhou will highlight their view on emerging topics.

For the main conference we are excited to present Dr Sara Mazur, Head of Research Ericsson, as the opening keynote talk. Ericsson is a leading company on 5G systems, which will be an integrated part of our future embedded wireless systems. The main program will present carefully selected papers on embedded networks and systems. Posters presenting emerging topics mixed with a nerve of demonstrations will end the technical part of first day that will be followed by a reception for social interaction. To increase the suspense, awards will be given to the best paper, poster and demos the last day.

EWSN is since 2016 held in cooperation with ACM SIGBED. It gives us not only the highest recognition of our community but also that the proceedings will be electronically available in the ACM Digital Library. It follows our open access model where the papers are free of charge to everybody in order to maximize the impact of our selected papers and poster abstracts. Our deepest thanks to the publication chair Christian Renner and Meghan Haley from Junction Publishing who managed this process smoothly and efficiently.

Implementing EWSN 2017 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 program chairs Luca Mottola and Chenyang Lu who put together an exciting program, the workshop chairs Leo Selavo and Domenico Giustiniano as well as the poster and demo chairs Marco Zimmerling and Yuan He. The competition chair Carlo Alberto Boano spend several weeks at Uppsala University ensuring the testbed was ready for the competition. He deserves special thanks as well as Christian Rohner who took the huge workload of being local organizer and web chair. We are also thankful to our publicity chairs Marco Cattani, Kaishun Wu and Omprakash Gnawali.

Last but not least a big thanks to the sponsors of EWSN 2017, Uppsala University, RISE SICS, Uppsala Kommun and Internetfonden.

We are looking forward to hosting EWSN 2017 in Uppsala.

Message from the Program Chairs

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Marco Zimmerling TU Dresden, Germany

DEPENDABILITY COMPETITION CHAIR Carlo Alberto Boano, TU Graz, Austria

WORKSHOP CHAIRS

Leo Selavo University of Latvia, Latvia

Domenico Giustiniano IMDEA Networks Institute, Spain

On the scientific and technical side, EWSN 2017 continues along the path drawn by EWSN 2016. The program committee reinforces the mix of top researchers representing the broader scope of the conference. Based on the positive feedback gathered from authors at EWSN 2016, the review process includes again a rebuttal phase, instrumental for the authors to address incorrect factual statements in the reviews and provide additional clarifications. Even though this step was not mandatory for authors, this year only the authors of three submitted papers did not leverage the opportunity.

The additional inputs provided through the rebuttal phase were considered, along with the original and revised reviews as well as the outcome of an online discussion, during the online program committee meeting held on November 28th, 2016. Overall, 23 members of the program committee participated scattered across five different timezones, to take final acceptance and rejection decisions. The program committee eventually accepted 14 full papers and 4 short papers. About half of the accepted papers were assigned a shepherd to ensure that the reviewers concerns were satisfactorily addressed in the final version. Overall, the resulting program is both strong and diverse; it nicely represents the broader scope of the conference.

For the first time at EWSN, the Best Paper Award is going to be decided based on a combination of three factors. The reviewer scores weighted by their expertise determined the three best papers included in the "Best Paper Award" session of the program. A small committee of PC members looked at both the papers and at their presentation during the conference. Finally, all attendees voted for the best presentation right at the conference.

POSTERS / DEMOS

Complementing the presentations of regular papers, we have an exciting poster and demo session at EWSN 2017 with a total of 36 contributions, including 21 posters and

15 demos. Each poster and demo submission was peerreviewed by 3 reviewers to ensure quality and scope. We would like to thank all TPC members of the poster and demo track for their timely and thorough reviews, and for their suggestions to the authors on how to improve the abstracts. As part of the main conference program, poster and demo authors pitch their work to the entire audience in a "one-minute madness" session. The best poster and the best demo receive an award.

DEPENDABILITY COMPETITION

At its second edition, the EWSN dependability competition brings together researchers and practitioners from academia and industry working in the area of wirelessly networked embedded systems to compare the performance of their solutions under the same settings. After the success of the first edition, 10 teams composed of 48 people from 10 different countries (17% from outside Europe, 40% from industry) will strive also this year to provide the most reliable, timely, and energy-efficient networking solution for wireless systems operating in environments rich with radio interference. Organizing this year's competition would not have been possible without the exceptional support and invaluable help of Markus Schuß in setting up the required infrastructure. We also would like to thank all those who dedicated time and effort, making it possible to repeat this exciting event: among others, Joel Fredrikson, Engelbert Meissl, Charalampos Orfanidis, and Thiemo Voigt. Good luck to all contestants and happy coding!

Workshops

This year, there are two workshops in conjunction with EWSN.

MadCom 2017 is the Second International Workshop on New Wireless Communication Paradigms for the Internet of Things. After the success of the first edition, MadCom 2017 will continue to provide the opportunity to present new and unconvential methods to communicate data wirelessly. We received submissions from Europe, the US and Asia; with each submission receiving at least four reviews from the TPC members. 6 papers have been accepted by the program committee to gather a stimulating program under one roof. The final program gives attendees the opportunity to learn about the strengths of emerging areas ranging from visible light communication and LoRa to novel ways for inter-technology communication schemes. The workshop program includes an insightful keynote by Xia Zhou about the use of ubiquitous light around us as a unobtrusive sensing medium. We would like to express our gratitude to the TPC for their commitment and support.

The NextMote workshop represents "Next Generation Platforms for the Cyber-Physical Internet". It is dedicated to novel hardware, associated software paradigms, and challenges for the world of IoT and remote distributed sensing. The program committee has accepted 4 papers for presentation. The topics range from low cost robots and prototyping platforms for IoT, to harnessing back-scatter communications and cognitive wireless sensor networks. We thank the International TPC for dedicating time and effort to this workshop to become reality and look forward to a fruitful and interesting meeting.

Our gratitude goes to the program committee members for the significant amount of work they invested along the entire review process, and of course to all the authors for contributing their great research work to EWSN!

Organization

GENERAL CHAIRS

Per Gunningberg Uppsala University, Sweden

Thiemo Voigt Uppsala University and SICS, Sweden

PROGRAM CHAIRS

Luca Mottola Politecnico di Milano and SICS, Sweden

Chenyang Lu Washington University in St. Louis, USA

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Poster & Demo Chairs

Yuan He Tsinghua University, China

Marco Zimmerling TU Dresden, Germany

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PUBLICATION CHAIR

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Guoliang Xing Michigan State University, USA

Desheng Zhang Rutgers University, USA

Keynote Address

Designing with Actuation -- not sensing?

Kristina Höök Royal Institute of Technology (KTH), Sweden

Presenter

Kristina Höök is a Professor in Interaction Design at Royal Institute of Technology (KTH) in Sweden and part-time at SICS (Swedish Institute of Computer Science). She heads the Mobile Life centre. She is known for her work on social navigation, seamfulness, affective loops and most recently on somaesthetic design.

Abstract

Despite its importance in our lives, technology is still frequently frustrating, dehumanising, or just plain boring. So while our everyday life is saturated with technology, our relationship to it is still very far from perfect. In the Internet of Things era, we will be surrounded by even more technology. What could a stronger focus on enjoyment, creativity and engagement - for all - bring? I will present some of the tactics, methods and insights gained from the work in the Mobile Life centre where we learnt early on that the focus on data and sensing is not the key to bringing out relevant and interesting applications. Instead, we learnt how to see Internet of Things as a 'design material', in particular focusing on the actuation. To make technology rhyme with our everyday engagement, we explore aesthetics, the role of the materials in our design processes and we work interdisciplinary. To make this shift, we often collaborate with experts in a varied set of fields - such as fashion studies, fine art, opera, medical science, street performance, TV-production or somaesthetic practices. We get inspired by doing studies on people's mundane leisure and creative activities such as horseback riding, hunting, parkour, dancing or live-action role-playing. We use those insights to spur innovative design processes, resulting in sensor-based applications, pervasive games, new mobile media, technical platforms and materials to support amateurs' creativity - but always with a focus on what the system brings to our lives.

Keynote Address

Ubiquitous Sensing Using Visible Light

Xia Zhou Dartmouth College, USA

Abstract

The ability to sense what we do and how we behave is crucial to help detect diseases, diagnose early symptoms of health issues, and foster healthier lifestyles. Existing sensing technologies, however, have significant drawbacks. They either are intrusive — we have to constantly carry or wear sensing devices (e.g., Apple Watch, Fitbit), or present serious privacy risks by capturing raw images, or are limited in sensing granularity.

In this talk, I will present a radically different approach to unobtrusive human sensing, which exploits the ubiquitous light around us as a sensing medium that senses and responds to what we do, without requiring any on-body devices nor any cameras. I will first present LiSense, the first-of-its-kind system that reconstructs a 3D human skeleton in real time (60 Hz) using purely the light around us. Empowered by Visible Light Communication (VLC), LiSense uses shadows created by a human body from blocked light to reconstruct the 3D skeleton. I will then present our recent effort StarLight, which advances LiSense by addressing several practical issues and pushes light sensing closer to practice. I will conclude with our ongoing work and future directions.



Presenter

Xia Zhou is an Assistant Professor in the Department of Computer Science at Dartmouth College. She received her PhD at UC Santa Barbara in 2013. Her research interests are in mobile systems and wireless networking. Her recent work on visible light communication systems has won the Best Video Award at MobiCom 2015 and 2016, Best Demo Award at MobiSys 2015, and the Best Paper Award at ACM VLCS 2014. Her work on spectrum distributions won Best Practical Paper Award at SIGMETRICS 2013, and Best Paper Award Finalist at MobiCom 2008. She also won other paper awards in UbiComp 2014 and 2015, HotWireless 2015. She is the recipient of the NSF CAREER Award in 2016 and Google Faculty Research Award in 2014.

Keynote Address

5G – a game changer

Sara Mazur Ericsson Research, Sweden



Presenter

Sara Mazur is the head of Ericsson Research, where she manages a team of 650 researchers across the globe, all dedicated to innovation and developing the technologies that are still five to seven years out. She has a PhD in electrical engineering and was an Associate Professor in fusion plasma physics. She owns 69 patents and literally wrote the book on adaptive antennas, so it's safe to say her interest in 5G is not to contribute to the hype, but to make it deliver from a practical and technological perspective.