

# Program IEEE ETFA 2015

## Program Overview

### Tuesday, 08. September 2015: Industry Day and Workshops

08:00	<b>Registration</b>			
08:45	<b>Opening Industry Day (ID)</b> Room: Hollenfels	<b>Registration</b>	<b>Registration</b>	
09:00	<i>Automotive Ethernet drives AUTOSAR standardization</i> Sebastian Gruber, Continental AG, Germany	<b>Workshop 4DIAC</b> Room: Diekirch	<b>Workshop SOCNE session 1</b> Room: Fischbach	
09:30	Room: Hollenfels			
10:00	Coffee Break			
10:30	<i>Methods and Tools for Timing-Aware Design of Automotive Control Software</i> Dr. Arne Hamann, Robert Bosch GmbH, Germany	<b>Workshop 4DIAC</b> Room: Diekirch	<b>Workshop SOCNE session 2</b> Room: Fischbach	
11:00	Room: Hollenfels			<b>Coffee Break</b>
11:30	<i>On-board digital electronics and software emerging technologies in space applications</i> Olivier Notebaert, AIRBUS Defense and Space, France	<b>Workshop 4DIAC</b> Room: Diekirch	<b>Workshop SOCNE session 2</b> Room: Fischbach	
12:00	Room: Hollenfels			
12:30	<b>Lunch Break</b>			
13:00		<b>Lunch Break</b>	<b>Lunch Break</b>	
13:30		<b>Lunch Break</b>	<b>Lunch Break</b>	
14:00	<i>Electro-optical Sense Solution for Sense &amp; Avoid for Aircrafts and Unmanned Aerial Systems</i> Dr. Martin Arndt, Diehl BGT Defence GmbH, Germany	<b>Workshop 4DIAC</b> Room: Diekirch		<b>Workshop RTT session 1</b> Room: Fischbach
14:30	Room: Hollenfels			
15:00	<i>Current and Future Needs in Automation for Microsatellite Missions</i> Florio Dalla Vedova, LuxSpace Sarl. Luxembourg	<b>Workshop 4DIAC</b> Room: Diekirch		<b>Coffee Break</b>
15:30	Room: Hollenfels			
16:00	<b>Coffee Break</b>	<b>Workshop 4DIAC</b> Room: Diekirch		<b>Workshop RTT session 2</b> Room: Fischbach
16:30	<b>Panel discussion</b> Room: Hollenfels			
17:00				
17:30				
18:00 - 19:00	<b>IEEE Women in Engineering Benelux Section</b> Room: Hollenfels			

**Wednesday, 09. September 2015**

08:00 - 08:40	<b>Registration (Registration Desk)</b>					
08:40 - 10:00	<b>T1.1</b> Room: Europe A	<b>T7.1</b> Room: Wiltz	<b>SS01</b> Room: Vianden	<b>SS03</b> Room: Diekirch	<b>WiP T2</b> Room: Fischbach	<b>WiP T4</b> Room: Hollenfels
10:00 - 10:30	<b>Coffee Break</b>					
10:30 - 11:00	<b>Opening Session</b> Room: Europe A					
11:00 - 12:00	<b>Keynote 1 Raymond Liao: "Open Innovation Practices: Integrated Methods to Hidden Challenges"</b> Room: Europe A					
12:00 - 13:30	<b>Lunch Break</b>					
13:30 - 15:30	<b>Panel Discussion: "Prospects for the growth of hi-tech startup industry sector in Europe"</b> Room: Europe A					
15:30 - 16:00	<b>Coffee Break</b>					
16:00 - 18:00	<b>T1.2</b> Room: Europe A	<b>T2.1</b> Room: Hollenfels	<b>T3.1</b> Room: Vianden	<b>T5.1</b> Room: Fischbach	<b>T9.1</b> Room: Diekirch	<b>SS06</b> Room: Wiltz
<b>18:20</b>	<b>Start Bus Transfer: 18:20 at Alvisse Parc Hotel</b>					
19:00 - 21:00	<b>Welcome Reception</b> Cercle Cité, Luxembourg City					

**Thursday, 10. September 2015**

08:00 - 08:30	<b>Registration (Registration Desk)</b>					
08:30 - 10:30	<b>T2.2</b> Room: Wiltz	<b>SS02.1</b> Room: Hollenfels	<b>SS04</b> Room: Diekirch	<b>SS05</b> Room: Vianden	<b>SS07</b> Room: Fischbach	<b>WiP T1</b> Room: Europe A
10:30 - 11:00	<b>Coffee Break</b>					
11:00 - 12:00	<b>Keynote 2</b> <b>Jerker Delsing: "Building Automation Systems from Internet of Things"</b> Room: Europe A					
12:00 - 13:30	<b>Lunch Break</b>					
13:30 - 14:30	<b>Plenary 1</b> <b>Lionel C. Briand: "Scalable Software Testing and Verification of Real-Time and Embedded Systems Through Metaheuristic Search and Optimization"</b> Room: Europe A					
14:30 - 15:30	<b>T2.3</b> Room: Vianden	<b>T6.1</b> Room: Diekirch	<b>SS02.2</b> Room: Europe A	<b>WiP T3</b> Room: Wiltz	<b>WiP T8</b> Room: Hollenfels	<b>WiP T9</b> Room: Fischbach
15:30 - 16:00	<b>Coffee Break</b>					
16:00 - 18:00	<b>T1.3</b> Room: Europe A	<b>T3.2</b> Room: Vianden	<b>T4.1</b> Room: Hollenfels	<b>T5.2</b> Room: Fischbach	<b>T6.2</b> Room: Diekirch	<b>T7.2</b> Room: Wiltz
<b>18:20</b>	<b>Start Bus Transfer: 18:20 at Alvisse Parc Hotel</b>					
19:00 - 24:00	<b>Cruise and Conference Banquet</b> Remich, Luxembourg					

**Friday, 11. September 2015**

08:00 - 08:30	<b>Registration (Registration Desk)</b>					
08:30 - 10:30	<b>T1.4</b> Room: Fischbach	<b>T4.2</b> Room: Vianden	<b>T8.1</b> Room: Diekirch	<b>SS08</b> Room: Wiltz	<b>WiP T5</b> Room: Hollenfels	<b>WiP T6 WiP T7</b> Room: Europe A
10:30 - 11:00	<b>Coffee Break</b>					
11:00 - 12:00	<b>Plenary 2</b> <b>Herman Bruyninckx: "Mobile Manipulation: Doing It Badly Makes It Better"</b> Room: Europe A					
12:00 - 13:30	<b>Lunch Break</b>					
13:30 - 14:30	<b>Keynote 3</b> <b>Peter Palensky: "Cyber-physical Energy Systems"</b> Room: Europe A					
14:30 - 15:30	<b>T5.3</b> Room: Europe A	<b>T7.3</b> Room: Hollenfels	<b>T8.2</b> Room: Wiltz	<b>T9.2</b> Room: Vianden		
15:30 - 16:00	<b>Closing Session</b> Room: Europe A					
<b>16:30</b>	<b>Start Bus Transfer: 16:30 at Alvisse Parc Hotel</b>					
17:00 - 19:00	<b>Goodby Reception / Exhibition MUDAM</b> MUDAM, Luxembourg City, Kirchberg					

## Industry Day, 08. September 2015

**Time: 09:00 – 18:00**      **Room: Hollenfels**

The Industry Day, introduced at ETFA in 1999, has been an important part of the ETFA conference series. Every year we ask people from industry to talk on applied research and important technical developments, hoping to learn what is important to the industry and to have a glimpse of the emerging trends to stimulate academic research. This year the focus is on automotive electronics, avionics, and electronics in space technology. Top experts from leading industrial entities will give five one-hour long presentations to cover state of the art and emerging trends in their areas of endeavor, and participate in a panel discussion at the end of the event:

### **08:45 - 09:00**    **Opening**

#### **09:00 - 10:00**    **"Automotive Ethernet drives AUTOSAR standardization"**

Sebastian Gruber, Continental AG, Regensburg, Germany  
AUTOSAR Center, System & Technology Automotive

**Summary:** AUTOSAR (AUTomotive Open System ARchitecture) is a worldwide development partnership of vehicle manufacturers, suppliers and other companies from the electronics, semiconductor and software industry which is a key enabling technology to manage growing electrical/electronic complexity. It aims to be prepared for the upcoming technologies and to improve cost-efficiency without making any compromise with respect to quality. Ethernet well established in office communication is becoming a new trend in the automotive industry to interconnect ECUs in the vehicle as well as to connect the vehicles to the infrastructure. The first cars with the Ethernet technology on Board are already out on the street. But the future use cases differ from the classical approach of single domains within the car which are connected via specially designed bus technologies (e.g. CAN, LIN and FlexRay). This is where both worlds AUTOSAR and Ethernet & IP Technology currently have to adapt in order to efficiently exploit the advantages of the new technology.

### **10:00 - 10:30**    **Coffee Break**

#### **10:30 - 11:30**    **"Methods and Tools for Timing-Aware Design of Automotive Control Software"**

Dr. Arne Hamann, Robert Bosch GmbH, Corporate Research, Systems & Software Engineering  
Renningen, 70465 Stuttgart, Germany

**Summary:** The underlying theories of both control engineering and real-time systems engineering assume idealized system abstractions that mutually neglect central aspects of the other discipline. Control engineering theory, on the one hand, usually assumes jitter free sampling and constant input-output latencies disregarding complex real-world timing effects. Real-time engineering theory, on the other hand, uses abstract performance models that neglect the functional behavior, and derives worst-case situations that have little expressiveness for control functionalities in physically dominated automotive systems. As a consequence, there is a lot of potential for a systematic co-engineering between both disciplines, increasing design efficiency and confidence. In this talk, possible approaches for such a co-engineering and their current applicability to real world problems are discussed. In particular, simulation-based and formal verification techniques are compared for different construction principles of automotive real-time control software.

#### **11:30 - 12:30**    **"On-board digital electronics and software emerging technologies in space applications"**

Olivier Notebaert , AIRBUS Defense and Space, Toulouse, France  
Onboard Processing Architecture Expert / Research & Technology coordination, TSOEF2 – Orbital data processing and on-board Software

**Summary:** Space systems covers applications in space transport, orbital infrastructures, science, earth observation, telecommunications, space exploration which includes many different types of vehicles and

missions. Spacecraft on-board digital processing devices and software have become one of the major cost drivers, rapidly growing in volume and complexity. Since the cost to adapt a technology to the space application domain is rather high with a limited market, Space Agencies and Industry have developed a technology harmonization strategy focusing a limited set of standard solutions selected for their ability to cover generic needs, and to develop adaptations to the space environment and missions specific constraints. For the future generation of spacecraft, R&T studies in this domain focus on modular avionics and data handling concepts taking benefit from other industrial and commercial domains such as aeronautics and automotive. Technologies coming from the very dynamic market of consumer electronics and software are evaluated in priority to be adapted to the specificities of space needs, physical environment and business model.

**12:30 - 14:00 Lunch Break**

**14:00 - 15:00 "Electro-optical Sense Solution for Sense & Avoid for Aircrafts and Unmanned Aerial Systems"**

Dr. Martin Arndt, Diehl BGT Defence GmbH, Überlingen, Germany  
Project Manager Reconnaissance & Protection Systems

**Summary:** For the wide-spread use of Remotely Piloted Aircraft Systems (RPAS) within civil airspace "Sense & Avoid" represents the key issue for safe integration. As air traffic safety must not be compromised by the introduction of these unmanned aircraft into the airspace, special devices for "seeing" and avoiding imminent collision candidates will be required on-board. Without a pilot on-board, high-resolution cameras are used to replace human vision. An on-board real-time image processing unit is able to interpret the camera images automatically. Starting with the evaluation of single blobs in single images over time, tracks are being setup connecting the same object candidate along its occurrence with in the image sequence. Finally the tracks together with meta-data are provided at the output interface to the Avoid module. Thus the EO Sense module as a non-cooperative sensor is able to provide measurements of potentially interfering object within the surrounding airspace of the RPAS to enable a successful avoidance maneuver.

**15:00 - 16:00 "Current and Future Needs in Automation for Microsatellite Missions"**

Florio Dalla Vedova, Senior System Engineer, QMS manager, LuxSpace Sarl. (- a company of OHB Group -), Luxembourg

**16:00 - 16:30 Coffee Break**

**16:30 - 18:00 Panel Discussion with all participants**

## Workshops, 08. September 2015

### 6th 4DIAC Users' Workshop

09:00 – 18:00 Room: Diekirch

**Workshop Organizers:** Alois Zoitl, fortiss GmbH, Germany; Gerhard Ebenhofer, PROFACTOR GmbH, Austria; Thomas Strasser, AIT Austrian Institute of Technology, Austria

**Aims and Objectives:** The open source initiative 4DIAC – Framework for Distributed Industrial Automation and Control (<http://www.fordiac.org>) has been founded with the idea to support research activities and industrial adoption of distributed automation systems. With this workshop we would like to bring the developers and users of 4DIAC together as the users are the main drivers of ongoing development activities. This event should provide a discussion platform to present novel research and achieved results based on the 4DIAC open source project.

### Program:

#### 09:00 – 13:00 Morning Session

- Welcome and Recent Activities of the 4DIAC Open Source Initiative. *A. Zoitl*
- Using IEC 61499 for Virtual Commissioning. *Dr. Thomas Hadlich, Venkata Naveen Bantu*
- Avoiding overwhelming external systems by events coming from IEC 61499 control applications. *Petr Kadera*
- Integrating IoT for Industrial Applications using IEC61499. *Federico Perez, Marga Marcos, Dario Orive*
- Certified extensions to 4DIAC. *Per Lindgren, Marcus Lindner*
- Example of a Cyber-Physical Attacks Investigation on IEC 61850/61499 equipped PV Inverters using 4DIAC. *BooJoong Kang, Peter Maynard, Kieran McLaughlin, Sakir Sezer, Filip Andrén, Christian Seitzl, Friederich Kupzog, Thomas Strasser*
- Modular machines implemented in 4DIAC. *Alois Zoitl, Monika Wenger, Milan Vathoopan*
- Open Discussion

#### 14:00 – 18:00 Afternoon Hands on Session

"Programming Distributed Embedded Real-Time Control Systems with 4DIAC"

The half day workshop will be accompanied by a half day hands on session where the 4DIAC team will be available for detailed discussions and explanation on using 4DIAC as well as on implementation details.

**9th Int. Workshop on Service-Oriented Cyber-Physical Systems in Converging Networked Environments (SOCNE)**

**09:00 – 13:00 Room: Fischbach**

**Workshop Organizers:** Frank Golatowski, University of Rostock, Germany; Lucia Lo Bello, University of Catania, Italy; Michael Ditze, TWT Science & Innovation, Stuttgart, Germany; Christoph Niedermeier, Siemens, Germany

**Aims and Objectives:** Smart and reliable service interoperability and composition across heterogeneous platforms and networking environments build the foundation for added-value services. Their key requirement is seamless, well-defined, and potentially cross-sectorial interoperability among stakeholders on application-, service-, and device level. Interoperability has become a competitive factor for many industrial branches such as automotive, aerospace, energy, healthcare, or factory and building automation. At the same time, it serves as an application enabler for cross-domain business as envisioned, e.g., for electro mobility, smart grid, or even cooperative engineering. This workshop encourages communication and exchange of ideas between industrial and academic researchers and developers in the field of preferably embedded middleware, service-oriented architectures, and heterogeneous networked environments.

**Program:**

09:00- 11:00 SESSION I		
09:00	Welcome and Opening	
09:15	Technical Management System for Dependable Building Automation Systems	<i>Malte Burkert, Christoph Fiehe, and Heiko Krumm</i>
09:40	Engineering and Operation Made Easy – A Semantics and Service Oriented Approach to Building Automation.	<i>Norbert Vicari, Egon Wuchner, Arne Bröring, and Christoph Niedermeier</i>
10:05	DuDE-Cloud: A Resilient High Performance Cloud.	<i>Peter Danielis, Jan Skodzik, Vlado Altmann, Frank Golatowski and Dirk Timmermann</i>
10:30	Utilizing OPC UA as comprehensive communication technology for Cyber Physical Production Systems	<i>Arne Neumann, Lukasz Wisniewski, Omid Givehchi and Jürgen Jasperneite</i>
10:45	Service-based architecture and frameworks for pervasive health applications	<i>Phillippe Lalanda, Eva Gerbert-Gaillard, Colin Aygalinc, and Stéphanie Chollet</i>
11:10 - 11:30 Coffee Break		
11:30 - 13:00 SESSION II		
11:30	Functional mock-up unit manager for real-time critical applications and simulations	<i>Ulf Zimmermann, Michael Küper, Ulrich Odefey, Markus Pfeil and Victor Fäßler</i>
11:45	Towards automated service-oriented lifecycle management for 5G networks	<i>Rafia Inam, Athanasios Karapantelakis, Konstantinos Vandikas, Leonid Mokrushin, Aneta Vulgarakis Feljan, and Elena Fersman</i>
12:10	A Survey of Commercial Frameworks for the Internet of Things	<i>Hasan Derhamy, Jens Eliasson, Jerker Delsing, and Peter Priller</i>
12:35	Open Discussion	



**1. Int. International Workshop on Robotics Technology Transfer: Innovation from Academia to Industry (RTT2015)**

**13:30 – 17:30 Room: Fischbach**

**Workshop Organizers:** Marina Indri, Politecnico di Torino, Italy; Antoni Grau, Technical University of Catalonia, Spain

**Aims and Objectives:** Aim of this Workshop is the illustration of the current state-of-the-art of robotics technology transfer through successful examples of conversion of scientific findings from research laboratories into useful products, processes and services. Relevance is given to the innovative content of the developed applications and to their technology and commercial impact, as well as to their contribution to the spread of robot systems and to successful solutions for a stable industry-academia collaboration. This collaboration can be also spread to research institutes, universities, industry organizations and stakeholders, technology transfer offices and governments as well.

**Program:**

13:30- 15:40 SESSION I		
13:30	Welcome and Opening	<i>Marina Indri and Antoni Grau, RTT workshop organizers</i>
13:35	<b>Invited talk</b> , "Factories of the Future and Robotics in H2020"	<i>Mr. Antonio Puente Rodero, Unit Robotics, European Commission</i>
14:05	Experience of an EU Robotics Program: ECHORD++	<i>Prof. Antoni Grau, UPC, Barcelona</i>
14:20	The RoboLAB experience: aims, challenges and results of a joint academia-industry lab of industrial robotics	<i>Marina Indri (Politecnico di Torino) and Ivan Lazzero (Comau S.p.A.)</i>
14:40	Human Robot interaction in industrial robotics. Examples from research centers to industry	<i>Alberto Tellaeché (IK4 – Tekniker)</i>
15:00	Observer-based SLAM in robot-assisted eye surgery	<i>Yanick G.M. Douven (Eindhoven University of Technology), Gerrit J.L. Naus (PRECEYES Medical Robotics), Marinus J.G. V.D. Molengraft and Maarten Steinbuch (Eindhoven University of Technology)</i>
15:20	Developing New Application Fields for Industrial Robots - Examples for Academia Industry Collaboration	<i>Arne Muxfeldt, Daniel Kubus and Friedrich M. Wahl (Technical University of Braunschweig)</i>
15:40 - 16:00 Coffee Break		
16:00 - 17:30 Session II		
16:00	Leveraging the Cloud for Connected Service Robotics Applications	<i>Stefano Rosa, Ludovico Orlando Russo, Giorgio Toscana, Stefano Primatesta, Miguel Kaouk Ng and Basilio Bona (Politecnico di Torino)</i>
16:20	Preparing sampling-based motion planning for manufacturers of micro-optical components	<i>Christian Schlette and Juergen Rossmann (RWTH Aachen University)</i>
16:40	A systematic approach to the engineering design of a HRC workcell for bio-medical product assembly	<i>Fabio Pini, Francesco Leali and Matteo Ansaloni (University of Modena and Reggio Emilia)</i>
17:00	<b>Round Table:</b> How can EU foster technology transfer in Robotics?	<i>Panelists: Antonio Puente Rodero, Holger Voos, Marina Indri and Antoni Grau. Open discussion among attendees.</i>
17:30	Workshop closing	

## Detailed Program, Wednesday, 09. September 2015

### Parallel Sessions, 08:40 – 10:00

<b>T1.1: Monitoring</b>	
<b>Time: Wednesday, 09. Sept., 08:40 - 10:00,</b>	
<b>Chairs: Alexander Fay, Jan Olaf Blech, Room: Europe A</b>	
08:40 - 09:00	Jan Olaf Blech, Ian Peake, Heinz Schmidt, Mallikarjun Kande, Akilur Rahman, Srinu Ramaswamy, Sudarsan Sd and Venkateswaran Narayanan <b>(84) Efficient Incident Handling in Industrial Automation through Collaborative Engineering</b>
09:00 - 09:20	Andreas Friedrich and Peter Göhner <b>(66) Fault diagnosis of automated systems using mobile devices</b>
09:20 – 09:40	Monika Wenger, Jan Olaf Blech and Alois Zoitl <b>(173) Behavioral Type-based Monitoring for IEC 61499</b>
09:40 – 10:00	Jens Ziegler, Sebastian Heinze and Leon Urbas <b>(228) The potential of smartwatches to support mobile industrial maintenance tasks</b>

<b>T7.1: Intelligent Robotic Systems</b>	
<b>Time: Wednesday, 09. Sept., 08:40 - 10:00;</b>	
<b>Chairs: Marina Indri, Angelika Zube; Room: Wiltz</b>	
08:40 – 09:00	Angelika Zube <b>(70) Combined Workspace Monitoring and Collision Avoidance for Mobile Manipulators</b>
09:00 – 09:20	Marina Indri, Stefano Trapani and Ivan Lazzero <b>(97) A general procedure for collision detection between an industrial robot and the environment</b>
09:20 – 09:40	Ibrahim Jasim, Peter Plapper and Holger Voos <b>(270) Model Free Robust Adaptive Control for Flexible Rubber Objects Manipulation</b>
09:40 – 10:00	Maximilian Wagner, Peter Heß, Sebastian Reitelshöfer and Jörg Franke <b>(35) Self-Calibration Method for a Robotic Based 3D Scanning System</b>

<b>SS01: Big Data and Semantic Technologies for Automation</b>	
<b>Time: Wednesday, 09. Sept., 08:40 - 10:00;</b>	
<b>Chairs: Alois Zoitl, Stefan Windmann; Room: Vianden</b>	
08:40 - 09:00	Francisco Pozo, Wilfried Steiner, Guillermo Rodriguez-Navas and Hans Hansson <b>(154) A Decomposition Approach for SMT-based Schedule Synthesis for Time-Triggered Networks</b>
09:00 – 09:20	Stefan Windmann, Florian Jungbluth and Oliver Niggemann <b>(194) A HMM-Based Fault Detection Method for Piecewise Stationary Industrial Processes</b>
09:20 – 09:40	Ondřej Hrcuba and Pavel Vrba <b>(233) Ontologies for Flexible Production Systems</b>
09:40 – 09:45	Asmir Vodencarevic and Thomas Fett <b>(111 WiP) Data Analytics for Manufacturing Systems: Experiences and Challenges</b>

09:45 – 09:50	Ganesh Man Shrestha and Oliver Niggemann <b>(122 WiP) Hybrid Approach Combining Bayesian Network and Rule-based Systems for Resource Optimization in Industrial Cleaning Processes</b>
09:50 – 09:55	Stefan Windmann and Oliver Niggemann <b>(287 WiP) MapReduce algorithms for efficient generation of CPS models from large historical data sets</b>

### SS03: Fault Tolerance Techniques in Distributed Embedded and Automation Systems

**Time: Wednesday, 09. Sept., 08:40 - 10:00;**

**Chairs: Julian Proenza, Ramez Daoud; Room: Diekirch**

08:40 – 09:00	Hassan Halawa, Ramez Daoud, Hassanein Amer, Gehad Alkady and Ali Abdelkader <b>(214) FPGA-Based Reliable TMR Controller Design for S2A Architectures</b>
09:00 – 09:20	Michael Short, Muneeb Dawood and Carlos Insaurralde <b>(207) Fault-tolerant Generator Telecontrol over a Microgrid IP Network</b>
09:20 – 09:25	Mara Martins, Paulo Portugal and Francisco Vasques <b>(222 WiP) A Framework to Support Dependability Evaluation of WSNs from AADL Models</b>
09:25 – 09:30	Sinisa Derasevic, Manuel Barranco and Julián Proenza <b>(378 WiP) An OMNET++ model to assess node fault-tolerance mechanisms for FTT-Ethernet DESs</b>
09:30 – 09:35	David Gessner, Ignasi Furió and Julián Proenza <b>(380 WiP) Towards a Layered Architecture for the Flexible Time-Triggered Replicated Star for Ethernet</b>
09:35 – 09:40	Sinisa Derasevic, Maties Melià, Alberto Ballesteros, Manuel Barranco and Julián Proenza <b>(376 WiP) First Experimental Evaluation of the Consistent Replicated Voting in the Hard Real-time Ethernet Switching architecture</b>

### WiP T2: Industrial Communication Technologies and Systems

**Time: Wednesday, 09. Sept., 08:40 - 10:00;**

**Chairs: Stig Petersen; Room: Fischbach**

08:40 – 08:45	Jacob Maxa, Thilo Krachenfels and Helmut Beikirch <b>(293) Near Field Communication Interface for a Packet-Based Serial Data Transmission Using a Dual Interface EEPROM</b>
08:45 – 08:50	Thomas Frühwirth, Lukas Krammer and Wolfgang Kastner <b>(314) Dependability Demands and State of the Art in the Internet of Things</b>
08:50 – 08:55	Dimitri Block, Niels Hendrik Fliedner, Daniel Toews and Uwe Meier <b>(323) Wireless Channel Measurement Data Sets for Reproducible Performance Evaluation in Industrial Environments</b>
08:55 – 09:00	Giuliana Alderisi, Svetlana Girs, Lucia Lo Bello, Elisabeth Uhlemann and Mats Björkman <b>(325) Probabilistic Scheduling and Adaptive Relaying for WirelessHART Networks</b>
09:00 – 09:05	Thu Pham, Trong-Tien Nguyen and Dong-Seong Kim <b>(351) Location Aided Zone Routing Protocol in Mobile Ad Hoc Networks</b>
09:05 – 09:10	Minh-Phuong Tran, Thu Pham and Dong-Seong Kim <b>(353) Effective Spectrum Handoff for Cognitive UWB Industrial Networks</b>
09:10 – 09:15	Dominik Henneke, Mohammad Elattar and Jürgen Jasperneite <b>(362) Communication Patterns for Cyber-Physical Systems</b>
09:15 – 09:20	Pedro Gonçalves, Joaquim Ferreira, Paulo Pedreiras and Daniel Corujo <b>(388) Adapting SDN datacenters to support Cloud IIoT applications</b>

09:20 – 09:25	Moisés Urbina and Roman Obermaisser <b>(34) Multi-Core Architecture for AUTOSAR based on Virtual Electronic Control Units</b>
09:25 – 09:30	Lars Evertz and Ulrich Epple <b>(127) Semi-Automatic Development of Service Adaptors from Property-Based Service Descriptions</b>
09:30 – 09:35	Florian Palm, Sten Grüner, Julius Pfrommer, Markus Graube and Leon Urbas <b>(226) Open Source as Enabler for OPC UA in Industrial Automation</b>

#### WiP T4: Automated Manufacturing Systems

**Time: Wednesday, 09. Sept., 08:40 - 10:00;**

**Chairs: Carla Seatzu, Peter Plapper; Room: Hollenfels**



08:40 – 08:45	Naoki Kushi and Shigemasa Takai <b>(291) Supervisor Synthesis for Similarity Control of Nondeterministic Discrete Event Systems</b>
08:45 – 08:50	Yue Wu, Jonathan Zhen Ming Go, Syeda Mariam Ahmed, Wen Feng Lu, Chee Meng Chew and Chee Kiang Pang <b>(311) Automated Bead Layout Methodology for Robotic Multi-pass Welding</b>
08:50 – 08:55	Heng-Chao Yan, Junhong Zhou, Chee Kiang Pang and Xiang Li <b>(316) Parameter Update and PDF Prediction of Degradation Using Stage-Based Gamma Process</b>
08:55 – 09:00	Syeda Mariam, Jinqiang Yuan, Yue Wu, Chee-Meng Chew and Chee Kiang Pang <b>(317) Collision-free Path Planning for Multi-pass Robotic Weldings</b>
09:00 – 09:05	Francesco Basile, Pasquale Chiacchio, Jolanda Coppola and Diego Gerbasio <b>(320) Automated warehouse systems: a cyber-physical system perspective</b>
09:05 – 09:10	Amir Ebrahimi, Knut Åkesson, Pierre E. C. Johansson and Thomas Lezama <b>(357) Formal analysis of product variability and the effects on assembly operations</b>
09:10 – 09:15	Theresa Beyer, Ramin Yousefifar, Nasser Jazdi and Peter Göhner <b>(379) Knowledge-based Planning and Adaptation of Industrial Automation Systems</b>
09:15 – 09:20	Jiang Wan, Arquimedes Canedo and Mohammad Al Faruque <b>(391) Security-Aware Functional Modeling of Cyber-Physical Systems</b>
09:20 – 09:25	Mariagrazia Dotoli, Nicola Epicoco and Carla Seatzu <b>(296) An improved technique for train load planning at intermodal rail-road terminals</b>

**Keynote 1: Wednesday 09. September 2015, 11:00 – 12:00, Room: Europe A**

**Raymond Liao: "Open Innovation Practices: Integrated Methods to Hidden Challenges"**

**Summary:** Companies in various industries have started looking outside for transformative technologies with Open Innovation methods including spin-in, investment and acquisition. In this talk, the author shares some best practices from his decade long Open Innovation experience at Siemens and Samsung, such as spin-in technologies from startups and universities, and invest in startups to secure commercial partnerships including acquisitions. The insights on the challenges of corporate Open Innovation and the integrated approaches to address them will help researchers better commercialize their ideas.



**Bio:** Dr. Raymond Liao is a Managing Director of investment at Samsung Global Innovation Center focusing on startup investments in Big Data, Cloud, AI, and Security areas. The Global Innovation Center is actively leveraging Open Innovation tools including investment, acquisition, incubation and partnership to advance Samsung's software and service offerings and nurture the ecosystem around Samsung platforms. Prior to Samsung, Raymond worked at Siemens for over a decade practicing the entire spectrum of Open Innovation. He joined Siemens TTB in Berkeley as an innovator to commercialize his PhD from Columbia University, which led to the market-leading industrial WLAN business. He became a Director of Venture Technology to conduct spin-in and early stage investment projects. He relocated to Germany in 2008 as the founding CTO (Head of Tech. Innovation) of Siemens global Industrial Communications business.

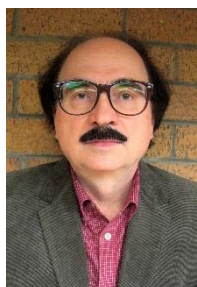
Previously Raymond was a productive researcher in the area of network performance. He has over 20 technical publications including the top-tier networking journals (e.g., IEEE/ACM Trans. on Networking, IEEE Journal of Selected Areas of Communications) and conferences (e.g., ACM MOBICOM and IEEE/ACM INFOCOM). His research has made impact to the industry with more than 10 issued patents. Raymond received his Ph.D. from the EE Dept. at Columbia University with the Eliahu Jury Award.

**Panel Discussion, Wednesday, 09. September 2015, 13:30 – 15:30, Room: Europe A**

**«Prospects for the growth of hi-tech startup industry sector in Europe»**

**Panelists:**

- Richard Zurawski, ISA Group, CA, USA (Moderator)
- Raymond Liao, Director, Open Innovation, Samsung Electronics, Mountain View, USA
- Björn Ottersten, Director SnT, University of Luxembourg, Luxembourg
- Yannick Wilden, Fraunhofer Ventures, Germany
- Jérôme Wittamer, President, Luxembourg Private Equity & Venture Capital Association (LPEA), and Expon Capital, Luxembourg



**Bio:** Richard Zurawski is a partner in a San Francisco based private equity firm; since 2014 also a visiting professor at AGH University of Science & Technology in Krakow. He has close to 40 years of academic and industrial experience, including professorial post at University of Tokyo and Director of R&D, Kawasaki Electric - both Tokyo, Japan. He held various executive posts at a number of hi-tech companies in the San Francisco Bay area.

Dr. Zurawski co-founded three Silicon Valley based hi-tech companies. He was a partner in a joint venture in China, involved in the development of telecommunication equipment for the Chinese market. He has been involved in due diligence done for venture capital companies in California and NYC for over 17 years. He received M.Eng in Electronics from AGH US&T in Krakow; and a Ph.D. in Computer Science from LaTrobe University, Melbourne, Australia.



**Bio:** Björn Ottersten was born in Stockholm, Sweden, 1961. He received the M.S. degree in electrical engineering and applied physics from Linköping University, Linköping, Sweden, in 1986. In 1989 he received the Ph.D. degree in electrical engineering from Stanford University, Stanford, CA. Dr. Ottersten has held research positions at the Department of Electrical Engineering, Linköping University, the Information Systems Laboratory, Stanford University, the Katholieke Universiteit Leuven, Leuven, and the University of Luxembourg. During 96/97 Dr. Ottersten was

Director of Research at ArrayComm Inc, a start-up in San Jose, California based on Ottersten's patented technology. In 1991 he was appointed Professor of Signal Processing at the Royal Institute of Technology (KTH), Stockholm. From 1992 to 2004 he was head of the department for Signals, Sensors, and Systems at KTH and from 2004 to 2008 he was dean of the School of Electrical Engineering at KTH. Currently, Dr. Ottersten is Director for the Interdisciplinary Centre for Security, Reliability and Trust at the University of Luxembourg. Dr. Ottersten is a board member of the Swedish Research Council and as Digital Champion of Luxembourg, he acts as an adviser to the European Commission. He is currently editor in chief of EURASIP Signal Processing Journal and a member of the editorial boards of EURASIP Journal of Applied Signal Processing and Foundations and Trends in Signal Processing. Dr. Ottersten is a Fellow of the IEEE and EURASIP and a member of the IEEE Signal Processing Society Board of Governors. In 2011 he received the IEEE Signal Processing Society Technical Achievement Award. He is a first recipient of the European Research Council advanced research grant.



**Bio:** Yannick Wilden is senior investment manager at Fraunhofer Venture, which is the central management department of the Fraunhofer Gesellschaft in charge of the technology commercialization through spin-offs. In his role Yannick manages a portfolio of high-tech companies, supports and advises them with focus on technology exploitation and IP, business modeling as well as business development and financing. Before joining the Fraunhofer Venture team, he worked as analyst at a private investment management firm and for several years at Valeo Group, one of the world's leading automotive suppliers. Through a successful international career in Germany, France and the US, Yannick

leverages on several years of industry experience and expertise in the development, production and financing of technical products. He holds a master degree in production engineering from the RWTH in Aachen and a MBA with distinction from the HULT International Business School in Boston.

Fraunhofer Venture acts as a partner of founders, start-up companies, Fraunhofer institutes and investors. By offering access to Fraunhofer technologies, infrastructure and know-how with more than 5,200 patent classes, it provides young companies with the opportunity of a faster and better establishment of their products on the markets. The activities led by Fraunhofer Venture include technology scouting, support and consulting services from the idea to corporate foundation, the due diligence of potential investments as well as the management of active portfolio companies.



**Bio:** Jérôme Wittamer is Managing Partner of Expon Capital, a global VC firm. He has been an investor and entrepreneur in technology for over 20 years. Jérôme worked in senior management at BIP Investment Partners where he co-founded VOXmobile (sold to Orange). Jérôme also successfully invested in media and communication technology companies such as EVS and Option, all of which became a world leader in their field. He later joined the DCL Group, a vibrant group of internet companies, followed by Genii Capital, where he lead and

developed the firm's corporate finance activities, working on both small (< EUR 20m) and large (>EUR 1b) transactions. Jerome is a regular lecturer, active in non-profit organisations supporting education and entrepreneurship. He is currently President of Luxembourg's Venture Capital & Private Equity Association (LPEA). Jérôme holds a Master of Laws from Université Catholique de Louvain and an MBA from the Rotterdam School of Management, Erasmus University.

**Parallel Sessions, 16:00 – 18:00**

<b>T1.2: Model Based Engineering</b>	
<b>Time: Wednesday, 09. Sept., 16:00 - 18:00,</b>	
<b>Chairs: Alois Zoitl, Per Lindgren; Room: Europe A</b>	
16:00 – 16:20	Patrick Leserf, Pierre De Saqui-Sannes and Jérôme Hugues <b>(11) Multi-Domain optimization with SysML modeling</b>
16:20 – 16:40	Luca Berardinelli, Stefan Biffli, Emanuel Maetzler, Tanja Mayerhofer and Manuel Wimmer <b>(238) Model-Based Co-Evolution of Production Systems and their Libraries with AutomationML</b>
16:40 – 17:00	Benedikt Weißenberger, Stefan Flad, Xinyu Chen, Susanne Rösch, Tobias Voigt and Birgit Vogel-Heuser <b>(142) Model Driven Engineering of Manufacturing Execution Systems using a formal specification - Extension of the MES-ML for the generation of MES code</b>
17:00 – 17:20	Jiang Wan, Arquimedes Canedo and Mohammad Al Faruque <b>(62) Model-Based Design of Time-Triggered Real-time Embedded Systems for Industrial Automation</b>
17:20 – 17:40	Thomas Simon and Susanne Rösch <b>(199) Comparing the object-oriented extension with the classical IEC 61131-3 regarding reusability and understandability - a case study</b>
17:40 – 18:00	Juliane Fischer, David Friedrich and Birgit Vogel-Heuser <b>(12) Configuration of PLC software for automated warehouses based on reusable components- an industrial case study</b>

<b>T2.1: Wireless and Powerline Communication</b>	
<b>Time: Wednesday, 09. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Stig Petersen, Uwe Meier; Room: Hollenfels</b>	
16:00 – 16:20	Maryam Vahabi, Stefano Tennina, Eduardo Tovar and Bjorn Andersson <b>(202) Response Time Analysis of Slotted WiDOM in Noisy Wireless Channels</b>
16:20 – 16:40	Federico Tramarin, Stefano Vitturi and Michele Luvisotto <b>(230) Improved Rate Adaptation Strategies for Real-Time Industrial IEEE 802.11n WLANs</b>
16:40 – 17:00	Duc Khai Lam, Keishi Yamaguchi, Yasuhiro Shinozaki, Satoshi Morita, Yuhei Nagao, Masayuki Kurosaki and Hiroshi Ochi <b>(64) A Fast Industrial WLAN Protocol and its MAC Implementation for Factory Communication Systems</b>
17:00 – 17:20	Gaetano Patti, Giuliana Alderisi and Lucia Lo Bello <b>(187) SchedWiFi: An Innovative Approach to support Scheduled Traffic in Ad-hoc Industrial IEEE 802.11 networks</b>
17:20 – 17:40	Francisco Nombela, Enrique García, Jesús Ureña, Álvaro Hernández and Pablo Poudereux <b>(23) Robust Synchronization Algorithm for Broadband PLC based on Wavelet-OFDM</b>
17:40 – 18:00	Pablo Poudereux, Raúl Mateos, Álvaro Hernández, Francisco Nombela and Fernando Cruz-Roldán <b>(24) Study of Suitable Filter Architectures for FBMC Techniques Applied to PLC Communications</b>

<b>T3.1: Real-time Scheduling</b>	
<b>Time: Wednesday, 09. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Marko Bertogna, Guillaume Phavorin; Room: Vianden</b>	
16:00 – 16:20	Guillaume Phavorin, Pascal Richard and Claire Maiza <b>(58) Complexity of scheduling real-time tasks subjected to cache-related preemption delays</b>
16:20 – 16:40	Hai Nam Tran, Frank Singhoff, Stéphane Rubini and Jalil Boukhobza <b>(109) Addressing Cache Related Preemption Delay in Fixed Priority Assignment</b>
16:40 – 17:00	Sara Afshar, Moris Behnam, Reinder J. Bril and Thomas Nolte <b>(182) Resource Sharing in a Hybrid Partitioned/Global Scheduling Framework for Multiprocessors</b>
17:00 – 17:20	Romain Gratia, Thomas Robert and Laurent Pautet <b>(239) Scheduling of Mixed--Criticality Systems with RUN</b>
17:20 – 17:40	Akramul Azim, Sebastian Fischmeister and Rodolfo Pellizzoni <b>(257) Generation of Communication Schedules Using Component Interfaces</b>

<b>T5.1: Industrial Control I</b>	
<b>Time: Wednesday, 09. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Oscar Barambones, Orlando Arrieta; Room: Fischbach</b>	
16:00 – 16:20	Oscar Barambones and Jose Maria Gonzalez de Durana <b>(8) Wind Turbine Control Scheme based on Adaptive Sliding Mode Controller and Observer</b>
16:20 – 16:40	Fabrizio Padula, Antonio Visioli, Domenico Facchinetti and Alberto Saleri <b>(17) A Dynamic Inversion Approach for Oscillation-free Control of Overhead Cranes</b>
16:40 – 17:00	Manuel Bordasch, Christian Brand and Peter Göhner <b>(47) Fault-based identification and inspection of fault developments to enhance availability in industrial automation systems</b>
17:00 – 17:20	Navid Rajabpour and Yasser Sedaghat <b>(68) A Hybrid-based Error Detection Technique for PLC-based Industrial Control Systems</b>
17:20 – 17:40	José David Rojas, Diana Valverde Mendez, Víctor M. Alfaro, Ramon Vilanova and Orlando Arrieta <b>(115) Comparison of multi-objective optimization methods for PI controllers tuning</b>

<b>T9.1: Information and Communication Technology in Smart Energy Systems</b>	
<b>Time: Wednesday, 09. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Petr Kadera, Lin Pan; Room: Diekirch</b>	
16:00 – 16:20	Salvatore Cavalieri and Alessio Regalbuto <b>(16) Improving engineering process in Smart Grid by IEC 61850 SCL and OPC UA integration</b>
16:20 – 16:40	Davide Caprino, Marco Luigi Della Vedova and Tullio Facchinetti <b>(18) Applying limited-preemptive scheduling to peak load reduction in smart buildings</b>
16:40 – 17:00	Lin Pan, Holger Voos, Yumei Li, Mohamed Darouach, Yuhua Xu and Shujun Hu <b>(128) A Wake Interaction Model for the Coordinated Control of Wind Farms</b>
17:00 – 17:20	Davide Brunelli, Pietro Tosato and Riccardo Fiorelli <b>(169) Design and implementation of zero power wake-up for PLC modems in smart street lighting systems</b>



**SS06: Industrial Automation Systems in the Industrial Internet (of Things)****Time: Wednesday, 09. Sept., 16:00 - 18:00;****Chairs: Kristian Sandstrom, Moris Behnam; Room: Wiltz**

16:00 – 16:20	Dirk Schulz <b>(44) FDI and the Industrial Internet of Things</b>
16:20 – 16:40	Willian Tessaro Lunardi, Everton De Matos, Ramão Tiago Tiburski, Leonardo Albernaz Amaral, Sabrina Marczak and Fabiano Passuelo Hessel <b>(223) Context-based Search Engine for Industrial IoT: Discovery, Search, Selection, and Usage of Devices</b>
16:40 – 17:00	Alexander Dennert, Martin Wollschlaeger, Robert Lehmann and Stefan Trebing <b>(244) Diagnosis, Alarms and their Management in integrated Automation Systems</b>
17:00 – 17:20	Ricardo Sousa, Paulo Pedreiras and Pedro Goncalves <b>(265) Enabling IIoT IP backbones with real-time guarantees</b>

## Detailed Program, Thursday, 10. September 2015

### Parallel Sessions, 08:30 – 10:30

<b>T2.2: Industrial Ethernet</b>	
<b>Time: Thursday, 10. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Stig Petersen, Stefano Scanzio; Room: Wiltz</b>	
08:30 – 08:50	Uwe Hentschel, Marvin Elz and Steffen Bernet <b>(77) Automatic Device Scans in EtherCAT Networks with Cable Redundancy</b>
08:50 – 09:10	Peter Danielis, Vlado Altmann, Jan Skodzik, Eike Bjoern Schweissguth, Frank Golatowski and Dirk Timmermann <b>(52) Emulation of SDN-Supported Automation Networks</b>
09:10 – 09:30	Long Qian, Zihan Chen and Peter Kazanzides <b>(249) An Ethernet to FireWire Bridge for Real-Time Control of the da Vinci Research Kit (dVRK)</b>
09:30 – 09:50	Pavel Burget, Ondrej Fiala and Jan Prasek <b>(252) Simulation, modelling and delay estimation in Profinet networks</b>
09:50 – 10:10	Artemios Voyiatzis, Konstantinos Katsigiannis and Stavros Koubias <b>(10) A Modbus/TCP Fuzzer for Internetworked Industrial Systems</b>
10:10 – 10:30	Tatsuya Maruyama and Tsutomu Yamada <b>(129) Communication Architecture of EtherCAT Master for High-Speed and IT-enabled Real-Time Systems</b>

<b>SS02.1: Advanced Flexibility Methods in Engineering &amp; Operation of Automated Production Systems</b>	
<b>Time: Thursday, 10. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Michael Weyrich, Paulo Leitao; Room: Hollenfels</b>	
08:30 – 08:50	Nicole Schmidt, Arndt Lüder, Ronald Rosendahl, Daria Ryashentseva, Matthias Foehr and Jan Vollmar <b>(57) Surveying Integration Approaches for Relevance in Cyber Physical Production Systems</b>
08:50 – 09:10	Birgit Vogel-Heuser, Jan Weber and Jens Folmer <b>(161) Evaluating reconfiguration abilities of automated production systems in Industrie 4.0 with metrics</b>
09:10 – 09:30	Daniel Regulin, Christopher Krooß, Daniel Schütz and Birgit Vogel-Heuser <b>(185) Bridging the gap between discrete and continuous simulation of logistic systems in production based on the modelica modeling language</b>
09:30 – 09:50	Paulo Leitao, Nelson Rodrigues and José Barbosa <b>(159) What-if Game Simulation in Agent-based Strategic Production Planners</b>
09:50 – 09:55	Andreas Zeller and Michael Weyrich <b>(330 WiP) Test Case Selection for Networked Production Systems</b>
09:55 – 10:00	Constantin Wagner and Ulrich Epple <b>(167 WiP) Variant Management for Control Blocks</b>

<b>SS04: Approaches and Challenges in Design and Implementation of Cyber-physical Production Systems</b>	
<b>Time: Thursday, 10. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Lukasz Wisniewski, Jürgen Jasperneite; Room: Diekirch</b>	
08:30 – 08:50	Dirk Schulz, Roland Braun and Johannes Schmitt <b>(39) Behind the Façade - Efficient Software Development with OPC UA</b>
08:50 – 09:10	Tomas Grimm, Benedikt Janßen, Osvaldo Navarro and Michael Huebner <b>(261) The Value of FPGAs as Reconfigurable Hardware Enabling Cyber-Physical Systems</b>
09:10 – 09:30	Andreas Papalambrou, Dimitris Karadimas, John Gialelis and Artemios Voyiatzis <b>(198) A Versatile Scalable Smart Waste-bin System based on Resource-limited Embedded Devices</b>
09:30 – 09:50	Helene Dörksen and Volker Lohweg. <b>(46) Automated Fuzzy Classification with Combinatorial Refinement</b>
09:50 – 10:10	Felix Specht, Holger Flatt, Jens Eickmeyer and Oliver Niggemann <b>(130) Exploiting Multicore Processors in PLCs using Libraries for IEC 61131-3</b>
10:10 – 10:15	Lukasz Wisniewski, Markus Schumacher, Juergen Jasperneite and Christian Diedrich <b>(140 WiP) Increasing Flexibility of Time Triggered Ethernet based Systems by Optimal Greedy Scheduling Approach</b>

<b>SS05: Secure and Resilient Industrial Automation and Control Systems</b>	
<b>Time: Thursday, 10. Sept., 08:30 - 10:30;</b>	
<b>Chairs: André Teixeira; Yumei Li; Room: Vianden</b>	
08:30 – 08:50	Boojoong Kang, Peter Maynard, Kieran McLaughlin, Sakir Sezer, Thomas Strasser, Filip Andrén, Friederich Kupzog and Christian Seitzl <b>(183) Investigating Cyber-Physical Attacks against IEC 61850 Photovoltaic Inverter Installations</b>
08:50 – 09:10	Haiding Tang, Zhouzheng Lu, Lifu Zhang, Yang Chen, Peng Cheng and Jiming Chen <b>(266) LQG Control under Denial-of-Service Attacks: An Experimental Study</b>
09:10 – 09:30	André Teixeira, Kaveh Paridari, Henrik Sandberg and Karl Johansson <b>(221) Voltage control for interconnected microgrids under adversarial actions</b>
09:30 – 09:50	Marcus Völp, Nils Asmussen, Hermann Härtig, Benedikt Nöthen and Gerhard Fettweis <b>(269) Towards Dependable CPS Infrastructures: Architectural and Operating-System Challenges</b>
09:50 – 09:55	Apala Ray, Johan Akerberg, Mats Bjorkman and Mikael Gidlund <b>(147 WiP) Towards Trustworthiness Assessment of Industrial Heterogeneous Networks</b>

<b>SS07: Mobile Robotics in the Factory of the Future</b>	
<b>Time: Thursday, 10. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Sebastian Zug, Nico Hochgeschwender, Room: Fischbach</b>	
08:30 – 08:50	Dirk Holz, Angeliki Topalidou-Kyniazopoulou, Francesco Rovida, Mikkel Rath Pedersen, Volker Krueger and Sven Behnke <b>(179) A Skill-Based System for Object Perception and Manipulation for Automating Kitting Tasks</b>
08:50 – 09:10	Christoph Walter, Felix Penzlin, Erik Schulenburg and Norbert Elkmann <b>(112) Enabling Multi-Purpose Mobile Manipulators: Localization of Glossy Objects using a Light Field Camera</b>
09:10 – 09:30	Sebastian Zug, Stefan Wilske, Christoph Steup and Arndt Lüder <b>(181) Online evaluation of manipulation tasks for mobile robots in Industry 4.0 scenarios</b>
09:30 – 09:50	Sven Schneider, Frederik Hegger, Nico Hochgeschwender, Rhama Dwiputra, Alexander Moriarty, Jakob Berghofer and Gerhard Kraetzschmar <b>(131) Design and Development of a Benchmarking Testbed for the Factory of the Future</b>
09:50 – 10:10	Victor M. Cedeno-Campos, Paul A. Trodden and Tony J. Dodd <b>(146) An interactive methodology to explore optimization scenarios of a reconfigurable factory</b>
10:10 – 10:30	Lorenzo Sabattini, Elena Cardarelli, Valerio Digani, Cristian Secchi, Cesare Fantuzzi and Kay Fuerstenberg <b>(245) Advanced Sensing and Control Techniques for Multi AGV Systems in Shared Industrial Environments</b>

<b>WiP T1: Information Technology in Automation</b>	
<b>Time: Thursday, 10. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Arndt Lüder, Souad Bezzaoucha; Room: Europe A</b>	
08:30 – 08:35	Philipp Schmidt and Alexander Fay. <b>(406) Transformation of Continuous Simulation Models of Automated Manufacturing Systems into Discrete Event Models on Different Levels of Detail</b>
08:35 – 08:40	Carlos C. Insaurralde. <b>(253) Physiologically-Inspired Self-Regulation for Factory Automation - Towards Artificial Homeostasis for Shopfloors</b>
08:40 – 08:45	Ian Peake, Jan Olaf Blech, Lasith Fernando, Heinz Schmidt, Ravi Sreenivasamurthy and Sudarsan Sd. <b>(299) Visualization Facilities for Distributed and Remote Industrial Automation: VxLab</b>
08:45 – 08:50	Holger Flatt, Nils Koch, Andrei Guenter, Carsten Roecker and Juergen Jasperneite. <b>(304) A Context-Aware Assistance System for Maintenance Applications in Smart Factories based on Augmented Reality and Indoor Localization</b>
08:50 – 08:55	Johannes Pfeffer, Markus Graube, Patrick Reipschlaeger, Stephan Arndt, Leon Urbas, Raimund Dachsetl and Ralph Stelzer. <b>(307) Towards Collaborative Plant Control using a Distributed Information and Interaction Space</b>
08:55 – 09:00	Martin Plank and Andreas Gössling. <b>(310) Concept for Distributed Modules for Advanced Energy Management</b>
09:00 – 09:05	Ronald Rosendahl, Nicole Schmidt, Arndt Lüder and Daria Ryashentseva. <b>(321) Industry 4.0 value networks in legacy systems</b>
09:05 – 09:10	Hendrik Simon, Nico Friedrich, Sebastian Biallas, Stefan Kowalewski, Stefan Hauck-Stattelmann and Bastian Schlich. <b>(327) Automatic Test Case Generation for PLC Programs using Coverage Metrics</b>
09:10 – 09:15	Sebastian Ulewicz, Mattias Ulbrich, Alexander Weigl, Bernhard Beckert and Birgit Vogel-Heuser. <b>(328) Proving Equivalence between Control Software Variants for Programmable Logic Controllers - Using Regression Verification to Reduce Unneeded Variant Diversity</b>
09:15 – 09:20	Federico Perez, Edurne Irisarri, Darío Orive, Marga Marcos and Elisabet Estevez. <b>(335) A CPPS Architecture approach for Industry 4.0</b>
09:20 – 09:25	Dirk Schöttke, Stephan Schaefer, Ulrich Berger, Thomas Kaempfe and Dominik Matura. <b>(341) Collaborating Robots in a Museum Environment: Modular Systems for 3D Documentation</b>
09:25 – 09:30	Christos Anagnostopoulos and Athanasios Kalogeras. <b>(344) An Industrial Simulator Utilizing a Gaming Platform</b>
09:30 – 09:35	Joerg Robert, Heinrich Milosiu and Thomas Lindner. <b>(345) Sub 10 <math>\mu</math>W Wake-Up-Receiver Based Indoor/Outdoor Asset Tracking System</b>
09:35 – 09:40	Sebastian Rauh, Daniel Zsebedits, Efim Tamplon, Stephan Bolch and Gerrit Meixner. <b>(356) Using Google Glass for mobile maintenance and calibration tasks in the AUDI A8 production line</b>
09:40 – 09:45	Pramod Tc and Sunitha Nr. <b>(358) KMI for SCADA and WirelessHART in IACS</b>
09:45 – 09:50	Everton Matos, Leonardo Amaral, Ramão Tiburski, Willian Lunardi, Fabiano Hessel and Sabrina Marczak <b>(363) Context-Aware System for Information Services Provision in the Internet of Things</b>
09:50 – 09:55	Miriam Schleipen, Evgeny Selyansky, Robert Henßen and Tino Bischoff. <b>(387) Multi-level user and role concept for a secure plug &amp; work based on OPC UA and AutomationML</b>
09:55 – 10:00	Olga Kovalenko, Manuel Wimmer, Marta Sabou, Arndt Lüder, Fajar J. Ekaputra and Stefan Biffel. Modeling <b>(390) AutomationML: Semantic Web Technologies vs. Model-Driven Engineering</b>
10:00 – 10:05	Antoaneta Kondeva, Vincent Aravantinos, Lukas Hermanns and Leenhard Hörauf. <b>(399) The SFIT Tool: Supporting Assembly Planners to Deal with New Product Variants</b>

10:05 – 10:10	Christopher Martin, Matthias Freund, Annerose Braune, Ralf-Erik Ebert, Matthias Pleßow, Sven Severin and Oliver Stern. <b>(157) Integrated Design of Human-Machine Interfaces for Production Plants</b>
10:10 – 10:15	Remiel Feno, Aline Cauvin, Alain Ferrarini and Thomas Dalançon. <b>(241) Manufacturing engineering data integration for assembly process design review</b>
10:15 – 10:20	Lars Dürkop, Lukasz Wisniewski, Sascha Heymann, Benedikt Lücke and Jürgen Jasperneite. <b>(292) Analyzing the engineering effort for the commissioning of industrial automation systems</b>

**Keynote 2: Thursday, 10. September 2015, 11:00 – 12:00, Room: Europe A**

**Jerker Delsing: “Building Automation Systems from Internet of Things”**

**Summary:** Nowadays products and services are produced and delivered by numerous stakeholders, all required to interact with suppliers and customers in an efficient and flexible way. Energy consumption and energy usage environmental impact have become of paramount concern in those activities. Automation technology offers solutions to deal with those challenges. Automation technology as we know it today, however, has got some limitations. The emerging era of the Internet of Things (IoT) with its ease to build complex system of systems (SoS) opens new perspectives in the automation area.

In this context, the European project Arrowhead envisions “Collaborative automation by networked embedded devices”. This necessitates a wide interoperability of devices, as well as systems and platforms. The proposed framework provides such interoperability at the service level. The Arrowhead framework efficiently support the development, deployment and operation of interconnected, collaborative systems. Arrowhead cloud automation systems are based on automation devices such as sensors, actuators, controllers, and others transformed into IoT-type of devices and systems adopting the Service Oriented Architecture philosophy. The building elements of a cloud automation system are systems that provide and consume services, and cooperate as systems of systems from which automation services like monitoring, control, optimisation, analytics etc are created. The building of complete automation systems is supported by orchestration and authorisation services. The presentation is going to discuss the new automation challenges, and solutions the Arrowhead framework offers.



**Bio:** Prof. Jerker Delsing received the M.Sc. in Engineering Physics at Lund Institute of Technology, Sweden 1982. In 1988 he received the PhD. degree in Electrical Measurement at the Lund Univeristy. During 1985 - 1988 he worked part time at Alfa-Laval - SattControl (now ABB) with development of sensors and measurement technology. In 1994 he got the docent degree (associate prof.) in Heat and Power Engineering. In 1995 he was appointed full professor in Industrial Electronics at Lulea University of Technology where he currently is working as the scientific head of EISLAB, <http://www.ltu.se/eislab>. For the period 2004-2006 he also served as Dean of the engineering faculty at Lulea University of Technology.

Delsing has a long standing in ultrasound sensor technology in particularly applied to flow measurement. His present research profile can be entitled "Embedded Internet Systems Services", with applications to automation in large and complex industry and society systems. Currently he is the coordinator of Arrowhead Europes largest Automation project, with 78 partners and a budget of 68M€. At the European level he is steering board member of ARTEMIS, ProcessIT.EU, ProcessIT Innovations and ESIS. Since 1999 he is chairman of ITF (Instrument Tekniska Foreningen/Instrument Society of Sweden).

**Plenary Session 1: Thursday, 10. September 2015, 13:30 – 14:30, Room: Europe A**

**Lionel C. Briand: “Scalable Software Testing and Verification of Real-Time and Embedded Systems Through Metaheuristic Search and Optimization”**

**Summary:** Testing and verification problems in real-time and embedded systems come in many different forms, due to significant differences across domains and contexts. But one common challenge is scalability, the capacity to test and verify increasingly large, complex systems. Another concern relates to practicality. Can the inputs required by a given technique be realistically provided by engineers? This talk reports on 10 years of research tackling verification and testing as a search and optimization problem, usually relying on abstractions and models of the system under test. Our observation is that most of the problems we faced could be re-expressed so as to make use of appropriate search and optimization techniques to automate a

specific testing or verification strategy. One significant advantage of such an approach is that it often leads to solutions that scale in large problem spaces and that are less demanding in terms of the level of detail and precision required in models and abstractions. Their drawback, as heuristics, is that they are not amenable to proof and need to be thoroughly evaluated by empirical means. However, in the real world of software development, proof is usually not an option, even for smaller and critical systems. In practice, testing and verification is a means to reduce risk as much as possible given available resources and time. Concrete examples of problems we have addressed and that I will cover in my talk include schedulability analysis, stress/load testing, CPU usage analysis, robustness testing, and testing dynamic controllers. Most of these projects have been performed in industrial contexts and solutions were validated on industrial systems.



**Bio:** Lionel C. Briand is professor and FNR PEARL chair in software verification and validation at the SnT centre for Security, Reliability, and Trust, University of Luxembourg. He also acts as vice-director of the centre. Lionel started his career as a software engineer in France (CS Communications & Systems) and has conducted applied research in collaboration with industry for more than 20 years. Until moving to Luxembourg in January 2012, he was heading the

Certus center for software verification and validation at Simula Research Laboratory, where he was leading applied research projects in collaboration with industrial partners. Before that, he was on the faculty of the department of Systems and Computer Engineering, Carleton University, Ottawa, Canada, where he was full professor and held the Canada Research Chair (Tier I) in Software Quality Engineering. He has also been the software quality engineering department head at the Fraunhofer Institute for Experimental Software Engineering, Germany, and worked as a research scientist for the Software Engineering Laboratory, a consortium of the NASA Goddard Space Flight Center, CSC, and the University of Maryland, USA.

Lionel was elevated to the grade of IEEE Fellow for his work on the testing of object-oriented systems. He was recently granted the IEEE Computer Society Harlan Mills award and the IEEE Reliability Society engineer-of-the-year award for his work on model-based verification and testing. His research interests include: software testing and verification, model-driven software development, search-based software engineering, and empirical software engineering. Lionel has been on the program, steering, or organization committees of many international, IEEE and ACM conferences. He is the coeditor-in-chief of Empirical Software Engineering (Springer) and is a member of the editorial boards of Systems and Software Modeling (Springer) and Software Testing, Verification, and Reliability (Wiley). More details can be found on: <http://people.svv.lu/briand/>

## Parallel Sessions, 14:30 – 15:30

<b>T2.3: Clock and Network Synchronization</b>	
<b>Time: Thursday, 10. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Stig Petersen, Lucia Lo Bello; Room: Vianden</b>	
14:30 – 14:50	Gianluca Cena, Stefano Scanzio and Adriano Valenzano <b>(189) Reliable Comparison of Clock Discipline Algorithms for Time Synchronization Protocols</b>
14:50 – 15:10	Aboubacar Diarra, Armin Zimmermann, Andreas Grzempa, Thomas Hogenmueller and Umair Asrar Khan <b>(117) Improved Clock Synchronization Start-Up Time for Switched Ethernet-Based In-Vehicle Networks</b>
15:10 – 15:30	Linus Thrybom, Thanikesavan Sivanthi and Yvonne-Anne Pignolet <b>(164) Performance Analysis of Process Bus Communication in a Central Synchrocheck Application</b>

<b>T6.1: Computational Intelligence and Modern Heuristics in Automation</b>	
<b>Time: Thursday, 10. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Martin Horauer, Kazuhiko Takahashi; Room: Diekirch</b>	
14:30 – 14:50	Kazuhiko Takahashi <b>(41) Remarks on Self-tuning Feedback Controller Using the Clifford Multi-layer Neural Network</b>
14:50 – 15:10	Giulio Binetti, David Naso and Biagio Turchiano <b>(91) Genetic Algorithm based on the Lagrange Method for the Non-Convex Economic Dispatch Problem</b>
15:10 – 15:30	Muhammad Rizal Khaefi, Jin-Yong Im and Dong-Seong Kim <b>(136) An Efficient DDS Node Discovery Scheme for Naval Combat System</b>

<b>SS02.2: Advanced Flexibility Methods in Engineering &amp; Operation of Automated Production Systems</b>	
<b>Time: Thursday, 10. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Marga Marcos, Paulo Leitao; Room: Europe A</b>	
14:30 – 14:50	Rafael Priego, Daniel Schütz, Birgit Vogel-Heuser and Marga Marcos <b>(134) Reconfiguration Architecture for Runtime Updates of an Automation System</b>
14:50 – 15:10	Petr Kadera and Petr Novák <b>(260) Automatic Compilation of Performance Models for Industrial Multi-Agent Systems</b>
15:10 – 15:30	Michael Obst, Thomas Holm, Leon Urbas, Alexander Fay, Sven Kreft, Ulrich Hempen and Thomas Albers <b>(160) Semantic description of process modules - Towards an open implementation for plug and produce in process plants</b>



<b>WiP T3: Real-Time and (Networked) Embedded Systems [RTNES]</b>	
<b>Time: Thursday, 10. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Ahlem Mifdaoui, Nicolas Navet; Room: Wiltz</b>	
14:30 – 14:35	Esam Qaralleh, Diogo Lima, Tiago Gomes, Adriano Tavares and Sandro Pinto. <b>(280) HcM-FreeRTOS: Hardware-centric FreeRTOS for ARM Multicore</b>
14:35 – 14:40	Sandro Pinto, Daniel Oliveira, Jorge Pereira, Jorge Cabral and Adriano Tavares. <b>(281) FreeTEE: when real-time and security meet</b>
14:40 – 14:45	Tiago Gomes, Sandro Pinto, Paulo Garcia and Adriano Tavares. <b>(282) RT-SHADOWS: Real-Time System Hardware for Agnostic and Deterministic OSES Within Softcore</b>
14:45 – 14:50	Hyunwoo Joe, Dongwook Kang, Jin-Ah Shin, Vincent Dupre, Soo-Young Kim, Chaedeok Lim and Taeho Kim. <b>(298) Remote Graphical Processing for Dual Display of RTOS and GPOS on an Embedded Hypervisor</b>
14:50 – 14:55	Stefan Windmann and Jürgen Jasperneite. <b>(303) An FPGA Based FIFO with Efficient Memory Management</b>
14:55 – 15:00	Woonggy Kim and Minyoung Sung. <b>(349) Scalable Motion Control System Using EtherCAT-based Shared Variables</b>
15:00 – 15:05	Saad Mubeen, Mohammad Ashjaei, Thomas Nolte, John Lundbäck and Kurt-Lennart Lundbäck. <b>(384) Integrating Response-time Analysis for Heterogeneous Networks with Rubus Analysis Framework: Challenges and Preliminary Solutions</b>

<b>WiP T8: Intelligent Sensors, Sensor Networks, and Information Processing</b>	
<b>Time: Thursday, 10. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Antônio Augusto Fröhlich, Andrzej Pawlowski; Room: Hollenfels</b>	
14:30 – 14:35	Anetta Nagy and Thilo Sauter <b>(313) Low Complexity Room Thermal Models for Energy Optimization in Industrial Buildings</b>
14:35 – 14:40	Alexander Dicks, Volker Lohweg, Henrik Wittke and Stefan Linke. <b>(318) Structural Health Monitoring of Plastic Components with Piezoelectric Sensors</b>
14:40 – 14:45	Tiago Gomes, Sandro Pinto, Adriano Tavares and Jorge Cabral. <b>(326) Towards an FPGA-Based Edge Device for the Internet of Things</b>
14:45 – 14:50	Pablo Pajuelo Cabeza, Maria Del Carmen Pérez Rubio, José Manuel Villadangos Carrizo, Enrique García Nuñez, David Gualda Gómez, Jesús Ureña and Alvaro Hernández Alonso. <b>(359) Implementation of indoor positioning algorithms using Android smartphones</b>
14:50 – 14:55	José Manuel Alcalá, Jesús Ureña and Álvaro Hernández. <b>(360) Activity Supervision Tool using Non-Intrusive Load Monitoring Systems</b>
14:55 – 15:00	Abdul Rauf Khan, Henrik Schiøler, Torben Knudsen and Murat Kulahci. <b>(364) Statistical Data Mining for Efficient Quality Control in Manufacturing</b>
15:00 – 15:05	Jongwoo Choi, Youn-Kwae Jeong and Ilwoo Lee. <b>(168) Development of the Simple Building Electric Power Prediction Model with Local Weather Forecast based on Clustering and Silhouette Algorithm</b>
15:05 – 15:10	Stephan Wildermuth, Ulf Ahrend, Christoph Byner, Pawel Rzeszucinski, Daniel Lewandowski and Maciej Orman. <b>(188) Condition monitoring of electric motors based on magnetometer measurements</b>
15:10 – 15:15	Salvatore Gaglio, Giuseppe Lo Re, Gloria Martorella, Daniele Peri and Salvatore Davide Vassallo. <b>(224) Closing the Sensing-Reasoning-Actuating Loop in Resource-constrained WSANs through Distributed Symbolic Processing</b>
15:15 – 15:20	Vlado Altmann, Björn Butzin, Robert Balla, Frank Golatowski and Dirk Timmermann. <b>(237) A BACnet Gateway for Embedded Web Services</b>

<b>WiP T9: Information and Communication Technology in Energy Systems</b>	
<b>Time: Thursday, 10. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Oliver Gehrke, Adriana Aguilera; Room: Fischbach</b>	
14:30 – 14:35	Richard Kuntschke, Michael Specht, Marco Wagler, Martin Winter, Rolf Witzmann and Marie van Amelsvoort. <b>(271) Economic Optimization in Virtual Power Plants vs. Stable Grid Operation — Bridging the Gap</b>
14:35 – 14:40	Hyunjeong Lee, Sangkeun Yoo and Yong-Woon Kim. <b>(276) Design and Implementation of an Energy Trading Model for Smart Factories</b>
14:40 – 14:45	Aravind Ingalali, Shriram S, Nitin Adlok and Shanthi Bhushan. <b>(308) Automated Testing of Medium Voltage Drive Hardware in Loop Systems</b>
14:45 – 14:50	Andrzej Ożadowicz and Jakub Grela. <b>(338) Control Application for Internet of Things Energy Meter – a Key Part of Integrated Building Energy Management System</b>
14:50 – 14:55	Gulnara Zhabelova, Alireza Yavarian and Valeriy Vyatkin. <b>(377) Data center power dynamics within the settings of regional power grid</b>
14:55 – 15:00	Daniel Esteban Morales Bondy, Kai Heussen, Oliver Gehrke and Anders Thavlov. <b>(382) A Functional Reference Architecture for Aggregators</b>
15:00 – 15:05	Lorenzo Bottaccioli, Edoardo Patti, Andrea Acquaviva, Enrico Macii, Matteo Jarre and Michel Noussan. <b>(213) A tool-chain to foster a new business model for photovoltaic systems integration exploiting an Energy Community approach</b>
15:05 – 15:10	Khadidja Chaib Draa, Holger Voos, Marouane Alma and Mohamed Darouach <b>(200) Linearizing Control of Biogas Flow Rate and Quality</b>

### Parallel Sessions, 16:00 – 18:00

<b>T1.3: Virtual Plants</b>	
<b>Time: Thursday, 10. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Alois Zöttl, Richard Mordinyi; Room: Europe A</b>	
16:00 – 16:20	Mathias Oppelt, Gerrit Wolf and Leon Urbas <b>(61) Towards an integrated use of simulation within the life-cycle of a process plant</b>
16:20 – 16:40	Sebastian Süß, Anton Strahilov and Christian Diedrich <b>(139) Behaviour Simulation for Virtual Commissioning using Co-Simulation</b>
16:40 – 17:00	Mario Hoernicke, Alexander Fay and Mike Barth <b>(19) Virtual Plants for Brown-Field Projects - Automated generation of simulation models based on existing engineering data</b>
17:00 – 17:20	Richard Mordinyi, Philipp Schindler and Stefan Biffel <b>(240) Evaluation of NoSQL Graph Databases for Querying and Versioning of Engineering Data in Multi-disciplinary Engineering Environments</b>
17:20 – 17:40	Pouria Ghobadi Bigvand, Rainer Drath, André Scholz and Andreas Schüller <b>(22) Agile Standardization by means of PCE Requests, Data Exchange via NAMUR Data Container</b>
17:40 – 18:00	Maik Riedel, Esteban Arroyo and Alexander Fay <b>(79) Knowledge-based Selection of Principle Solutions for Sensors and Actuators based on Standardized Plant Description and Semantic Concepts</b>

<b>T3.2: Real-time Analysis and Tools</b>	
<b>Time: Thursday, 10. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Ahlem Mifdaoui, Leo Hatvani; Room: Vianden</b>	
16:00 – 16:20	Hany Kashif, Johnson Thomas, Hiren Patel and Sebastian Fischmeister <b>(3) Static Slack-Based Instrumentation of Programs</b>
16:20 – 16:40	Nicolas Gobillot, David Doose, Charles Lesire and Luca Santinelli <b>(104) Periodic state-machine aware real-time analysis</b>
16:40 – 17:00	Zaher Owda, Mohammed Abuteir and Roman Obermaisser <b>(124) Co-simulation Framework for Networked Multi-core Chips with Interleaving Discrete Event Simulation Tools</b>
17:00 – 17:20	Rafia Inam, Moris Behnam, Thomas Nolte and Mikael Sjödin <b>(144) Compositional Analysis for the Multi-Resource Server</b>
17:20 – 17:40	Leo Hatvani and Reinder J. Bril <b>(175) Schedulability using native non-preemptive groups on an AUTOSAR/OSEK platform</b>
17:40 – 18:00	Georges Kemayo, Nassima Banammar, Frédéric Ridouard, Henri Bauer and Pascal Richard <b>(190) Improving AFDX End-to-End delays analysis</b>

<b>T4.1: Scheduling and Optimization in Manufacturing Systems</b>	
<b>Time: Thursday, 10. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Mariagrazia Dotoli, Nadine Keddiss; Room: Hollenfels</b>	
16:00 – 16:20	Mariagrazia Dotoli, Nicola Epicoco and Marco Falagario <b>(36) Integrated supplier selection and order allocation under uncertainty in agile supply chains</b>
16:20 – 16:40	Nadine Keddiss, Bilal Javed, Georgeta Igna and Alois Zoitl <b>(178) Optimizing Schedules for Adaptable Manufacturing Systems</b>
16:40 – 17:00	Marcelo Teixeira, Richardson Ribeiro, Marco Barbosa, Fabrício Enembreck and Ricardo Massa <b>(171) A modeling architecture for the orchestration of service components in factory automation</b>
17:00 – 17:20	Christophe Sauvey and Wajdi Trabelsi <b>(94) Hybrid job shop scheduling with mixed blocking constraints between operations</b>
17:20 – 17:40	Imed Nasri, Jean-François Petin and Frédérique Bicking-Simon <b>(14) An Integer Coded Genetic Algorithm Based on a Replacement Procedure for Designing Operational Control Architectures of Critical Systems</b>

<b>T5.2 Industrial Control II</b>	
<b>Time: Thursday, 10. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Koichi Suyama, I. Yung; Room: Fischbach</b>	
16:00 – 16:20	Aiman Alabdo, Javier Pérez, Jorge Pomares, Gabriel J. Garcia and Fernando Torres <b>(30) FPGA-based Framework for Dynamic Visual Servoing of Robot Manipulators</b>
16:20 – 16:40	Koichi Suyama and Noboru Sebe <b>(9) Tolerance against multiple fault modes and its application to corrective maintenance of faulty actuators in servo systems</b>
16:40 – 17:00	I Yung, Carlos Vázquez and Leonid Freidovich <b>(177) Automation of Front End Loaders: Self Leveling Task</b>
17:00 – 17:20	Paulina Golinska- Dawson and Pawel Pawlewski <b>(220) Modeling of the remanufacturing process from a sustainable perspective</b>
17:20 – 17:40	Jukka Kortela and Sirkka-Liisa Jämsä-Jounela <b>(227) Fault-tolerant model predictive control (FTMPC) for the BioGrate boiler</b>

<b>T6.2: Computer Vision and Modern Heuristics in Automation</b>	
<b>Time: Thursday, 10. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Martin Horauer, Yasuyo Kita; Room: Diekirch</b>	
16:00 – 16:20	Yasuyo Kita and Yoshihiro Kawai. <b>(31) Localization of freely curved pipes for bin picking</b>
16:20 – 16:40	Esteban Arroyo, Xuan Luu Hoang and Alexander Fay <b>(38) Automatic Detection and Recognition of Structural and Connectivity Objects in SVG-coded Engineering Documents</b>
16:40 – 17:00	Kaoru Mitsuhashi, Yasuhiro Ohyama and Hiroshi Hashimoto <b>(145) Suggestion of Creating Solid Method using Projective Method in 3D Real Space with Microsoft Kinect</b>
17:00 – 17:20	Georg Braun, Christian Nissler and Florian Krebs <b>(205) Development of a vision-based 6D pose estimation end effector for Industrial Manipulators in Lightweight Production Environments</b>
17:20 – 17:40	Andreas Bihlmaier and Heinz Wörn <b>(113) CVVisual: Interactive Visual Debugging of Computer Vision Programs</b>
17:40 – 18:00	Bernd Glatz, Roman Beneder, Martin Horauer and Thomas Rauscher <b>(156) Deadlock Detection Runtime Service for Embedded Linux</b>

<b>T7.2: Motion Planning and Control for Real-World Applications</b>	
<b>Time: Thursday, 10. Sept., 16:00 - 18:00;</b>	
<b>Chairs: Christian Schlegel, Raúl Suárez; Room: Wiltz</b>	
16:00 – 16:20	Carlos Rodriguez and Raúl Suárez <b>(51) Comparison of motion planners in an environment with removable obstacles</b>
16:20 – 16:40	Néstor García, Raúl Suárez and Jan Rosell <b>(90) HG-RRT*: Human-Guided Optimal Random Trees for Motion Planning</b>
16:40 – 17:00	Muhayyuddin, Aliakbar Akbari and Jan Rosell <b>(107) Ontological Physics-based Motion Planning for Manipulation</b>
17:00 – 17:20	Aliakbar Akbari, Muhayyuddin and Jan Rosell <b>(209) Task and Motion Planning Using Physics-based Reasoning</b>
17:20 – 17:40	Timo Blender and Christian Schlegel <b>(100) Motion Control for Omni-Drive Servicerobots Under Kinematic, Dynamic and Shape Constraints</b>
17:40 – 18:00	Georgios Andrikopoulos, George Nikolakopoulos and Stamatios Manesis <b>(193) Motion Control of a Novel Robotic Wrist Exoskeleton via Pneumatic Muscle Actuators</b>

## Detailed Program, Friday, 11. September 2015

### Parallel Sessions, 08:30 – 10:30

<b>T1.4: Data Based Approaches</b>	
<b>Time: Friday, 11. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Alois Zoitl, David Gouyon; Room: Fischbach</b>	
08:30 – 08:50	Thomas Cochard, David Gouyon and Jean-François Pétin <b>(184) Generation of safe plant operation sequences using reachability analysis</b>
08:50 – 09:10	Christos Alexakos and Athanasios Kalogeras <b>(120) Internet of Things Integration to a Multi Agent System based Manufacturing Environment</b>
09:10 – 09:30	Kashif Gulzar, Seppo Sierla, Nikolaos Papakonstantinou, Chen-Wei Yang, Paul G. Flikkema and Valeriy Vyatkin <b>(76) An auction-based smart district heating grid</b>
09:30 – 09:50	Shuhui Qu, Tianshu Chu, Jie Wang, Weiwen Jian and James Leckie <b>(123) A Centralized Reinforcement Learning Approach for Proactive Scheduling in Manufacturing</b>
09:50 – 10:10	Thomas Kothmayr, Alfons Kemper, Andreas Scholz and Jörg Heuer <b>(150) Schedule-based Service Choreographies for Real-Time Control Loops</b>
10:10 – 10:30	Markus Graube, Jan Hladik and Leon Urbas <b>(48) Integrating Industrial Middleware in Linked Data Collaboration Networks</b>

<b>T4.2: Analysis and Operation of Manufacturing Systems</b>	
<b>Time: Friday, 11. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Shigemasa Takai, Fabian Bertelsmeier; Room: Vianden</b>	
08:30 – 08:50	Xiao Feng Qian, Xiang Li, Wen Feng Lu and Sitong Xu <b>(141) Critical Component Life Prediction and Cost Estimation for Decision Support In Manufacturing</b>
08:50 – 09:10	Kenneth Renny Simba, Naoki Uchiyama and Shigenori Sano <b>(256) Iterative Contouring Controller Design for Biaxial Feed Drive Systems</b>
09:10 – 09:30	Gaël Humbert, Minh Tu Pham, Xavier Brun, Mady Guillemot and Didier Noterman <b>(176) Comparative analysis of pick &amp; place strategies for a multi-robot application</b>
09:30 – 09:50	Ami Sakakibara, Sasinee Pruekprasert and Toshimitsu Ushio <b>(60) Optimal Directed Control of Discrete Event Systems with Linear Temporal Logic Constraints</b>
09:50 – 10:10	Shigemasa Takai and Ratnesh Kumar <b>(125) Verification of Generalized Inference Diagnosability for Decentralized Diagnosis in Discrete Event Systems</b>
10:10 – 10:30	Fabian Bertelsmeier and Ansgar Trächtler <b>(75) Decentralized Controller Reconfiguration Strategies for Hybrid System Dynamics based on Product-Intelligence</b>

<b>T8.1: Data Processing in Sensor Networks</b>	
<b>Time: Friday, 11. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Xiang Li, Matthias Becker; Room: Diekirch</b>	
08:30 – 08:50	Álvar Sánchez-Fernández, Maria Jesus Fuente and Gregorio Ismael Sainz-Palmero <b>(28) Fault detection in Wastewater Treatment Plants using Distributed PCA Methods</b>
08:50 – 09:10	Johan Lukkien and Richard Verhoeven <b>(116) The Case of Dynamic Street Lighting An exploration of long-term data collection</b>
09:10 – 09:30	Jian Wu, Xiang Li, Meng Joo Er, Lai Wei, Sitong Xu and Wen Feng Lu <b>(121) Machine Learning Approach for Shaft Crack Detection through Acoustical Emission Signals</b>
09:30 – 09:50	Desheng Fu, Matthias Becker, Sven Schaust and Helena Szczerbicka <b>(174) Grid-Based Orthogonal Cut Algorithm for Value-Based Multiple Events Localization in Sensor Networks</b>
09:50 – 10:10	Andrzej Pawlowski, Francisco Rodríguez, Julián Sánchez-Hermosilla and Sebastián Dormido <b>(87) Fast nonstationary filtering for adaptive weighing system</b>
10:10 – 10:30	Matthias Becker, Florian Blatt and Helena Szczerbicka <b>(133) Optimizing the Exploration Efficiency of Autonomous Search and Rescue Agents using a Concept of Layered Robust Communication</b>

<b>SS08: Design and Validation of Collaborative Automation Components and Systems</b>	
<b>Time: Friday, 11. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Gulnara Zhabelova, Arash Mousavi; Room: Wiltz</b>	
08:30 – 08:50	Gerardo Santillán Martínez, Tommi Karhela, Hannu Niemistö, Ahti Rossi, Cheng Pang and Valeriy Vyatkin <b>(81) A Hybrid Approach for the Initialization of Tracking Simulation Systems</b>
08:50 – 09:10	Hasan Derhamy, Pal Varga, Jens Eliasson, Jerker Delsing and Pablo Punal Pereira <b>(219) Translation Error Handling for Multi-Protocol SOA Systems</b>
09:10 – 09:30	Ayoub Soury, Melek Charfi, Denis Genon-Catalot and Jean-Marc Thiriet <b>(254) Performance analysis of Ethernet Powerlink protocol: Application to a new lift system generation</b>
09:30 – 09:50	Andreas Lindner, Marcus Lindner and Per Lindgren <b>(272) RTFM-RT: a threaded runtime for RTFM-core to execute IEC 61499 models</b>
09:50 – 10:10	Gulnara Zhabelova and Valeriy Vyatkin <b>(273) Towards software metrics for evaluating quality of IEC 61499 automation software</b>
10:10 – 10:15	Arash Mousavi, Valeriy Vyatkin, Yulia Berezovskaya and Xiaojing Zhang <b>(286 WiP) Towards Energy Smart Data Centers: Simulation of Server Room Cooling System</b>
10:15 – 10:20	Per Lindgren, Marcus Lindner, Andreas Lindner, Valeriy Vyatkin, David Pereira and Luis Miguel Pinho <b>(206 WiP) A Real-Time Semantics for the IEC 61499 standard</b>

<b>WiP T5: Industrial Control</b>	
<b>Time: Friday, 11. Sept., 08:30 - 10:30;</b>	
<b>Chairs: Ramon Vilanova; Orlando Arrieta; Room: Hollenfels</b>	
08:30 – 08:35	Matthias Becker and Helena Szczerbicka. <b>(137) On the influence of state update interval length on the prediction success of Decision Support System in Multi-Site Production Environment</b>
08:35 – 08:40	Paolo Sangregorio, Alberto Luigi Cologni, Franklin Caleb Owen and Fabio Previdi. <b>(277) An integrated system for supporting remote maintenance services</b>
08:40 – 08:45	Daria Ryashentseva, Arndt Lüder, Ronald Rosendahl and Valerij Finaev. <b>(301) An optimization approach within supervisor architecture for boiler control</b>
08:45 – 08:50	Takuya Kinoshita, Shin Wakitani and Toru Yamamoto. <b>(355) Design and Experimental Evaluation of a Predictive PID Controller</b>
08:50 – 08:55	Julien Niguez, Saïd Amari and Jean-Marc Faure. <b>(368) Fault-Tolerant Control of Discrete Event Systems: Comparison of Two Approaches on the same Case Study</b>
08:55 – 09:00	Juan Zuluaga, Jorge Herrera and Sergio Serna. <b>(371) Communication Profibus-ZigBee using low cost Gateway</b>
09:00 – 09:05	Nina Sundström and Bengt Lennartson. <b>(381) From time-optimal schedule to robust event-based control</b>
09:05 – 09:10	Yannick Martz, Alassane Ba and Dominique Knittel. <b>(389) Robust industrial control with optimized decoupling in roll-to-roll systems: new approaches using finite element modeling of the web</b>
09:10 – 09:15	Domenico Gorni, Maria Del Mar Castilla, Jose Domingo Alvarez and Antonio Visioli. <b>(32) A Comparison between Temperature Modeling Strategies in Smart Buildings</b>
09:15 – 09:20	Helem Sabina Sanchez Corrales, Gilberto Reynoso-Meza, Ramon Vilanova and Xavier Blasco Ferragud. <b>(143) Multistage Procedure for PI controller design of the Boiler Benchmark problem</b>
09:20 – 09:25	Raquel Ventura and Xavier Berjaga. <b>(203) Comparison of multivariate analysis techniques in plastic injection moulding process</b>
09:25 – 09:30	Luca Simoni, Manuel Beschi, Davide Colombo, Antonio Visioli and Riccardo Adamini. <b>(370) A Hardware-In-the-Loop Setup for Rapid Control Prototyping of Mechatronic Systems</b>
09:30 – 09:35	Edder Guevara, Helber Meneses, Orlando Arrieta, Ramon Vilanova, Antonio Visioli and Fabrizio Padula. <b>(373) Fractional Order Model Identification: Computational Optimization</b>

<b>WiP T6: Computer Vision, Computational Intelligence, and Modern Heuristics in Automation</b> <b>WiP T7: Intelligent Robots &amp; Systems</b> <b>Time: Friday, 11. Sept., 08:30 - 10:30;</b> <b>Chairs: Marina Indri, Christian Schlegel; Room: Europe A</b>	
08:30 – 08:35	Raghav Khanna, Martin Möller, Johannes Pfeifer, Frank Liebisch, Achim Walter and Roland Siegwart. <b>(300) Beyond Point Clouds - 3D Mapping and Field Parameter Measurements using UAVs</b>
08:35 – 08:40	Hang Li. <b>(196) The implementation of reinforcement learning algorithms on the elevator control system</b>
08:40 – 08:45	Martina Lavelle, Lando Mentrasti, Mirko Pupilli, Maria Paola D'Imperio, Jian S. Dai, Ferdinando Cannella and Luca Carbonari. <b>(248) New Test Rig for Creased Paperboard Investigation to Confectionery Industry Reconfigurable Folders</b>
08:45 – 08:50	Anas Anis, Wilhelm Schäfer, Oliver Niggemann and Andrey Pines. <b>(289) CP3L: A Cyber-Physical Production Planning Language</b>
08:50 – 08:55	Magnus Hanses, Christoph Walter and Arndt Lüder. <b>(294) Operating articulated objects with force sensitive mobile manipulators</b>
08:55 – 09:00	Eric Rohmer, Paulo Pinheiro Pinheiro, Mauro Bellone, Giulio Reina and Eleri Cardozo. <b>(331) Laser based Driving Assistance for Smart Robotic Wheelchairs</b>
09:00 – 09:05	Shin Wakitani, Toru Yamamoto and Mingcong Deng. <b>(340) Design of a CMAC-FRIT Controller for a Magnetic Levitation Device</b>
09:05 – 09:10	Naoki Uchiyama, Kazushige Haneda and Shigenori Sano. <b>(393) Design of a crane system with a curved rail for a narrow space and load sway suppression</b>
09:10 – 09:15	Emil Fresk and George Nikolakopoulos. <b>(2) Experimental Evaluation of a Full Quaternion Based Attitude Quadrotor Controller</b>
09:15 – 09:20	Hannes Gruschinski. <b>(37) The Future of the Industrial Robotics Market</b>
09:20 – 09:25	Maarten Bezemer and Jan Broenink. <b>(78) Connecting ROS to a real-time control framework for embedded computing</b>
09:25 – 09:30	Audun R. Sanderud, Tryge Thomessen and Mihoko Niitsuma. <b>(118) A Likelihood Analysis for a Risk Analysis for Safe Human Robot Collaboration</b>
09:30 – 09:35	Hunsue Lee, Junghyun Oh and Beomhee Lee. <b>(153) Design and Implementation for Multiple-robot Deployment in Intelligent Space</b>
09:35 – 09:40	Ibrahim Jasim, Peter Plapper and Holger Voos. <b>(343) Gaussian Filtering for Enhanced Impedance Parameters Identification in Robotic Assembly Processes</b>
09:40 – 09:45	Nico Hochgeschwender, Miguel Angel Olivares Mendez, Holger Voos and Gerhard Kraetzschmar. <b>(374) Context-based Selection and Execution of Robot Perception Graphs</b>



**Plenary Session 2: Friday, 11. September 2015, 11:00 – 12:00, Room: Europe A**

**Herman Bruyninckx: "Mobile Manipulation: Doing It Badly Makes It Better"**

**Summary:** Mobile manipulator hardware becomes more and more affordable, starting from platforms like the KUKA youBot to wheelchairs equipped with Jako arms. But we are still controlling them as CNC machines, with lots of degrees of freedom. The result is that these devices are overdoing their motion control, which not only leads to more costs but paradoxically also to poorer behaviour. The reason is that the mainstream control of these devices is way too "stiff" for the purposes, so that physical interactions with the environment (or humans...) are still more of a "bug" instead of a "feature". This talk explains our research towards changing the approach of programming and controlling mobile manipulation tasks, which, especially in industrial service robotics context, can lead to a revolutionary step change in applications.



**Bio:** Dr. Bruyninckx (<http://people.mech.kuleuven.be/~bruyninc/>) obtained the Masters degrees in Mathematics (Licentiate, 1984), Computer Science (Burgerlijk Ingenieur, 1987) and Mechatronics (1988), all from the Katholieke Universiteit Leuven, Belgium. In 1995 he obtained his Doctoral Degree in Engineering from the same university, with a thesis entitled "Kinematic Models for Robot Compliant Motion with Identification of Uncertainties." He is full-time Professor at the KU Leuven, and held visiting research positions at the Grasp Lab of the University of Pennsylvania, Philadelphia (1996), the Robotics Lab of Stanford University (1999), and the Kungl Tekniska Hogskolan, Stockholm (2002). Between 2007 and 2015, he was leading the European robotics community, first as Coordinator of the European Robotics Research Network EURON and from 2012 as the Vice-President Research of the euRobotics AISBL association.

His current research interests are on-line Bayesian estimation of model uncertainties in sensor-based robot tasks, kinematics and dynamics of robots and humans, and the software engineering of large-scale robot control systems. In 2001, he started the Free Software ("open source") project Orocos (<http://www.orocos.org>), to support his research interests, and to facilitate their industrial exploitation. Bayesian estimation is his core research activity, and has its focus on "realtime" design: the raw sensor measurements must be processed and interpreted in the context of the motion and interaction models fast enough in order to use them in the feedback control of the robot. The sensors and models used in the "interactions" are mostly force sensors, distance sensors and cameras. The focus of the research activities shifts from the traditional industrial robotics applications to more biomechanical "robotic devices", looking for new application domains of the robotics signal processing and control expertise of the research group.

**Keynote 3: Friday, 11. September 2015, 13:30 – 14:30, Room: Europe A**

**Peter Palensky: "Cyber-physical Energy Systems"**

**Summary:** This talk will introduce the audience into the concepts of smart grid and its current research topics. The second part is devoted to the principles of cyber-physical energy systems, how to describe and how to work with them. The smart grid is the ICT answer to the power challenges of today and tomorrow by enabling flexible loads, active distribution grids, storage management, smart energy markets, and bidirectional power flows. Conceptually it is a distributed IT and automation system that is amalgamated with the physical power infrastructure: a cyber-physical system, and even a system of systems. Designing, optimizing, running, and diagnosing such systems requires reliable and scalable models which is the main problem with cyber-physical systems: hybrid models (discrete and continuous) are hard to deal with. There are, however, new and promising languages and methods to deal with such systems. Learn what works and what does not, and see how you can enhance your research and development with these methods.



**Bio:** Peter Palensky is Professor for intelligent electric power grids at TU Delft (Netherlands). Before that he was Principal Scientist for complex energy systems and Head of Business Unit "Sustainable Building Technologies" at the Austrian Institute of Technology, CTO of Envidatec Corp., Hamburg, Germany, associate Professor at the University of Pretoria, South Africa, Department of Electrical, Electronic and Computer Engineering, University Assistant at the Vienna University of Technology, Austria, and researcher at the Lawrence Berkeley National Laboratory, California. He is active in international committees like ISO,

IEEE and CEN.

He carries a PhD (EE, 2001) from the Vienna University of Technology and is an IEEE senior member. His research field is complex energy systems and smart grids. In his research he models, (co-)simulates and optimizes heterogeneous cyber-physical energy systems. The areas of optimization are stability, robustness, efficiency and control of smart grids. Mr. Palensky is associate editor for various IEEE Transactions and organizes the annual Workshop on Modeling and Simulation of Cyber-Physical Energy Systems.

## Parallel Sessions, 14:30 – 15:30

<b>T5.3 Industrial Control III</b>	
<b>Time: Friday, 11. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Ernesto Aranda-Escolástico; Constantine Florin Caruntu, Room: Europe A</b>	
14:30 – 14:50	Constantin Florin Caruntu <b>(162) Predictive Control based on Piecewise Nonlinear Models for Vehicle Drivetrains</b>
14:50 – 15:10	Ernesto Aranda-Escolástico, María Guinaldo and Sebastián Dormido <b>(101) Stability of output event-based control systems through quadratic trigger functions</b>

<b>T7.3: Autonomous Mobile and Micro-Robots</b>	
<b>Time: Friday, 11. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Marina Indri, Dariusz Pazderski; Room: Hollenfels</b>	
14:30 – 14:50	Dariusz Pazderski, Krzysztof Kozłowski and Tomasz Gawron <b>(251) A Unified Motion Control and Low Level Planning Algorithm for a Skid-Steering Robot</b>
14:50 – 15:10	Julien Mintenbeck, Michael Uhl, Ramon Estaña and Heinz Wörn <b>(99) Microman - Autonomous Omni-Directional Microrobot-System for Biotechnological and Miniaturized Automation</b>

<b>T8.2: Distributed Signal Processing and Protocols for Sensor Networks</b>	
<b>Time: Friday, 11. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Hans-Peter Bernhard, Marek Miskowicz; Room: Wiltz</b>	
14:30 – 14:50	Hans-Peter Bernhard, Achim Berger and Andreas Springer <b>(114) Timing Synchronization of Low Power Wireless Sensor Nodes with Largely Differing Clock Frequencies and Variable Synchronization Intervals</b>
14:50 – 15:10	Davi Resner and Antônio Fröhlich <b>(119) Design Rationale of a Cross-layer, Trustful Space-Time Protocol for Wireless Sensor Networks</b>

<b>T9.2: Control in Energy Systems</b>	
<b>Time: Friday, 11. Sept., 14:30 - 15:30;</b>	
<b>Chairs: Oliver Gehrke, Mariagrazia Dotoli; Room: Vianden</b>	
14:30 – 14:50	Raffaele Carli, Mariagrazia Dotoli and Roberta Pellegrino. <b>(152) ICT and optimization for the energy management of smart cities: the street lighting decision panel</b>
14:50 – 15:10	Kai Heussen, Oliver Gehrke and Henrik Niemann. <b>(275) On Early Conflict Identification by Requirements Modeling of Energy System Control Structures</b>

## Social Events

### Welcome Reception, Wednesday, 09. September

Cercle Cité, City of Luxembourg, 19:00 - 21:00



The Welcome Reception of ETFA2015 will be held at the Cercle Cité in the City of Luxembourg. It is located at the eastern end of the Place d'Armes, in the historic central Ville Haute quarter of the city. A bus transfer from the conference venue, the Alvisse Parc Hotel, to the City Centre of Luxembourg will be offered at **18:20 from the hotel**.

### Conference Banquet and Cruise, Thursday, 10. Sept. 2015

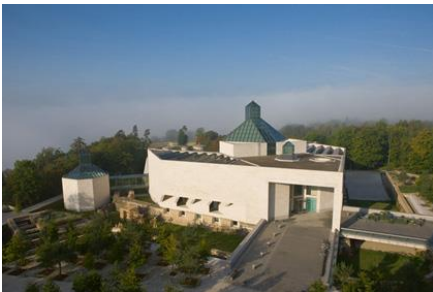
Remich, Luxembourg, 19:00 - 24:00



This year, the conference banquet of ETFA 2015 will take place on a boat on the Moselle river during a romantic cruise in the evening. A bus transfer from the conference venue, the Alvisse Parc Hotel, to Remich, a small town at the Moselle river, will be offered at **18:20 from the hotel**. After the banquet, a bus transfer back to the Alvisse Parc Hotel as well as the City Centre of Luxembourg will be offered at 24:00.

### Visit of MUDAM, Goodbye Reception, Friday, 11. Sept. 2015

MUDAM, Kirchberg, City of Luxembourg, 17:00 - 19:00



After the end of the conference in the afternoon of 11. Sept. 2015, we will offer a visit of the Musée d'Art Moderne Grand-Duc Jean (Mudam), with a guided tour of the exhibition "Eppur Si Muove", followed by a goodbye reception at the Mudam. A bus transfer from the conference venue, the Alvisse Parc Hotel, will be offered **at 16:30 from the hotel**.

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The product of an ambitious partnership with the Musée des arts et métiers, the exhibition Eppur si muove (And yet it turns) focuses on the many links that exist between the fields of the visual arts and technology, as well as the decisive influence that the history of the sciences and technology has exercised on contemporary artists. As a part of the exhibition, a special robotic demo of the SnT / University of Luxembourg will also be visited, demonstrating the future potential of mobile robots as museum tour guides.

