EWSN 2016

International Conference on Embedded Wireless Systems and Networks

February 15. – 17. 2016

Graz, Austria

acm In-Cooperation

acm SIGBED

TU Graz. Graz University of Technology

Das Land Steiermark

GRAZ STADT

NXP

>makeSense Easy Programming of Integrated Wireless Sensor Networks

Universitas Studii Lubecensis

Content

Local Information

Almost 200 years of research and teaching make Graz University of Technology one of Austria's most venerable scientific institutions. The conference sessions will take place in the beautiful auditorium in the historical main building completed in 1888 that is located on campus "Alte Technik" in Rechbauerstrasse 12. It is located close to the city center and it is easily reachable by foot from Jakomini Platz (main transfer point) and/or by public transportation.

The EWSN 2016 Dependability Competition will be held on another campus in Inffeldgasse 16/I, 1st floor (a bit outside of the city center). From Jakomini Platz it is easily reachable by foot (about 20 min) or by public transport (tram number 6 stops close by at Schulzentrum St. Peter or Moserhofgasse).

For more information, please check the following page: http://verbundlinie.at/lang/en/

Network Connection

The "eduroam" (education roaming) network is available throughout the conference area. You can connect to the network using the standard eduroam guidelines.

www.tugraz.at

If you don´t have an eduroam account, you can connect to WLAN SSID “tug”. Open a web browser and enter username and password to connect to the Internet. Please ask for an account at the registration desk.

Organisers’ Contacts

Kay Römer, General Chair
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WELCOME MESSAGE

Welcome to EWSN 2016, the International Conference on Embedded Wireless Systems and Networks, held during February 15-17 in Graz, Austria. 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. 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 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. Also new in 2016, the conference has a featured topic each year to put a focus on a hot topic, but without excluding other topics in scope of the conference. The 2016 featured topic is dependability, reflecting the trend that wirelessly networked embedded systems are increasingly used in safety-critical applications such as smart production systems that require dependable performance. To this end, EWSN 2016 features for the first time a dependability competition where international teams compete in providing the most reliable networking solution in environments with strong interference. To open EWSN also to new emerging topics, two workshops have been added to the program that explore novel wireless communication paradigms such as visible light communication and to shed light on how the next generation of wireless embedded computing platforms will look like.

Besides these changes at the naming and content levels, EWSN 2016 is also held for the first time in cooperation with ACM SIGBED. The proceedings are published electronically in the ACM Digital Library, following an open access model where the papers are available online and free of charge to everybody in order to maximize the impact of the research results published at EWSN.

Implementing all these changes in order to continue the success of EWSN also during the next decade was a major endeavour that would not have been possible without the fantastic support of the organizing team, first and foremost the program chairs Koen Langendoen and Thiemo Voigt, the workshop chairs Leo Selavo and Marco Zuniga, the competition chair Carlo Alberto Boano, as well as the poster and demo chairs Olaf Landsiedel and Luca Mottola. They brought many innovative aspects and an exciting program to EWSN 2016 as they will report on the following pages. My deepest thanks go also to the publication chair Christian Renner and Meghan Haley from Junction Publishing who were instrumental to implement the new publication model of EWSN. Christian Steger, Markus Quaritsch, Engelbert Meissl, Silvia Reiter, and Nora Zakany made EWSN happen by managing the finances, web site, and local arrangements with highest dedication. I am also grateful to the sponsors of EWSN 2016, Graz University of Technology, University of Luebeck, NXP Semiconductors Austria GmbH, the City of Graz, and the Federal State of Styria.

I hope you enjoy the conference in its new format!

Kay Römer, *General Chair*

February 2016, Graz, Austria

	SATURDAY 13.02.2016	SUNDAY 14.02.2016	MONDAY 15.02.2016	TUESDAY 16.02.2016	WEDNESDAY 17.02.2016
MORNING		Dependability Competition Preparation	Keynote MadCom Workshop	Keynote Competition Presentation Full papers	Keynote Full Papers
			Dependability Competition		
AFTERNOON	Dependability Competition Preparation	Dependability Competition Preparation	Keynote NextMote Workshop	Short Papers Posters and Demos	Full papers Closing
EVENING			Reception	Graz Guided Tour Reception	

KEYNOTE SPEAKERS

Chenyang Lu

Dependable Wireless Control through Cyber-Physical Co-Design

Washington University St. Louis

Industrial wireless control systems are the new frontier of cyber-physical systems. While the adoption of industrial wireless standards has demonstrated the promise of wireless sensor-actuator networks in industrial environments, there remain daunting challenges in developing control systems that are dependable over wireless networks due to communication delays, data losses and resource constraints in such networks. In contrast to traditional approaches of designing wireless and control subsystems in isolation, we need a cyber-physical co-design approach that co-joins wireless and control designs to overcome the limitations of wireless communication. This talk will present recent advances toward dependable wireless control systems: (1) real-time wireless sensor-actuator networks with delay guarantees; (2) control-aware wireless network design; (3) realistic case studies of industrial control systems through holistic wireless cyber-physical simulations. The talk will further highlight research challenges and opportunities in the exciting area of industrial wireless sensor-actuator networks.

Friedemann Mattern

Cooperating with Smart Objects: Humans in the Loop!

ETH Zurich

We embed ever smaller processors in physical objects, network them with other smart things, analyze their sensed data somewhere in a cloud, and optimize real-world processes based on the knowledge gained. The application areas and business scenarios that benefit from Internet of Things technologies are abundant: Wind farms increase their yield, logistic chains are improved, and traffic patterns in whole cities become transparent – to mention only three somewhat arbitrary examples. Many of those classical scenarios are characterized by the fact that they work almost fully automatic - humans are out of the loop. So far, so good.

But with further technical progress and cost reduction, also more and more consumer products and everyday items in our direct personal environments will become smart ("hello Barbie, can you hear me?") and connected to the Internet and its ecosystem. People will communicate - first with their devices, and later also with many of their more mundane belongings. But when people are in the loop, things get interesting and often complicated. Already the problem how and by what technical means we can communicate with our friendly personal objects is an issue - but when these objects do

become really smart, communication is only a means to a higher purpose: cooperation. This gives rise to a number of interesting questions: How, in fact, do we cooperate with smart objects? Do they understand what we want? Do we always understand them? Even scenarios with such seemingly simple smart things as learning thermostats or robot vacuum cleaners are non-trivial in that respect.

There will certainly be much to explore in a future world where people are not out of the loop, but in the loop of communicating smart objects. And that future may be closer than we think.

Pat Pannuto

From 2010 to 2030: The Recent Past and Distant Future of Embedded Systems

University of Michigan

This talk will traverse the evolution from yesterday's motes to "next" and "next-next" generation motes. Along the way we'll face a few harsh realities that will limit and shape future evolution (a trillion devices cannot demand replacing a trillion batteries), uncover recent results already pushing boundaries (including highlights from the design and implementation of the world's smallest computer), and explore some of the possibilities that emerge when we rethink designs from the ground up (can we build useful motes that don't include CPUs?). The talk is based on recent achievements and visions of the Embedded Systems Research Lab at University of Michigan.

Stefan Mangold

Visible Light Communication for Toys and the Internet-of-Things

Disney Research Zurich

Visible Light Communication (VLC) with Light Emitting Diodes (LEDs) as transmitters and receivers enables low bitrate wireless adhoc networking, which is an interesting new approach for toys and related applications in the entertainment industry. LED-to-LED VLC adhoc networks with VLC devices communicating with each other over free-space optical links typically achieve a throughput of a few kilobit per second at distances of no more than ten meters. LED-to-LED VLC adhoc networks are useful for combining light bulbs and illumination with low-complex networking. In this talk, we present recent research achievements at Disney Research, address open challenges, and demonstrate the performanceof our software-based VLC physical layer and a VLC medium access control layer that retain the simplicity of the LED-to-LED approach.

SATURDAY PROGRAM, 13.02.2016

Dependability Competition

Location: Inffeldgasse 16/I (see page 20)

13:30 **Registration**

14:00 **Welcome: Rules Overview and Evaluation Procedure**
Chair: Carlo Alberto Boano (TU Graz, Austria)

14:30 **Early Preparation and Testing**
Coffee, drinks, and cold sandwiches are provided to all contestants.

19:30 **End of Early Preparation**
Dinner is not provided.

SUNDAY PROGRAM, 14.02.2016

Dependability Competition

Location: Inffeldgasse 16/I (see page 20)

08:00 **Registration**

08:30 **Welcome: Rules Overview and Evaluation Procedure**
Chair: Carlo Alberto Boano (TU Graz, Austria)

09:00 **Early Preparation and Testing**
Coffee, drinks, and cold sandwiches are provided to all contestants.

19:30 **End of Early Preparation**
Dinner is not provided.

MONDAY PROGRAM, 15.02.2016

Dependability Competition

Location: Inffeldgasse 16/I (see page 20)

08:30 **Evaluations**

08:30 **Team #1: Channel Exploration/Exploitation Based on a Thompson Sampling Approach in a Radio Cognitive Environment**
Arash Maskooki (Inria, France), Viktor Toldov (Inria and Université Lille, France), Laurent Clavier (Université Lille and Institut Mines-Télécom, Télécom Lille, France), Valeria Loscri and Nathalie Mitton (Inria, France)

09:25 **Team #3: Towards Low-Latency, Low-Power Wireless Networking under Interference**
Beshr Al Nahas and Olaf Landsiedel (Chalmers University of Technology, Sweden)

10:20 **Team #4: RedFixHop**
Jirka Klaue, Angel Corona, Martin Kubisch (Airbus Group Innovations, Germany), Javier Garcia-Jimenez (Kinexon, Germany), and Antonio Escobar (Infineon, Germany)

MONDAY PROGRAM, 15.02.2016

Dependability Competition

Location: Inffeldgasse 16/I (see page 20)

11:15 **Team #5: An Adaptive Protocol Stack for High-Dependability based on the Population Protocols Paradigm**
Dimitrios Amaxilatis (University of Patras and CTI, Greece) and Ioannis Chatzigiannakis (Sapienza University of Rome, Italy, and CTI, Greece)

12:10 **Team #6: Is Concurrent Transmission Flooding a Good Idea for Random Traffic?**
Makoto Suzuki, Chun-Hao, Liao Yuki Katsumata, Kyoichi Jinno, Hiroyuki Morikawa (The University of Tokyo, Japan)

13:05 **Team #7: Sparkle: Energy Efficient, Reliable, Ultra-low Latency Communication in Wireless Control Networks**
Dingwen Yuan and Matthias Hollick (Technische Universität Darmstadt, Germany)

14:00 **Team #8: Reliability through Time-Slotted Channel Hopping and Flooding-based Routing**
Pedro Henrique Gomes (University of Southern California, USA), Thomas Watteyne (Inria, France), Pradipta Gosh and Bhaskar Krishnamachari (University of Southern California, USA)

14:55 **Team #9: Interference-Aware Multi-Channel Cross Layer Protocol for Energy- Efficient and Low-Delay Networking**
Guillermo Sierra Aiello, Ilker Demirkol, Anna Calveras, Carles Gomez, Eduard Garcia (Universitat Politecnica de Catalunya, Spain), and August Betzler (i2CAT Foundation, Spain)

15:50 **Team #10: ContikiMAC with Differentiating Clear Channel Assessment**
Alex King, James Hadley, Utz Roedig (Lancaster University, United Kingdom)

16:45 **Team #11: Dependable Network Flooding using Glossy with Channel-Hopping**
Philipp Sommer and Yvonne-Anne Pignolet (ABB Corporate Research, Switzerland)

17:40 **Team #12: Multimodal Reactive-Routing Protocol to Tolerate Failure**
Tiong Hoo Lim (Institut Teknologi Brunei, Brunei), Iain Bate and Jon Timmis (University of York, United Kingdom)

18:30 **End of Evaluations**
Teams only have to present shortly before and during their timselots. Catering is provided in Rechbauerstraße 12.

Contact person for Dependability Competition: Carlo Alberto Boano
E-mail: cboano@tugraz.at

MONDAY PROGRAM, 15.02.2016

MadCom Workshop

Location: Rechbauerstraße 12 (see page 20)

08:00 Registration

09:00 Opening session/Welcome

Chair: Marco Zuniga (TU Delft, The Netherlands)

09:10 Keynote

"Visible Light Communication for Toys and the Internet-of-Things"

Stefan Mangold (Disney Research Zurich, Switzerland)

10:00 Session 1: Exploiting Visible Light

Chair: Frederik Hermans (Uppsala University, Sweden)

OptiSec3D - A new Paradigm in Secure Communication and Authentication featuring Time-of-Flight

Hannes Plank (Infineon Technologies Austria AG), Matthias Almer (Graz University of Technology, Austria), Robert Lobnik (Infineon Technologies Austria AG), Christian Steger (Graz University of Technology, Austria), Thomas Ruprechter, Holger Bock, Josef Haid, Gerald Holweg and Norbert Druml (Infineon Technologies Austria AG)

Embedded Visible Light Communication: Link Measurements and Interpretation

Milad Heydariaan, Shengrong Yin, Omprakash Gnawali (University of Houston, USA), Daniele Puccinelli (SUPSI, Switzerland) and Domenico Giustiniano (IMDEA Networks, Spain)

Using Spatial Light Modulators within MIMO Visible Light Communication Receivers to Dynamically Control the Optical Channel

Jimmy C. Chau, Cristian Morales, Thomas Little D.C. (Boston University, USA)

11:00 Coffee break

11:30 Session2: Rethinking Radio

Chair: Daniele Puccinelli (SUPSI, Switzerland)

Enabling Future Consumer Radios to Interact Directly with Things

Craig Partridge (Raytheon BBN Technologies, USA)

Do Multiple Bits per Symbol Increase the Throughput of Ambient Backscatter Communications?

Carlos Pérez-Penichet, Ambuj Varshney, Frederik Hermans, Christian Rohner and Thiemo Voigt (Uppsala University, Sweden)

LoRa for the Internet of Things

Martin C. Bor, John Vidler and Utz Roedig (Lancaster University, United Kingdom)

12:30 End of the Workshop

12:30 Lunch

MONDAY PROGRAM, 15.02.2016

NextMote Workshop

Location: Rechbauerstraße 12 (see page 20)

14:00 Welcome

Chair: Leo Selavo (University of Latvia)

14:10 Keynote

From 2010 to 2030: The Recent Past and Distant Future of Embedded Systems

Pat Pannuto (University of Michigan, USA)

15:00 Session 1: Security and Simulation

Chair: Marcel Baunach (TU Graz, Austria)

CESEL: Securing a Mote for 20 Years

Kevin Kiningham, Mark Horowitz, Phil Levis and Dan Boneh (Stanford University, USA)

Towards a Secure Key Generation and Storage Framework on Resource-Constrained Sensor Nodes

Michael Höberl (Technikon Forschungs- und Plannungsgesellschaft mbH, Austria), Ihtesham Haider and Bernhard Rinner (Alpen-Adria-Universität Klagenfurt, Austria)

Using Cooja for WSN Simulations: Some New Uses and Limits

Kevin Roussel, Ye-Qiong Song and Olivier Zendra (INRIA, France)

16:00 Coffee break

16:30 Session 2: Design for Low Energy and Devices

Chair: Marco Zuniga (TU Delft, The Netherlands)

The Neverending Runtime: Using new Technologies for Ultra-Low Power Applications with an Unlimited Runtime

Björn Cassens, Arthur Martens and Rüdiger Kapitza (TU Braunschweig, Germany)

Cinamin: A Perpetual and Nearly Invisible BLE Beacon

Bradford Campbell, Joshua Adkins and Prabal Dutta (University of Michigan, USA)

OpenMote+: a Range-Agile Multi-Radio Mote

Pere Tuset-Peiró (OpenMote Technologies, Spain), Xavier Vilajosana (Universitat Oberta de Catalunya, Spain) and Thomas Watteyne (INRIA, France)

17:30 End of the Workshop

19:00 Reception in Graz Town Hall with the Mayor of Graz

Location: Town Hall, Hauptplatz 1 (see page 20)

Meeting point: Registration Desk of EWSN2016 at 18:40. We will make our way together to the Graz Town Hall where the Reception will take place.

TUESDAY PROGRAM, 16.02.2016

Main Conference

Location: Rechbauerstraße 12 (see page 20)

08:00 **Registration**

08:30 **Welcome and Main Conference Opening**
Chair: Kay Römer (TU Graz, Austria)

Opening Words by the Rector of TU Graz

Opening Words by the General Chair

Opening Words by the Program Chairs

08:45 **Keynote**
Dependable Wireless Control through Cyber-Physical Co-Design
Chenyang Lu (Washington University St. Luis, USA)

09:45 **Dependability Competition: Awards and Presentations of Winners**
Chair: Carlo Alberto Boano (TU Graz, Austria)

Awards to the best three solutions
Presentation 1st place (10 minutes)
Presentation 2nd place (10 minutes)
Presentation 3rd place (10 minutes)

10:30 **Coffee break**

11:00 **Session 1: Dependability (full papers)**
Chair: Olga Saukh (ETH Zurich, Switzerland)

Adaptive Transmission Scheduling for Energy-Aware Real-time Wireless Communication
Arda Gumusalan and Robert Simon and Hakan Aydin (George Mason University)

Predictable MAC-level Performance in Low-power Wireless Under Interference
Mathieu Michel (UMONS), Thiemo Voigt (Uppsala University and SICS), Nicolas Tsiftes (SICS), and Luca Mottola (Politecnico di Milano and SICS), and Bruno Quoitin (UMONS)

Thingtegrity: A Scalable Trusted Computing Architecture for Resource Constrained Devices
Tobias Rauter, Andrea Höller, Johannes Iber, and Christian Kreiner (Graz University of Technology)

12:30 **Lunch**

TUESDAY PROGRAM, 16.02.2016

Location: Rechbauerstraße 12 (see page 20)

13:30 **Session 2: Short Papers**

Chair: Luca Mottola (Politecnico di Milano, Italy)

Simulating Intermittently Powered Embedded Networks
Muhammad Hamad Alizai (SBA School of Science and Engineering, LUMS), Qasim Raza and Yasra Chandio (SysNet, LUMS), Affan A. Syed (PLUMgrid Inc. and FAST NU, Islamabad), and Tariq M. Jadoon (SBA School of Science and Engineering, LUMS)

Simultaneous Acoustic Localization of Multiple Smartphones with Euclidean Distance Matrices
Seyed-Mohsen Moosavi-Dezfooli (EPFL, Switzerland) and Yvonne-Anne Pignolet and Dacfey Dzung (ABB Corporate Research, Switzerland)

PKF-ST: A Communication Cost Reduction Scheme Using Spatial and *Temporal Correlation for Wireless Sensor Networks*
Yanqiu Huang, Wanli Yu, and Alberto Garcia-Ortiz (University of Bremen)

Implementation of an energy management control strategy for WSNs using the LINC Middleware
Vergara Gallego Maria Isabel, Mokrenko Olesia, Louvel Maxime, Lesecq Suzanne, and Pacull François (CEA Grenoble)

TRAIL: Topology Authentication in RPL
Heiner Perrey, Martin Landsmann, and Osman Ugus (HAW Hamburg), Matthias Waehlisch (FU Berlin), and Thomas C. Schmidt (HAW Hamburg)

14:45 **Poster & Demos 1-Minute Madness Session**

Chairs: Luca Mottola (Politecnico di Milano, Italy) and Olaf Landsiedel (Chalmers University of Technology, Sweden)

Poster: Towards an Ultra-wide Band Sensor Network for Aircraft Applications
Daniel Neuhold, Jorge Friedrich Schmidt, Udo Schilcher, Günther Brandner, Christian Bettstetter, Jirka Klaue and Dominic Schupke

Demo: Topological Robustness of RPL with TRAIL
Martin Landsmann, Peter Kietzmann, Thomas Schmidt and Matthias Wählisch

Poster: Approximation: A New Paradigm also for Wireless Sensing
Thiemo Voigt, Magnus Själander, Frederik Hermans, Alexandra Jimborean, Erik Hagersten, Per Gunningberg and Stefanos Kaxiras

Poster: Maxima Estimation in Spatial Fields by Distributed Local Polynomial Regression
Reiner Jedermann, Henning Paul and Walter Lang

TUESDAY PROGRAM, 16.02.2016

Location: Rechbauerstraße 12 (see page 20)

Demo: SecureFlex - A Flexible System for Security Management
Christina Leitner, Thomas Schnabel and Helmut Neuschmied

Demo: Dead Reckoning for Monte Carlo Localization in Low Seed Density Scenarios
Arne Bochem, Andreas Zdziarstek, Salke Hartung and Dieter Hogrefe

Demo: Design and Evaluation of Underground Wireless Sensor Networks for Reforestation Monitoring
Martin Gellhaar, Jens Dede, Hartmut Koehler and Anna Förster

Poster: Integrating Rich User Interfaces with Real Systems
Laurent-Frederic Ducreux, Maxime Louvel, François Pacull and Maria Isabel Vergara-Gallego

Demo: Ball and Plate Wireless Control
Maxime Louvel, François Pacull and Maria Isabel Vergara Gallego

Poster: Affordable Acoustic Modem for Small-Sized Autonomous Underwater Vehicles
Christian Renner, Alexander J. Golkowski and Erik Maehle

Demo: TWIN Node, A Flexible Wireless Sensor Network Testbed
Idrees Zaman, Jens Dede and Anna Förster

Demo: Deploying a Drone to Restore Connectivity in a WSN
Thuy T. Truong, Kenneth N. Brown and Cormac J. Sreenan

Demo: A High-Performance, Energy-Efficient Node for a Wide Range of WSN Applications
Federico Terraneo, Alberto Leva and William Fornaciari

Poster: Programming Support for Time-sensitive Software Adaptation in Cyberphysical Systems
Mikhail Afanasov, Luca Mottola and Carlo Ghezzi

Demo: Terra - Scripting Customized Components for Wireless Sensor Networks
Adriano Branco, Noemi Rodriguez and Silvana Rossetto

Demo: Wearable Sensor System for Human Biomechanics Monitoring
Atis Hermanis, Ricards Cacurs, Krisjanis Nesenbergs, Modris Greitans, Emil Syundyukov and Leo Selavo

TUESDAY PROGRAM, 16.02.2016

Location: Rechbauerstraße 12 (see page 20)

Demo: Towards a MAC protocol App Store
Jan Bauwens, Bart Joortis, Eli De Poorter, Peter Ruckebusch and Ingrid Moerman

Poster: System Architecture for Programmable Connected Devices
Maria Laura Stefanizzi, Luca Mottola, Luca Mainetti and Luigi Patrono

Poster: Towards a Secure, Resilient, and Distributed Infrastructure for Hydropower Plant Unit Control
Andrea Höller, Johannes Iber, Tobias Rauter and Christian Kreiner

Poster: Dronemap - A Cloud-based Architecture for the Internet-of-Drones
Basit Qureshi, Anis Koubaa, Mohamed-Foued Sriti, Yasir Javed and Maram Alajlan

Poster: ContikiMAC, Some Critical Issues with the CC2420 Radio
Marie Paule Uwase, Maite Bezunartea, Jacques Tiberghien, Jean-Michel Dricot and Kris Steenhaut

Demo: 'Funkdebugger' - A Failure Analysis Framework for Industrial Wireless Communication Systems
Ulf Wetzker

Poster: Building a Stairway to Centralised WSN Control
Pablo Corbalán, Victor Cionca, Ramona Marfievici, Donna O'Shea and Dirk Pesch

Poster: Single Transmission Link Estimation
Camilo Rojas, Damien Piguet and Jean-Dominique Decotignie

Poster: Efficient Power Control Based on Interference Range in Wireless Ad Hoc Networks
Junmei Yao, Wei Lou and Chao Yang

Poster: 3D Virtual Disaster Management Environment Using Wireless Sensor Networks
Anis Zarrad, Anis Koubaa and Omar Cheikhrouhou

Demo: IoT Meets Robotics - First Steps, RIOT Car, and Perspectives
Hauke Petersen, Cedric Adjih, Oliver Hahm and Emmanuel Baccelli

Demo: Fine-tuned Lighting Control Leveraging Smartphone-based Occupancy Detection
Alexander de Moes, Jens Joachim K. Pedersen, Chayan Sarkar and R. Venkatesha Prasad

TUESDAY PROGRAM, 16.02.2016

Location: Rechbauerstraße 12 (see page 20)

Poster: Distance Estimation Modelling in High Performance Localization System (HPLS)
Michal Marks, Andrzej Sikora and Ewa Niewiadomska-Szynkiewicz

Poster: Poster: SoEasy - A Software Framework for Easy Peripheral Control Programming in Diverse Hardware Platforms
Kwang-Il Park, Jong-Ha Shin, Jin-Hae Lee and Seong-Eun Yoo

Demo: Eavesdropping on PolyPoint: Scaling High-Precision UWB Indoor Localization
Benjamin Kempke, Pat Pannuto, Bradford Campbell, Joshua Adkins and Prabal Dutta

Demo: Event Localization Using Instagram
Prasanna Giridhar and Tarek Abdelzaher

Poster: Detection of Wormhole Attack on Wireless Sensor Networks in Duty-Cycling Operation
Takashi Minohara and Kyosuke Nishiyama

Poster: RI-MAC Enhancements for Interference Resilience
Alex King and Utz Roedig

15:30 Poster & Demo Session (Coffee is served)

17:30 End of Poster & Demo Session

18:00 Graz Guided Tour

Meeting point: 18:00, City Hall, Hauptplatz 1 (see page 20)

Explore the main attractions of the Word Cultural Heritage Site: the Main Square, the Styrian Parliament, the Kunsthaus, romantic inner courtyards, the Mur Island, the Cathedral and a fascinating double spiral staircase.

Guided tour performed by City.Guides.Graz.

19:30 Reception and Dinner at the "Grazer Burg" with the Styrian State Government

Meeting point: 19:30, Weisser Saal, Grazer Burg, Hofgasse15 (see page 20)

You may also come to the Registration Desk of EWSN 2016 at 19:15. We will make our way together to the Grazer Burg where the Reception will take place.

WEDNESDAY PROGRAM, 17.02.2016

Main Conference

Location: Rechbauerstraße 12 (see page 20)

08:00 **Registration**

08:30 **Announcement of Awards and EWSN 2017**

08:40 **Keynote**

Cooperating with Smart Objects: Humans in the Loop!
Friedemann Mattern (ETH Zurich, Switzerland)

09:40 **Session 3: Smart Buildings (full papers)**
Chair: Christian Renner (University of Lübeck, Germany)

iLTC: Achieving Individual Comfort in Shared Spaces
Chayan Sarkar, Akshay Uttama Nambi S.N., and R. Venkatesha Prasad (Delft University of Technology)

LightMon: Apportioning the Effect of Light Switching Events on the Electricity Consumption of Buildings
Frank Englert, Patrick Lieser, Marius Rettberg-Päplow, Alaa Alhamoud, Doreen Böhnstedt, and Ralf Steinmetz (TU Darmstadt)

10:40 **Coffee break**

11:00 **Session 4: Networking (full papers)**
Chair: Carlo Alberto Boano (TU Graz, Austria)

WEAVE: Efficient Geographical Routing in Large-Scale Networks
Michał Król (Grenoble Institute of Technology), Eryk Schiller (University of Bern), and Franck Rousseau and Andrzej Duda (Grenoble Institute of Technology)

Efficient and Balanced Routing in Energy-Constrained Wireless Sensor Networks for Data Collection
Miguel Navarro (Indiana University - Purdue University) and Yao Liang (Indiana University - Purdue University)

Sharing a Medium Between Concurrent Protocols Without Overhead Using the Capture Effect
Michael König and Roger Wattenhofer (ETH Zürich)

Source-Node Selection to Increase the Reliability of Sensor Networks for Building Automat
Atis Elsts (SICS Swedish ICT)

13:00 **Lunch**

WEDNESDAY PROGRAM, 17.02.2016

Location: Rechbauerstraße 12 (see page 20)

14:00 **Session 5: State and Time (full papers)**
Chair: Philipp Sommer (ABB Corporate Research, Switzerland)

Efficient State Retention for Transiently-Powered Embedded Sensing
Naveed Anwar Bhatti (Politecnico di Milano, Italy) and Luca Mottola (Politecnico di Milano and SICS Swedish IC)

Time-of-Flight Aware Time Synchronization for Wireless Embedded System
Roman Lim, Balz Maag, and Lothar Thiele (ETH Zurich)

Session 6: Sensing (full papers)
Chair: Philipp Sommer (ABB Corporate Research, Switzerland)

Mitigating Slow Dynamics of Low-Cost Chemical Sensors for Mobile Air Quality Monitoring Sensor Networks
Adrian Arfire, Ali Marjovi, and Alcherio Martinoli (EPFL)

Pre-Deployment Testing, Augmentation and Calibration of Cross-Sensitive Sensors
Balz Maag and Olga Saukh (ETH Zürich), David Hasenfratz (Sensirion), and Lothar Thiele (ETH Zürich)

16:00 **Coffee break**

16:30 **Session 7: Tracking and Localization (full papers)**
Chair: Marcel Baunach (TU Graz, Austria)

Applied Sensor-Assisted Monte Carlo Localization for Mobile Wireless Sensor Networks
Salke Hartung, Arne Bochem, Andreas Zdziarstek, Dieter Hogrefe (University of Göttingen)

Information Bang for the Energy Buck: Towards Energy- and Mobility-Aware Tracking
Philipp Sommer (ABB Corporate Research) and Jiajun Liu, Kun Zhao, Branislav Kusy, Raja Jurdak, Adam McKeown,and David Westcott (CSIRO, Australia)

NaviGlass: Indoor Localisation Using Smart Glasses
Yongtuo Zhang and Wen Hu (School of Computer Science and Engineering, The University of New South Wales), Weitao Xu (School of Information Technology and Electrical Engineering, The University of Queensland), Hongkai Wen (Department of Computer Science, University of Oxford), and Chun Tung Chou (School of Computer Science and Engineering, The University of New South Wales)

18:00 **Closing**

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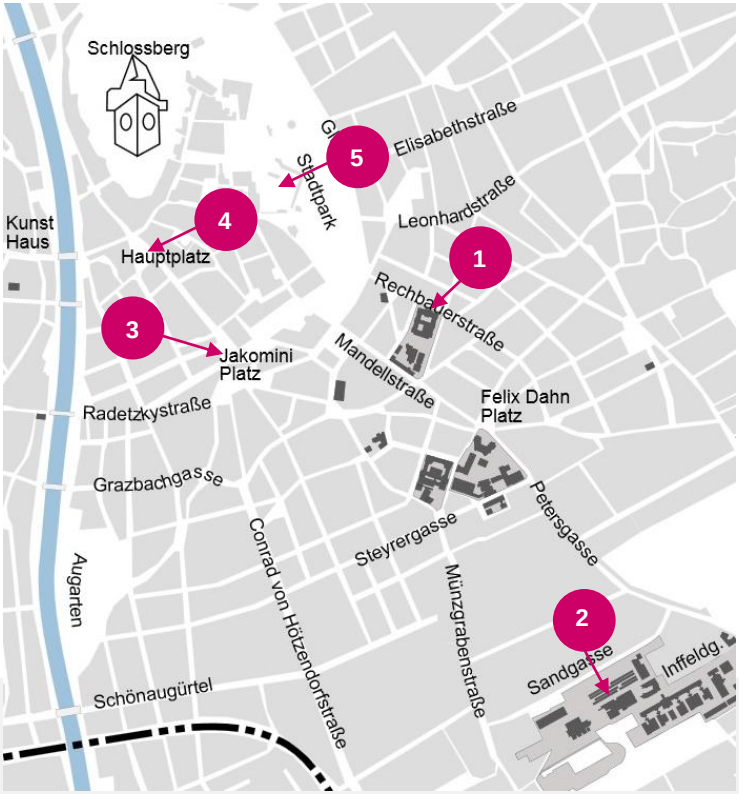
MAP



1. **Main Conference Venue: Rechbauerstraße 12**
2. **Dependability Competition Venue: Inffeldgasse 16/I (1st floor)**
3. **Jakomini Platz (Main transfer point)**
4. **Graz Town Hall: Hauptplatz 1 (Main square)**
   - **Monday: Reception**
   - **Tuesday: Meeting Point for Guided Tour**
5. **Grazer Burg: Hofgasse 15**
   - **Tuesday: Reception**