



ewsn 2015

12th European Conference on
Wireless Sensor Networks

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WELCOME MESSAGE

On behalf of the EWSN 2015 organizing committee, we are delighted and honored to welcome you to the School of Engineering (ISEP) of the Polytechnic of Porto (IPP), the hosting institution of the 12th European Conference on Wireless Sensor Networks. We believe you will be able to enjoy the rich technical content of this edition of EWSN, along with the culture and scenery Porto has to offer.

The technical program for EWSN 2015 covers a wide range of very compelling topics grouped into five technical sessions: Services and Applications, Mobility and Delay-tolerance, Routing and Data Dissemination, and two sessions on Human-centric Sensing. The program also includes a short paper presentation session, two keynote talks, an industry session, and a poster and research demonstration session.

The success of EWSN 2015 ultimately depends on everyone that contributed to the organization of this conference, in particular the Local Organizing Committee, and all the members of CISTER who worked extremely hard to prepare important aspects supporting the conference program and planned social activities. We would like to thank the International Program Committee members, Workshop, Posters and Industry Session Chairs for their efforts in putting together an excellent technical program, and our sponsors who provided invaluable help in lowering the cost of participation in EWSN. Finally, we would like to thank all the attendees of EWSN 2015. We plan to have an enjoyable and productive conference, and your participation will be key.

EWSN General Chair

Eduardo Tovar, CISTER/ISEP, Portugal

Program Co-Chairs

Tarek Abdelzaher, UIUC, USA

Nuno Pereira, CISTER/ISEP, Portugal

LOCAL INFO

The EWSN 2015 conference will take place at the ISEP Campus.

ISEP is located in the University area in the north of the city; and it is served by the Metro Line D (Yellow line, "IPO" or "Pólo Universitário" stations) with a direct connection (15 minutes) to the city center.



Network Connection

The configuration for the wireless network of EWSN'15 is:
SSID ccongressos
Shared Key ewsn@ccongressos



Printing

To print boarding passes and the like, please send an e-mail to infaa@isep.ipp.pt (Inês Almeida) or contact the registration desk.



Meetings

As the conference is not just about the technical presentations, but also to forge collaborations and serve as a meeting place for projects, we offer three meeting rooms of various sizes. Contact the conference organisers personally, or via phone or at the registration desk.



Organiser's Contacts

Landline +351 228 340 502
Conference Cell Phone: +351 968 479 958
E-mail: infaa@isep.ipp.pt (Inês Almeida)

PORTO SMARCITY WORKSHOP

MONDAY, 9TH FEBRUARY

09:00/12:30

AUDITORIUM E

Outlook, Experiences and Opportunities

Smart cities initiatives have taken root across the world with a vision of sustainable and efficient development of urban areas. This has caused tremendous interest among governmental organisations, companies and academia.

This workshop will bring together speakers who work in allied areas and will provide a discussion into the various issues. The workshop will include talks on smart city issues including energy, transport, health and the various initiatives by government, companies and research organisations towards it.

09:00

Opening Address

Raghuraman Rangarajan, CISTER/INESC TEC |
Paulo Calçada, City of Porto (Innovation Council)

09:00 - 10:00

Outlook - smartcity initiatives

Santiago Cáceres, Smart city initiatives, ETRA I+D, Spain
Gerd Ascheid, ICE-gateway, Germany

10:00 - 11:45 (with 15-minute coffee break)

Experiences

Smart Infrastructure - Porto Digital, Alexandre Sousa, General Director
Smart Mobility - Veniam Works, Susana Sargento, Head of Corporate Research
Smart Society - Government Services, Inova+, Gil Goncalves, Chief Scientific Officer
Smart Health - AAL, Fraunhofer Portugal, Filipe Sousa, Researcher
Smart Waste Collection - Soma, Fernando Oliveira, Manager

11:45 - 12:30

Opportunities

Porto Initiatives, City of Porto, Filipe Araújo, Head Innovation Council
Smartcity Portugal Initiative, Inteli.pt, Catarina Selada
Opportunities in North Portugal, Northern Regional Co-ordination Commission for Development (CCDR-N), Carlos Neves, Vice President

CONFERENCE OVERVIEW

	MONDAY, 9TH FEBRUARY	TUESDAY, 10TH FEBRUARY	WEDNESDAY, 11TH FEBRUARY
MORNING SESSIONS	Porto Smartcity Workshop	Keynote I Human Centring Sensing I	Keynote II Mobility and Delay Tolerance
AFTERNOON SESSIONS	Services & Applications Industry Session	Short Paper Session Poster/Demo Session	Human Centring Sensing II Routing and Data Dissemination
EVENING PROGRAM	Reception	Banquet	

KEYNOTES



Kamin Whitehouse
University of Virginia

The Rise on the Smart Household

The "smart home" has officially arrived. People can improve the comfort, convenience, and energy usage of their home with devices they purchase at the local hardware store. However, these devices can only monitor and control the physical home, and it remains an open challenge to monitor the most interesting things inside the home: the people. Without the use of cameras, microphones, or wearable tags, today's energy monitoring systems cannot tell who left the lights on, and elderly monitoring systems cannot tell who is sleeping well or accessing the medicine cabinet. The next research challenge in this domain is to evolve from a "smart home" that is concerned with the home itself to what I call a "smart household" that is concerned with both the home and its occupants. In this talk, I'll discuss the major challenges of monitoring individual people in a multi-person home, as well as several emerging approaches and the possible advantage over today's notion of a smart home.



Lothar Thiele
ETH Zurich

Predicatable wireless multi-hop communication?

The field of cyber-physical systems is now in a stage where serious applications of societal and economic importance are in reach such as internet of things, industrial process monitoring and control, environment monitoring, logistics, healthcare applications, home automation, and traffic control. In many of these applications, measurements are precious, data must not be lost and should arrive under real-time constraints. In order to significantly advance this class of application domains by using wireless sensor networks as a novel means of observation and interaction, it is inevitable that low power wireless communication is available with known and predictable properties .

In high dependable embedded systems such as automotive and avionics, the required predictability is achieved via the classical concept of time-triggered architectures and globally synchronous operation. The talk will introduce recently proposed models and methods that built on comparable principles and lead to predictable and efficient multi-hop wireless communication.

The concept of synchronous transmissions allows to abstract away network state in multi-hop communication and to treat the entire network as a single device that runs on a single logical clock. The nodes are time-synchronized and communicate in a time-triggered fashion according to a global communication schedule. In other words, the wireless network is turned into a shared bus. Such a disruptive approach is in sharp contrast to classical low-power wireless multi-hop protocols that build upon neighbor selection, topology control and routing.

The talk covers the underlying models and methods in this emerging field, extensions towards all-to-all data sharing and programmable in-network processing, the embedding into higher level protocols that provide virtually synchronous executions, formal modeling and probabilistic guarantees, and real-time operation that provides hard guarantees on end-to-end packet deadlines and seamlessly handles dynamic changes in network state and real-time requirements.

08:00	Registration
09:00	Porto Smartcity Workshop: Outlook, Experiences and Opportunities (see page 03)
12:30	Lunch
13:45	Opening Session/Welcome Address
14:00	Full Papers Session: Services and Applications Chair: Omprakash Gnawali (University of Houston) PyFUNS: a Python Framework for Ubiquitous Networked Sensors <i>Stefano Bocchino (Scuola Superiore Santa Anna, Italy)</i> <i>Szymon Fedor (UTRC, Ireland)</i> <i>Matteo Petracca (CNIT, Italy)</i> On Target Counting by Sequential Snapshots of Binary Proximity Sensors <i>Tongyang Li (IIS, Tsinghua University, P.R. China)</i> <i>Yongcai Wang (Tsinghua University, P.R. China)</i> <i>Lei Song (IIS, Tsinghua University, P.R. China)</i> <i>Haisheng Tan (Jinan University, Guangzhou, P.R. China)</i> Detecting and Avoiding Multiple Sources of Interference in the 2.4 GHz Spectrum <i>Venkat Iyer and Frederik Hermans (Uppsala University, Sweden)</i> <i>Thiemo Voigt (Uppsala University and SICS, Sweden)</i>
15:30	Coffee-Break
16:00	Industry Session (see page 09) Chair: Martin Kubisch (Airbus Group)
18:30	Reception (see page 10)

09:00	Keynote I : The Rise of the Smart Household (see page 05) Chair: Nuno Pereira (CISTER) <i>Kamin Whitehouse (University of Virginia)</i>
10:00	Coffee-Break
10:30	Full Papers Session: Human-centric Sensing I Chair: Daniel Roggen (University of Sussex) Extracting Human Behavior Patterns from Appliance-level Power Consumption Data <i>Alaa Alhamoud, Pei Xu, Frank Englert (TU Darmstadt, Germany)</i> <i>Andreas Reinhardt (TU Clausthal, Germany)</i> <i>Philipp Scholl, Doreen Böhnstedt and Ralf Steinmetz (TU Darmstadt, Germany)</i> SocialSense: A Collaborative Mobile Platform for Speaker and Mood Identification <i>Mohsin Y Ahmed, Sean Kenkeremath and John Stankovic (University of Virginia, USA)</i> Discovering Latent Semantic Structure in Human Mobility Traces <i>Budhaditya Deb (Microsoft Corporation, USA)</i> <i>Prithwish Basu (Raytheon BBN Technologies, USA)</i>
12:00	Lunch
13:30	Short Paper Session Chair: Kay Roemer (TU Graz) Implementation and Experimentation of Industrial Wireless Sensor-Actuator Network Protocols <i>Mo Sha (National Renewable Energy Laboratory, USA)</i> <i>Dolvara Gunatilaka, Chengjie Wu and Chenyang Lu (Washington University in St. Louis, USA)</i> Recycling Corrupt Packets over Multiple Hops <i>Muhammad Hamad Alizai (UET, Peshawar, Pakistan and RWTH Aachen University, Germany)</i> <i>Muhammad Moosa (UET, Pesahwar, Pakistan)</i> <i>Dong Han, Omprakash Gnawali (University of Houston, USA)</i> <i>Affan Syed (NUCES, Islamabad, Pakistan)</i>

On the Scalability of Constructive Interference in Low-Power Wireless Networks
Claro A Noda (CISTER/INESC TEC, ISEP and U. Minho, Portugal)
Carlos M Pérez-Penichet (U. Minho, Portugal)
Ballint Seeber (Ettus Research, USA)
Marco Zennaro (ICTP, Italy)
Mário Alves (CISTER/INESC-TEC, ISEP, Portugal)
Adriano Moreira (U. Minho, Portugal)

LibReplay: Deterministic Replay for Bug Hunting in Sensor Networks
Olaf Landsiedel, Elad Michael Schiller, Salvatore Tomaselli (Chalmers University of Technology, Sweden)

If You Can't Take The Heat: Temperature Effects On Low-Power Wireless Networks And How To Mitigate Them
Florian Schmidt (RWTH Aachen University, Germany)
Matteo Ceriotti (University of Duisburg-Essen, Germany)
Niklas Hauser and Klaus Wehrle (RWTH Aachen University, Germany)

A Software Approach to Protecting Embedded System Memory from Single Event Upsets
Jiannan Zhai, Yangyang He, Fred Switzer and Jason O. Hallstrom (Clemson University, USA)

Revealing Protocol Information and Activity from Energy Instrumentation in Wireless Sensor Network
Dong Han and Omprakash Gnawali (University of Houston, USA)
Abhishek B Sharma (NEC Labs America, USA)

Is RPL Ready for Actuation? A Comparative Evaluation in a Smart City Scenario
Timofel Istomin (University of Trento, Italy)
Csaba Kiraly (Bruno Kessler Foundation, Italy)
Gian Pietro Picco (University of Trento, Italy)

Adaptive Packet Size Control for Bulk Data Transmission in IPv6 over Networks of Resource Constrained Nodes
Yang Deng and Zhonghong Ou (Aalto University, Finland)
Antti Ylä-Jääski (Helsinki University of Technology, Finland)

15:00 Coffee-Break

15:30 **Poster/Demo Session**
Chair: Vlado Handziski (TU Berlin)
Virtual Experimental Evaluation of RF-based Indoor Localization Algorithms
Filip Lemic, Vlado Handziski, Niklas Wirstrom, Tom Van Haute, Eli De Poorter, Thiemo Voigt and Adam Wolisz

ProFuN TG: A Tool Using Abstract Task Graphs to Facilitate the Development, Deployment and Maintenance of Wireless Sensor Network Applications
Atis Elsts, Farshid Hassani Bijarbooneh, Martin Jacobsson and Konstantinos Sagonas

Security Challenges in Indoor Location Sensing using Bluetooth LE Broadcast
Prasant Misra, Shahid Raza, Vasanth Rajaraman, Jay Warrior and Thiemo Voigt

Radio Interferometric-Based Indoor Tracking
Gergely Zachar and Gyula Simon

Performance Analysis of Data Serialization Formats in M2M Wireless Sensor Networks
Francesca Pacini, Femi Aderohunmu, Andrea Azzara, Stefano Bocchino, Paolo Pagano and Matteo Petracca

Towards Developing a Generalized Modeling Framework for Data Dissemination
Kamini Garg and Silvia Giordano

Voltage Scheduling of Peripheral Components on Wireless Sensor Nodes
Ulf Kulau, Stephan Friedrichs and Lars Wolf

Deployment, Reconfiguration and Adaptation through Modelling and Simulation in DREAMS
Richard Figura, Sascha Jungen, Matteo Ceriotti and Pedro Jose Marron

Automating WSN experiments and simulations
Rémy Léone, Jérémie Leguay, Paolo Medagliani and Claude Chaudet

Towards the Development of XDense, A Sensor Network for Dense Sensing
João Loureiro, Raghuraman Rangarajan and Eduardo Tovar

Experiments On Using Vehicles As Data Mules For Data Collection From Urban Sensors
Pedro Santos, Tânia Calçada, André Sá, Susana Sargento, Ana Aguiar and João Barros

A Modular Programming Approach for IoT-Based Wireless Sensor Networks
Shashank Gaur, Nuno Pereira, Vikram Gupta and Eduardo Tovar

BSD-based ECC for the Contiki OS
Oriol Piñol Piñol, Shahid Raza, Joakim Eriksson and Thiemo Voigt

19:00 Banquet (see page 10)

09:00 **Keynote II**
Predictable wireless multi-hop communication? (see page 05)
Chair: Tarek Abdelzaher (UIUC)
Lothar Thiele (ETH Zurich)

10:00 Coffee-Break

10:30 **Full Papers Session: Mobility and Delay-tolerance**
Chair: Iain Bate (University of York)
 Mind the SmartGap: A Buffer Management Algorithm For Delay Tolerant Wireless Sensor Networks
Pehr Söderman (KTH, Sweden)
Karl-Johan Grinnemo (Karlstad University, Sweden)
Markus Hidell (KTH, Sweden)
Peter Sjödin (KTH, Sweden)

A Knapsack-based Message Scheduling and Drop Strategy for Delay-tolerant Networks
En Wang (Jilin University, P.R. China and Temple University, USA)
Yongjian Yang (Jilin University, P.R. China)
Jie Wu (Temple University, USA)

Integrating mobility in RPL
Cosmin Cobârzan, Julien Montavont and Thomas Noel (University of Strasbourg, France)

12:00 Lunch

13:30 **Full Papers Session: Human-centric Sensing II**
Chair: Andreas Reinhardt (TU Clausthal)
 Limited-Memory Warping LCSS for real-time low-power pattern recognition in wireless nodes
Daniel Roggen, Luis Ponce Cuspinera, Guilherme Pombo and Falah H. Ali (University of Sussex, UK); Long-Van Nguyen-Dinh (ETH Zurich, Switzerland)

Sensor-based User Authentication
He Wang (UIUC, USA)

14:30 Coffee-Break

15:00 **Full Papers Session: Routing and Data Dissemination**
Chair: Matteo Ceriotti (University of Duisburg-Essen)
 Improving the Performance of Trickle-Based Data Dissemination in Low-Power Networks
Milosh Stollkj, Thomas Meyfroyt, Pieter Cuijpers and Johan J. Lukkien (Eindhoven University of Technology, The Netherlands)

Featurecast: Lightweight Data-Centric Communications for Wireless Sensor Networks
Michał Król (Grenoble Institute of Technology, France); Franck Rousseau (University of Grenoble, France)
Andrzej Duda (Grenoble Institute of Technology, France)

RoCoCo: Receiver-initiated Opportunistic Data Collection and Command Multicasting for WSNs
Andreas Reinhardt (TU Clausthal, Germany)
Christian Renner (University of Lübeck, Germany)

16:30 **Closing Session**
 Includes a special taste of Porto

INDUSTRY SESSION

For EWSN 2015, several invitees from industry will talk about their work and experiences with real-world applications ranging from health to transport.

The industrial session will comprise of talks by each of our invited guest speakers addressing topics such as case studies, design methodologies, tools, deployment experiences and industry challenges, followed by a short discussion panel. The idea is to motivate discussions for interesting and potentially disruptive technology directions, so that you can walk away with a few interesting ideas to pursue.

Francesco Flammini
Ansaldo STS



Jorge Landeck
ISA Energy Efficiency



Martin Kubisch
Airbus Group Innovations



Paulo Ferreira dos Santos
Kinematix



Peter Priller
AVL ITS Global Research & Technology



SOCIAL PROGRAM

9/Feb. Reception at Palácio da Bolsa ⁵

"Palácio da Bolsa", the old Stock Exchange Palace of Porto is the location we chose for the Reception. It was built to impress and earn the credibility of European investors and so we hope to impress you as well when you stroll around establishment.

Built on the ruins of the cloisters of the St. Francis Convent, it houses to this day the Commercial Association of Porto and is intimately tied to the trade of Port Wine. The main courtyard - Pátio das Nações - displays around the ceiling all the countries Portugal had trading relations with. See for yourself if you can recognize them.

The mixture of architectural styles gives the ensemble an interesting flair and the Arab Hall in particular displays an amazing combination of western and eastern influences which will take our breath away. After a visit to the palace and with this splendid ambience we will have the chance to enjoy a reception dinner.

HOW TO GET THERE

Meet at the Registration Desk of EWSN2015 at 18:00 and we'll make our way together to the venue in the city centre. We will take the Metro (using the Andante Cards provided in your EWSN bag) and disembark at São Bento Metro Station. From there we walk down Rua das Flores to Palácio da Bolsa.

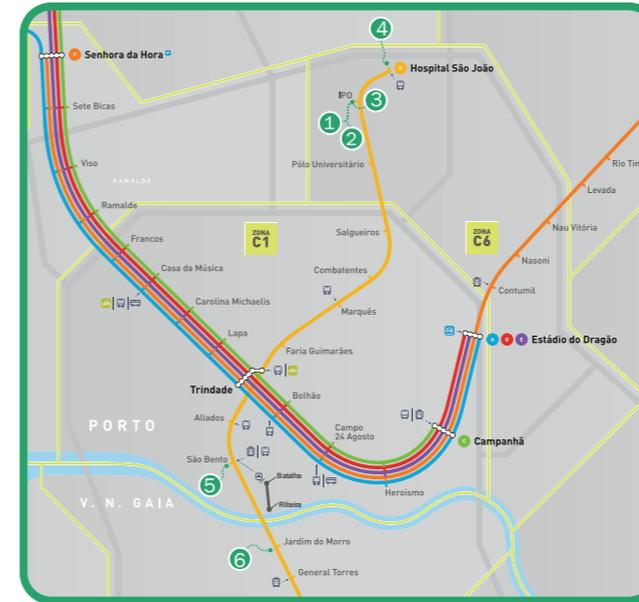
10/Feb. Banquet at Barão Fadgate Restaurant ⁶

Settle down onto the terrace and admire the view: feast your eyes over the Unesco World Heritage view of Porto, and the sinewy curves of the Douro river. Taylor's Port wine cellars, located in the heart of the historic area of Vila Nova de Gaia, across the river from the old city centre of Porto, houses most of the company's extensive reserves of wood aged Port as well its Vintage Port cellars. Named after John Fladgate, the celebrated 19th century Port shipper and partner of Taylor's who was awarded the title of Baron for his services to viticulture, the Barão Fadgate Restaurant enjoys a spectacular location and atmospheric setting in the grounds of Taylor's Port wine cellars with magnificent views across the Douro River to the old historic centre of Porto. It offers a contemporary interpretation of traditional cuisine where the accent is on fresh local ingredients and on showcasing the authentic flavours of Portugal. The wine list features a wide variety of labels from the main Portuguese vineyard areas and, as would be expected, a comprehensive choice of both wood-aged and Vintage Ports

Before the dinner at Barão Fladgate we will have the chance to visit Taylor's Port wine cellars followed by a relaxing cocktail before dinner.

HOW TO GET THERE

Meet at the Registration Desk of EWSN2015 at 18:00 and we'll make our way together to the venue. We will take the Metro (using the Andante Cards provided in your EWSN bag) and disembark at Jardim do Morro after Ponte D. Luis. From there take the stairway next to the metro station down to Rua Guilherme Braga towards the Taylor's Port wine cellars.



- 1 ISEP- Instituto Superior de Engenharia do Porto
Rua António Bernardino de Almeida, 431
4200-485 Porto
- 2 CISTER Research Centre
Rua Alfredo Allen, 535
4200-135 Porto
- 3 Hotel Ibis São João***
Rua Dr. Plácido Costa
4050-450 Porto
- 4 Hotel Eurostars Oporto****
Rua do Mestre Guilherme Camarinha, 212
4200-537 Porto
- 5 Palácio da Bolsa
Rua Ferreira Borges
4050-253 Porto
- 6 Taylor's Port
Rua do Choupelo, 250
4400-088 Vila Nova de Gaia

LOCAL ORGANIZERS

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EWSN2015 GOODIES BAG

EWSN2015 Conference Proceedings

EWSN 2015 Brochure

Time Out Porto 2014 for Visitor's

Porto City Maps: Official Tourism Map & Local

Transport Network Map

Certificate of Participation

Small Bottle of Port Wine

A mini soap-bar of the famous luxury brand Claus Porto (this is one that is used in luxury hotels and top celebrities all over the world; use it to upgrade your hotel accommodation while at EWSN 2015!)

Andante Card charged with valid trips to be used for getting to the Social Events Venues

Badge and Lanyard

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By Cristiana Barros, CISTER/INESC-TEC, Portugal

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