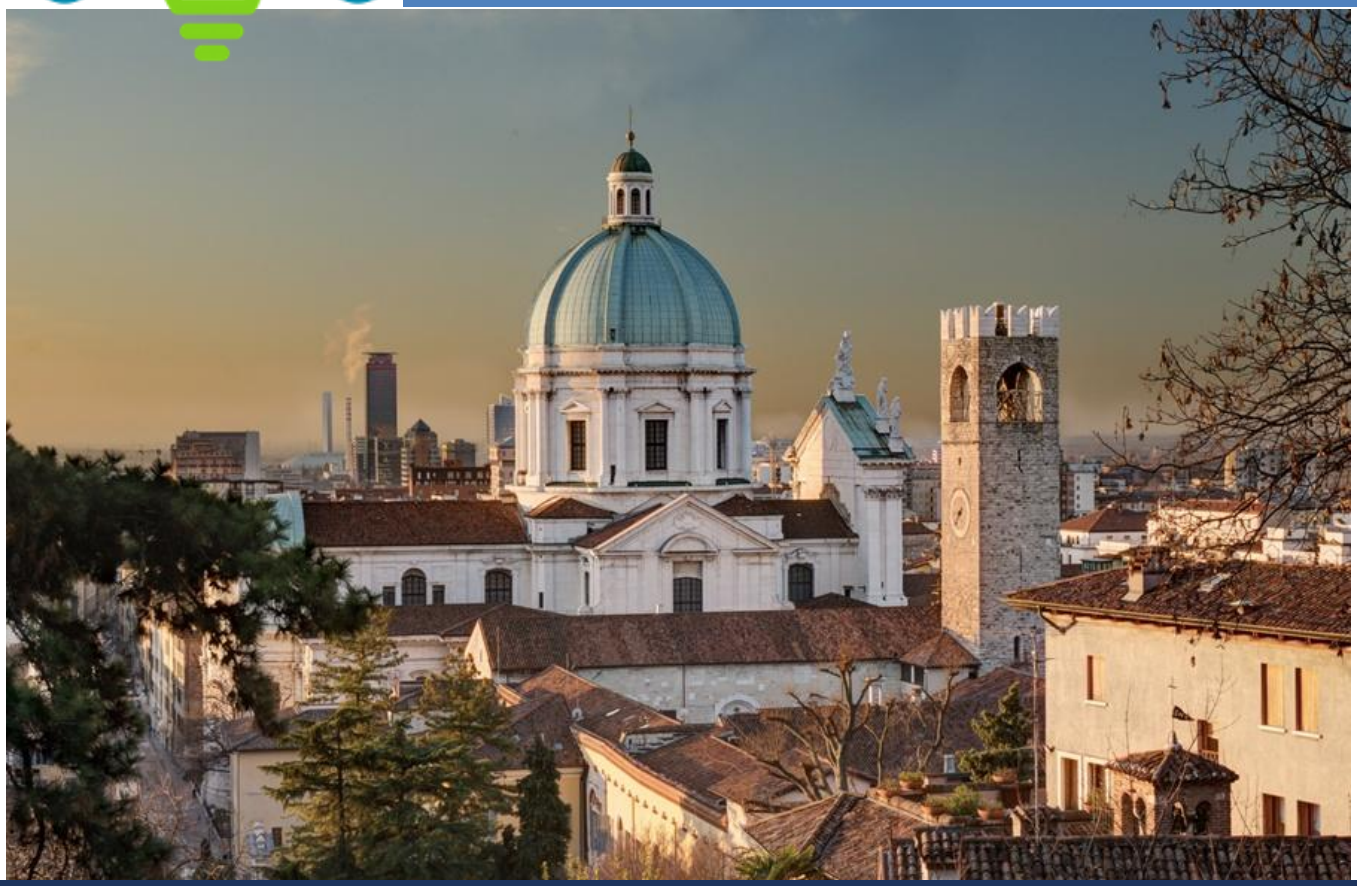
2018 IEEE INTERNATIONAL WORKSHOP ON

METROLOGY FOR INDUSTRY 4.0 AND IoT

BRESCIA, ITALY | APRIL 16 - 18, 2018



BRESCIA, ITALY | APRIL 16 - 18, 2018

FINAL PROGRAM

IEEE

IEEE Italy Section

UNIVERSITÀ DEGLI STUDI DI BRESCIA

DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

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Welcome to the 1st IEEE International Workshop on Metrology for Industry 4.0 and IoT

On behalf of the organizing committee, we wish to welcome you to the *2018 IEEE International Workshop on Metrology for Industry 4.0 and IoT* - MetroInd4.0&IoT.

The growing interest of industrial applications to the new Information and Communication Technologies has recently improved thanks to the fourth industrial revolution combined with mass deployment of the Internet of Things (IoT). In reality, this topic has several implications. In the World Economy Forum 2016 (WEF), organized by the worldwide foundation each year in Davos as a symposium to discuss about the emerging trends of economy, technology, environment and health, the title of the last event was “Mastering the Fourth Industrial Revolution” with the global vision about the impact on lost work positions, robots, and artificial intelligence.

The fourth industrial revolution implies evolutions and developments in fields, such as artificial intelligence, machine-learning, robotics, nanotechnologies, 3D Printer, genetics and biotechnologies. This revolution will determine a wide change in the field of business models and the emersion of new job sectors in the field of Smart-Energy, Financial Services, Health, ICT, Media & Entertainment, and Logistic.

All these deep changes are possible also thank to the recent developments in the field of metrology. Actually, monitoring remote physical phenomena and try to control them, requires the developments of new sensors, acquisition techniques, improve data acquisition systems, and so on.

MetroInd4.0&IoT aims to discuss the contributions both of the metrology for the development of Industry 4.0 and IoT and the new opportunities offered by Industry 4.0 and IoT for the development of new measurement methods and apparatus.

MetroInd4.0&IoT wants to gather people who work in developing instrumentation and measurement methods for Industry 4.0 and IoT, with new technologies for metrology-assisted production, component measurement, sensors and associated signal conditioning, and calibration methods for electronic test.

MetroInd4.0&IoT organization was a challenging task due to the large and increasing interest of our research and application areas. Efforts from many people were required to shape the technical program, arrange accommodation, manage the administrative aspects, and set up the social functions. We like to take this opportunity to thank all and each of them. We like also to thank the public and private organizations that supported the meeting in different ways.

MetroInd4.0&IoT hosts two plenary lectures, two tutorials, and 10 oral and poster sessions designed to take advantage of a multidisciplinary approach to give a complete picture of the measurements utilizations and data treatments with the ultimate goal of increasing knowledge on the fourth industrial. Thanks to all of the Technical Program Committee members and the reviewers who have contributed to make this outstanding program possible.

We received 61 abstracts from all over the world, form Japan to the South America.

The technical program encompasses several events and activities.

The keynote speeches will be held by experts in the field of metrology andindustry with a common view on the ongoing industrial revolution: Bert van der Linden, from ATS Applied Tech Systems B.V., Netherlands, will talk about *The missing "Thing" in Internet of Things*; the title of the speech of Diego Galar, from Luleå University of Technology, Sweden, is "*Virtual assets and virtual commissioning: Digitization in Industry 4.0*".

With the aim of providing a common ground for researches to share their findings about the metrology for industry of the future, the MetroInd4.0&IoT is based on a significant number of Special Sessions. The main reason is that a centralized research address definition is usually not suited for new research fields, while a spontaneous aggregation of well-focused themes is more effective. Therefore, several application-oriented Special Sessions have been organized. We wish to thank the organizers of these Special Sessions for their cooperation and support to the conference organization. A special attention has been given to the link between Academia and Industry, with an Industrial Special Session.

Awards will be assigned, including to young researchers and woman in engineering.

The social program includes a welcome cocktail in the historical center of Brescia and the Conference dinner in a wine cellar, so please enjoy the hospitality of Brescia and surroundings.

The First International Workshop on Metrology for Industry 4.0 and IoT is about to begin.

If there is anything that we may do for you, please contact one of us and we will be happy to try to accommodate your needs.

Pasquale Daponte, General co-Chair

Alessandra Flammini, General co-Chair

Emilio Sardini, General co-Chair

MetroInd4.0&IoT 2018 Committee

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LOCAL ARRANGEMENTS

ATHENA SRL
Business and technology consulting

MetroInd4.0&IoT Keynote Speakers

Keynote Tuesday, April 17, 2018

The missing "Thing" in Internet of Things

Bert van der Linden

ATS APPLIED TECH SYSTEMS B.V., NETHERLANDS

Bert van der Linden is a senior lecturer and consultant of Automation Engineering at ATS Applied Tech Systems B.V. a multinational company specialized in automation of big plants (Aerospace & Defence, Automotive, Electronics, Food & Beverage, Life Sciences,Metals & Mining).

He is the leader of teachers in the field of education, didactics and technology. He delivers vocational education/training about industrial automation, IEC61131-3, communication, Industrial IoT.

He develops new training and instruction materials, like workshops on Industrie 4.0 and Industrial IoT for engineers, and he writes articles in magazines about these topics.

He is deeply involved in industrial automation evolution. He is member of the following working groups International working group Industrie 4.0 (PLCopen), Industrial Platform Cyber Security (NEN) Platform about ISA 99/ IEC 62443, International working group Software Construction Guidelines (PLCopen). He is also Deputy Chairman of the Competence centers of the PROFIBUS PROFINET International association.

ABSTRACT. Do we need to change our focus or strategy from digitisation/connectivity to automatic control (automation)? We work hard to develop a flexible infrastructure of “Things” at this moment. This flexible infrastructure consists of sensors - for example in a mesh network - that are connected to IoT platforms, like Amazon Web Services (AWS), IBM Watson or Microsoft Azure IoT Hub. These platforms make it possible to integrate not only sensors but also actuators and controllers.

Why? We develop these complete infrastructures to serve humans to reach their goals. Humans can share the whole world via IoT!

So, we have a flexible infrastructure of shared resources (capacities, services), but on the other hand we have the goals and needs of the users. Resources are the means to realise the end results. But what happens if we need to share a resource? Is it possible that the (human) goals are going to compete? And how do we solve this shared resource problem in the IoT infrastructure. Do we need coordination or negotiation? And can we automate this kind of control?

Keynote Wednesday, April 18, 2018

Virtual assets and virtual commissioning: Digitization in Industry 4.0

Diego Galar

LULEA UNIVERSITY OF TECHNOLOGY / TECNALIA

Dr. Diego Galar is Professor of Condition Monitoring in the Division of Operation and Maintenance Engineering at LTU, Luleå University of Technology where he is coordinating several H2020 projects related to different aspects of cyber physical systems, Industry 4.0, IoT or industrial Big Data. He was also involved in the SKF UTC centre located in Lulea focused on SMART bearings and also actively involved in national projects with the Swedish industry or funded by Swedish national agencies like Vinnova.
He is also principal researcher in Tecnalia (Spain), heading the Maintenance and Reliability research group within the Division of Industry and Transport.
He has authored more than five hundred journal and conference papers, books and technical reports in the field of maintenance, working also as member of editorial boards, scientific committees and chairing international journals and conferences and actively participating in national and international committees for standardization and R&D in the topics of reliability and maintenance. In the international arena, he has been visiting Professor in the Polytechnic of Braganza (Portugal), University of Valencia and NIU (USA) and the Universidad Pontificia Católica de Chile. Currently, he is visiting professor inUniversity of Sunderland (UK), University of Maryland (USA), and Chongqing University in China.

ABSTRACT. For complex assets, much information needs to be captured and mined to assess the overall condition of the whole system including the one from design and manufacturing which obviously contains the physical knowledge. Therefore, the integration of asset information during the entire lifecycle is required to get an accurate health assessment of the whole system.
Moreover, the lack of data on advanced degraded states due to early replacements and "black swans" makes the data-driven approach vulnerable to such situations. The risk related to these scenarios, despite their low latency, is not acceptable, especially for assets for which safety is a must. Therefore, there is a need to augment datasets before training data-driven algorithms. For this purposeData covering a wider range of scenarios can be obtained by synthetic data generated by physics-based models. These models need to be realistic and provide meaningful and comparable information about the behavior of asset.
New technologies involving big data, cloud computing, IoT etc.. can help the use / owner / maintainer / designer to perform a virtual commissioning of the asset where it is digitized and virtualized combining the existing physical models with the data collected from the field and produce a digital twin containing both data driven and physical information. This virtualization allows the user to produce data regarding situations and scenarios which didn't happen yet or are very rare. These new data sets ca be blindlyfused to obtain a hybrid model and go one step beyond the digital twins. This talk will discuss the possibilities that lie within applying the analytics concept by the means of virtualization i.e virtual commissioning of the assets through hybrid data fusion and integration from a systems perspective.

Awards

Best Conference Paper Award

To recognize the most outstanding paper presented at the annual IEEE International Workshop on Metrology for Industry 4.0 and IoT.

The Best Paper Award will be selected on the basis of the review process and on the paper presentation during the workshop. The final assessment and selection criteria will be based on several key parameters, including: technical quality of the paper, authors' knowledge of the field, presentation effectivesess and clarity, engagement in substantive question & answer, etc.

Best Paper Presented by a Woman

An exclusive plaque will be given for the best paper authored and presented by a woman.

Basis for Judging: Technical merit, originality, potential impact on the field, clarity of the written paper, and quality of the oral or other presentation.

Best Paper Presented by a Young Researcher

An exclusive plaque will be given for the best paper authored and presented by a researcher younger than 35 years in age.

Basis for Judging: Technical merit, originality, potential impact on the field, clarity of the written paper, and quality of the oral or other presentation.

IEEE Student Contest

The Instrumentation and Measurement Italy Chapter and the IEEE Student Branch of Brescia organize an IEEE Student Contest to be held during the Workshop, in the form of a virtual poster session. The three best posters will be awarded with the MetroInd4.0&IoT 2018 IEEE Student Best Poster Award, funded by the IEEE Italy Section.

Social Functions

Welcome Reception

We are happy to invite MetroInd4.0&IoT attendees to the Welcome Reception on Monday April 16, 2018.

The Welcome Reception will be organized at the “Hotel Vittoria”, Via X Giornate, 20, Brescia

Gala Dinner

We are happy to invite MetroInd4.0&IoT attendees to the Welcome Party on Tuesday April 17, 2018.

The Gala Dinner will be held at “Al Rocol” restaurant, Ome (Brescia).

Program Schedule – Monday April 16, 2018

METROLOGY FOR INDUSTRY 4.0 & IoT MONDAY, APRIL 16			
13:00 - 17:30	Registration - University of Brescia		
14:00 - 14:30	Welcome Addresses - "Sala Consiliare" Hall		
	"Sala Consiliare" Hall	"AulaN. 8" Hall	Exposition Hall
14:30 - 15:50	**Special Session on Perception Methods to Enhance the role of the Man in the Loop**	**Special Session on Embedded vision methods and systems for edge-computing and IoT applications**	**Exhibitors** **IEEE Student Contest**
15:50 - 16:15	Coffee Break		
16:15 - 17:30	**TUTORIAL - SESSION 1** Measurement Science and Sensing Technologies: the Backbone Underlying Industry 4.0	**TUTORIAL - SESSION 2** Big Data and Industry 4.0: the Role of Data Exploration	

17:45 - 18:45	Tour of Brescia
18:45 - 20:45	Welcome Cocktail - Hotel Vittoria

Program Schedule – Tuesday April 17, 2018

METROLOGY FOR INDUSTRY 4.0 & IoT TUESDAY, APRIL 17			
08:00 - 17:00	Registration - University of Brescia		
09:00 - 10:00	Plenary Talk - Bert van der Linden "*The missing "Thing" in Internet of Things*" "Sala Consiliare" Hall - University of Brescia		
10:00 - 10:30	Coffee Break		
10:30 - 12:30	Industrial Session & Visit to Laboratory "Sala Consiliare" Hall - University of Brescia		
12:30 - 14:00	Lunch		
	"Sala Consiliare" Hall	"AulaN. 8" Hall	Exposition Hall
14:00 - 16:00	**Special Session on Smart Measurement Systems for on-line Quality Control**	**Special Session on Synchronization for Internet of Things**	**Poster Session** **Exhibitors** **IEEE Student Contest**
16:00 - 16:30	Coffee Break		
16:30 - 18:10	**Special Session on Measurement Systems and Approaches for Smart Manufacturing**		

19:30 - 22:30	GALA DINNER *AL ROCOL* Restaurant

Program Schedule – Wednesday April 18, 2018

METROLOGY FOR INDUSTRY 4.0 & IoT WEDNESDAY, APRIL 18			
08:30 - 15:00	Registration - University of Brescia		
09:00 - 10:00	Plenary Talk - Diego Galar "*Virtual assets and virtual commissioning: Digitization in Industry 4.0*" "Sala Consiliare" Hall - University of Brescia		
10:00 - 10:30	Coffee Break		
	"Sala Consiliare" Hall	"AulaN. 8" Hall	Exposition Hall
10:30 - 12:30	**Special Session on Measurement Systems in the Industrial IoT Era - PART I**	**Special Session on Standards and Technologies for CyberSecurity of IoT and Industry 4.0 (SecStandards)**	**Exhibitors**
12:30 - 14:00	Lunch		
14:00 - 16:00	**Special Session on Measurement Systems in the Industrial IoT Era - PART II**	**General Session**	**Exhibitors**
16:00 - 16:30	Closing and Award Ceremony "Sala Consiliare" Hall - University of Brescia		

Monday, April 16 - Technical Sessions

13:00 - 17:30
REGISTRATION
Place: University of Brescia

14:00 - 14:30
Welcome Addresses
Room: *"Sala Consiliare" Hall, University of Brescia*

14:30 - 15:50
Special Session on Perception Methods to Enhance the role of the Man in the Loop
Chairs: Mariolino De Cecco, *University of Trento, Italy*
Hirokazu Kato, *Nara Institute of Science and Technology, Japan*
Room: *"Sala Consiliare" Hall, University of Brescia*

14:30 Kinect-based micro-behavior sensing system for learning the smart assistance with human subjects inside their homes
Teruhiro Mizumoto, *Nara Institute of Science and Technology, Japan*
Alberto Fornaser, *University of Trento, Italy*
Hirohiko Suwa, *Nara Institute of Science and Technology, Japan*
Keiichi Yasumoto, *Nara Institute of Science and Technology, Japan*
Mariolino De Cecco, *University of Trento, Italy*

14:50 Efficient In-Situ Creation of Augmented Reality Tutorials
Alexander Plopski, *Nara Institute of Science and Technology, Japan*
Varunyu Fuvattanasilp, *Nara Institute of Science and Technology, Japan*
Jarkko Poldi, *Nara Institute of Science and Technology, Japan*
Takafumi Taketomi, *Nara Institute of Science and Technology, Japan*
Christian Sandor, *Nara Institute of Science and Technology, Japan*
Hirokazu Kato, *Nara Institute of Science and Technology, Japan*

15:10 An Augmented Reality virtual assistant to help mild cognitive impaired users in cooking

J. D'Agostini, *University of Trento, Italy*
L. Bonetti, *University of Trento, Italy*
A. Salem, *University of Trento, Italy*
L. Passerini, *University of Trento, Italy*
G. Fiacco, *University of Trento, Italy*
P. Lavanda, *University of Trento, Italy*
E. Motti, *University of Trento, Italy*
M. Stocco, *University of Trento, Italy*
K. T. Gashay, *University of Trento, Italy*
E. G. Abebe, *University of Trento, Italy*
S. M. Alemu, *University of Trento, Italy*
R. Haghani, *University of Trento, Italy*
A. Voltolini, *University of Trento, Italy*
C. Strobbe, *University of Trento, Italy*
N. Covre, *University of Trento, Italy*
G. Santolini, *University of Trento, Italy*
M. Armellini, *University of Trento, Italy*
T. Sacchi, *University of Trento, Italy*
D. Ronchese, *University of Trento, Italy*
C. Furlan, *University of Trento, Italy*
F. Facchinato, *University of Trento, Italy*
L. Maule, *University of Trento, Italy*
P. Tomasin, *University of Trento, Italy*
A. Fornaser, *University of Trento, Italy*
M. De Cecco, *University of Trento, Italy*

15:30 Multimodal computer vision framework for human assistive robotics

Eugenio Ivorra, *Universitat Politècnica de València, Spain*
Mario Ortega, *Universitat Politècnica de València, Spain*
Mariano Alcaniz, *Universitat Politècnica de València, Spain*
Nicolas Garcia-Aracil, *Universidad Miguel Hernàndez de Elche, Spain*

14:30 - 15:50
Special Session on Embedded vision methods and systems for edge-computing and IoT applications
Chairs: Giovanna Sansoni, *University of Brescia, Italy*
Diego R. C. Silva, *Universidade Federal do Rio Grande do Norte, Brazil*
Room: *"Aula N. 8" Hall, University of Brescia*

14:30 Academic FabLab at University of Naples Federico II: New Research and Development Opportunities in the Fields of IoT and Industry 4.0
Leopoldo Angrisani, *University of Naples Federico II, Italy*
Pasquale Arpaia, *University of Naples Federico II, Italy*
Francesco Bonavolontà, *University of Naples Federico II, Italy*
Rosario Schiano Lo Moriello, *University of Naples Federico II, Italy*

14:50 Deep Learning based Machine Vision: first steps towards a hand gesture recognition set up for Collaborative Robots
Cristina Nuzzi, *University of Brescia, Italy*
Simone Pasinetti, *University of Brescia, Italy*
Matteo Lancini, *University of Brescia, Italy*
Franco Docchio, *University of Brescia, Italy*
Giovanna Sansoni, *University of Brescia, Italy*

15:10 Development and characterization of a safety system for robotic cells based on multiple Time of Flight (TOF) cameras and point cloud analysis
Simone Pasinetti, *University of Brescia, Italy*
Cristina Nuzzi, *University of Brescia, Italy*
Matteo Lancini, *University of Brescia, Italy*
Giovanna Sansoni, *University of Brescia, Italy*
Franco Docchio, *University of Brescia, Italy*
Alberto Fornaser, *University of Trento, Italy*

15:30 IoT enabling measurement applications in Industry 4.0: platform for remote programming ATEs
Leopoldo Angrisani, *University of Naples Federico II, Italy*
Umberto Cesaro, *University of Naples Federico II, Italy*
Mauro D'Arco, *University of Naples Federico II, Italy*
Domenicantonio Grillo, *University of Naples Federico II, Italy*
Alessandro Tocchi, *University of Naples Federico II, Italy*

15:50 - 16:15	**COFFEE BREAK** **Place: *University of Brescia***

16:15 - 17:30

TUTORIAL - SESSION 1

Measurement science and sensing technologies: the backbone underlying Industry 4.0

Nicola Paone, *Università Politecnica delle Marche, Italy*

Paolo Castellini, *Università Politecnica delle Marche, Italy*

Chair: Emilio Sardini, *University of Brescia, Italy*

Room: "Sala Consiliare" Hall, University of Brescia

16:15 - 17:30

TUTORIAL - SESSION 2

Big Data and Industry 4.0: the role of data exploration

Devis Bianchini, *University of Brescia, Italy*

Chair: Alessandra Flammini, *University of Brescia, Italy*

Room: "Aula N. 8" Hall, University of Brescia

17:45 - 18:45

TOUR OF BRESCIA

18:45 - 20:45

WELCOME RECEPTION

Hotel Vittoria, Via X Giornate, 20, Brescia

Tuesday, April 17 - Technical Sessions

08:00 - 17:00
REGISTRATION
Place: University of Brescia

09:00 - 10:00
PLENARY SPEAKER

"The missing "Thing" in Internet of Things"
Bert van der Linden

Chair: Giorgio Sberveglieri, *University of Brescia, Italy*
Room: *"Sala Consiliare" Hall, University of Brescia*

10:00 - 10:30 **COFFEE BREAK**
Place: *University of Brescia*

10:30 - 12:00
INDUSTRIAL SESSION
Chair: Leopoldo Angrisani, *University of Naples Federico II, Italy*
Room: *"Sala Consiliare" Hall, University of Brescia*

10:30 "Energy Monitoring and Management: Easy Measurement with Cloud Integration"
Matteo Malara, *Siemens*

10:50 "Where are the goods?"
Luigi Wilmo Franceschetti, *Saccheria Franceschetti SpA*

11:00 "Increasing a SME productivity and complexity output through organizational innovations",
Michele Bonetti, *OMB Saleri SpA*

11:10 "The Power to Manage"
Angelo Baronchelli, *AB Holding SpA*

11:20 Talking with the experts

Industrial Session partecipants talk about the role of industrial research in the next years; special guest Prof. Giovanni Moroni from Politecnico of Milan.

12:00 Visit to eLUX Laboratory
Chair: Alessandra Flammini, *University of Brescia*

12:00 Short presentation of Brescia IEEE Student Branch

12:05 Short presentation of eLUX Laboratory, energy Laboratory as University eXpo

12:10 Visit to eLUX Laboratory

12:30 - 14:00 **LUNCH**
Place: *"I Silvani" Restaurant*

14:00 - 16:00
Special Session on Smart Measurement Systems for on-line Quality Control
Chairs: Nicola Paone, *Università Politecnica delle Marche , Italy*
Mahsa Mohammadikaji, *Karlsruhe Institute of Technology, Germany*
Room: *"Sala Consiliare" Hall, University of Brescia*

14:00 Distributed Human Machine Interface with localization functionalities: a real test bench
Paolo Bellagente, *University of Brescia, Italy*
Federico Bonafini, *University of Brescia, Italy*
Claudio Crema, *University of Brescia, Italy*
Alessandro Depari, *University of Brescia, Italy*

Paolo Ferrari, *University of Brescia, Italy*
Alessandra Flammini, *University of Brescia, Italy*
Giovanni Lenzi, *University of Brescia, Italy*
Marco Pasetti, *University of Brescia, Italy*
Stefano Rinaldi, *University of Brescia, Italy*
Emiliano Sisinni, *University of Brescia, Italy*

14:25 Inspection Planning for Optimized Coverage of Geometrically Complex Surfaces
Mahsa Mohammadikaji, *Karlsruhe Institute of Technology, Germany*
Stephan Bergmann, *Karlsruhe Institute of Technology, Germany*
Stephan Irgenfried, *Karlsruhe Institute of Technology, Germany*
Jurgen Beyerer, *Karlsruhe Institute of Technology, Germany*
Carsten Dachsbacher, *Karlsruhe Institute of Technology, Germany*
Heinz Worn, *Karlsruhe Institute of Technology, Germany*

14:50 High-accuracy dimensional measurement of cylindrical components by an automated test station based on confocal chromatic sensor
Paolo Chiariotti, *Università Politecnica delle Marche, Italy*
Matteo Fitti, *Università Politecnica delle Marche, Italy*
Paolo Castellini, *Università Politecnica delle Marche, Italy*
Saverio Zitti, *Zannini srl, Italy*
Marco Zannini, *Zannini srl, Italy*
Nicola Paone, *Università Politecnica delle Marche, Italy*

15:15 Home Automation Architecture based on IoT Technologies
Judson Costa, *Universidade Federal do Rio Grande do Norte, Brazil*
Daniel Araujo, *Universidade Federal do Rio Grande do Norte, Brazil*
Diego R. C. Silva, *Universidade Federal do Rio Grande do Norte, Brazil*
Marcelo B. Nogueira, *Universidade Federal do Rio Grande do Norte, Brazil*
Marconi C. Rodrigues, *Universidade Federal do Rio Grande do Norte, Brazil*

15:40 Array of Semiconductor Nanowires Gas Sensor for IoT in Wastewater Management
Matteo Soprani, *University of Brescia, Italy*
Giorgio Duina, *NASYS srl, Italy*
Maura Malgaretti, *A2A Ciclo idrico, Italy*
Marco Abbatangelo, *University of Brescia, Italy*
Elisabetta Comini, *University of Brescia, Italy*
Veronica Sberveglieri, *CNR-IBBR, NASYS srl, Italy*
Estefanía Núñez-Carmona, *University of Brescia, Italy*

Manohar Prasad Bhandari, *University of Brescia, Italy*
Daniele Bolpagni, *A2A Ciclo idrico, Italy*
Giorgio Sberveglieri, *University of Brescia, Italy*

14:00 - 16:00
Special Session on Synchronization for Internet of Things
Chairs: Francesco Lamonaca, *University of Sannio, Italy*
Paolo Francesco Sciammarella, *University of Calabria, Italy*
Room: *"Aula N. 8" Hall, University of Brescia*

14:00 Low Cost Field Test Measurement Method and Prototype Measurement Device Implementation for Timing Accuracy Evaluation of IEEE 1588 Solutions
Tamás Kovácsházy, *Budapest University of Technology and Economics, Hungary*
Ádám Erik Hollós, *Budapest University of Technology and Economics, Hungary*

14:25 Low-cost Implementation of an Active Phasor Data Concentrator for Smart Grid
Paolo Castello, *University of Cagliari, Italy*
Carlo Muscas, *University of Cagliari, Italy*
Paolo Attilio Pegoraro, *University of Cagliari, Italy*
Sara Sulis, *University of Cagliari, Italy*

14:50 Time Synchronization Based on CMTS: a Performance Analysis in Industry Scenarios
Domenico Capriglione, *University of Salerno, Italy*
Gianni Cerro, *University of Cassino and Southern Lazio, Italy*
Luigi Ferrigno, *University of Cassino and Southern Lazio, Italy*
Vincenzo Paciello, *University of Cassino and Southern Lazio, Italy*

15:15 Synchronization of IoT layers for Structural Health Monitoring
Francesco Lamonaca, *University of Sannio, Italy*
Paolo Francesco Sciammarella, *University of Calabria, Italy*
Carmelo Scuro, *University of Calabria, Italy*
Domenico Luca Carnì, *University of Calabria, Italy*
Renato Olivito, *University of Calabria, Italy*

15:40 Internet of Things for Structural Health Monitoring
Francesco Lamonaca, *University of Sannio, Italy*
Carmelo Scuro, *University of Calabria, Italy*
Paolo Francesco Sciammarella, *University of Calabria, Italy*
Domenico Luca Carnì, *University of Calabria, Italy*
Renato Olivito, *University of Calabria, Italy*

16:00 - 16:30 COFFEE BREAK
Place: *University of Brescia*

16:30 - 18:10
Special Session on Measurement Systems and Approaches for Smart Manufacturing
Chairs: Giulio D'Emilia, *L'Aquila University , Italy*
Khurram Shahzad, *Mid Sweden University, Sweden*
Room: *"Sala Consiliare" Hall, University of Brescia*

16:30 Condition Monitoring in Industry 4.0 - Design Challenges and Possibilities: A Case Study
Khurram Shahzad, *Mid Sweden University, Sweden*
Mattias O'Nils, *Mid Sweden University, Sweden*

16:50 Measurements for Smart Manufacturing in an Industry 4.0 scenario
Giulio D'Emilia, *University of L'Aquila, Italy*
Antonella Gaspari, *University of L'Aquila, Italy*
Emanuela Natale, *University of L'Aquila, Italy*

17:10 Data validation techniques for measurements systems operating in a Industry 4.0 scenario
Giulio D'Emilia, *University of L'Aquila, Italy*
Antonella Gaspari, *University of L'Aquila, Italy*

17:30 Additive manufacturing as a reshoring enabler
Luciano Fratocchi, *University of L'Aquila, Italy*

17:50 On the use of IoT Sensors for Indoor Conditions Assessment and Tuning of Occupancy Rates Models

Stefano Rinaldi, *University of Brescia, Italy*
Alessandra Flammini, *University of Brescia, Italy*
Lavinia Chiara Tagliabue, *University of Brescia, Italy*
Angelo Luigi Camillo Ciribini, *University of Brescia, Italy*

19:30 - 22:30
GALA DINNER

Al Rocol Restaurant, Ome (Brescia)

Wednesday, April 18 - Technical Sessions

08:30 - 15:00
REGISTRATION
Place: University of Brescia

09:00 - 10:00
PLENARY SPEAKER

" Virtual assets and virtual commissioning: Digitization in Industry 4.0"
Diego Galar

Chair: Paolo Ferrari, *University of Brescia, Italy*
Room: *"Sala Consiliare" Hall, University of Brescia*

10:00 - 10:30 **COFFEE BREAK**
Place: *University of Brescia*

10:30 - 12:30
Special Session on Measurement Systems in the Industrial IoT Era - PART I
Chairs: Emiliano Sisinni, *University of Brescia, Italy*
Dennis Brandão, *Universidade de São Paulo, Brazil*
Room: *"Sala Consiliare" Hall, University of Brescia*

10:30 IoT-based Measurement System for Wine Industry
Gianluca Masetti, *University of Modena and Reggio Emilia, Italy*
Francesco Marazzi, *University of Modena and Reggio Emilia, Italy*
Luca Di Cecilia, *University of Modena and Reggio Emilia, Italy*
Luigi Rovati, *University of Modena and Reggio Emilia, Italy*

10:55 A preliminary study of a Cyber Physical System for Industry 4.0: Modelling and Co-Simulation of an AGV for smart factories

Luca Cavanini, *Polytechnic University of Marche, Italy*
Paolo Cicconi, *Polytechnic University of Marche, Italy*
Alessandro Freddi, *Polytechnic University of Marche, Italy*
Michele Germani, *Polytechnic University of Marche, Italy*
Sauro Longhi, *Polytechnic University of Marche, Italy*
Andrea Monteriù, *Polytechnic University of Marche, Italy*
Emanuele Pallotta, *Polytechnic University of Marche, Italy*
Mariorosario Prist, *Polytechnic University of Marche, Italy*

11:20 Performance comparison between OPC UA and MQTT for data exchange

Murilo Silveira Rocha, *University of São Paulo, Brazil*
Guilherme Serpa Sestito, *University of São Paulo, Brazil*
Andre Luis Dias, *University of São Paulo, Brazil*
Afonso Celso Turcato, *University of São Paulo, Brazil*
Dennis Brandão, *University of São Paulo, Brazil*

11:45 THD_i measurement system of home energy signal based on IoT

Iran Macedo B. Neto, *Universidade Federal do Rio Grande do Norte, Brazil*
Amanda I. Lopes, *Universidade Federal do Rio Grande do Norte, Brazil*
Maria Alice de M. Sousa, *Universidade Federal do Rio Grande do Norte, Brazil*
Mateus M. de Assis Brito, *Universidade Federal do Rio Grande do Norte, Brazil*
Diego R. C. Silva, *Universidade Federal do Rio Grande do Norte, Brazil*
Marcelo B. Nogueira, *Universidade Federal do Rio Grande do Norte, Brazil*
Marconi C. Rodrigues, *Universidade Federal do Rio Grande do Norte, Brazil*

12:10 Telemetry for domestic water consumption based on IoT and open standards

Sayonara A. C. Tavares, *Universidade Federal do Rio Grande do Norte, Brazil*
Ricardo J. B. V. M. Cavalcanti, *Universidade Federal do Rio Grande do Norte, Brazil*
Diego R. C. Silva, *Universidade Federal do Rio Grande do Norte, Brazil*
Marcelo B. Nogueira, *Universidade Federal do Rio Grande do Norte, Brazil*
Marconi C. Rodrigues, *Universidade Federal do Rio Grande do Norte, Brazil*

10:30 - 12:30
Special Session on Standards and Technologies for CyberSecurity of IoT and Industry 4.0 (SecStandards)
Chairs: Raphael Machado, *Inmetro, Brazil*
Francesco Gringoli, *University of Brescia, Italy*
Room: *"Aula N. 8" Hall, University of Brescia*

10:30 Coverage-based Heuristics for Selecting Assessment Items from Security Standards: a core set proposal
Ferrucio de Franco Rosa, *CTI Renato Archer, FEEC-UNICAMP, Brazil*
Mario Jino, *FEEC-UNICAMP, Brazil*
Paulo Marcos Siqueira Bueno, *CTI Renato Archer, FEEC-UNICAMP, Brazil*
Rodrigo Bonacin, *CTI Renato Archer, FACCAMP, Brazil*

10:55 Building Reference Datasets to Support Socialbots Detection
Carla Pacheco, *Military Institute of Engineering, Brazil*
Alex Garcia, *Military Institute of Engineering, Brazil*
Raphael Machado, *INMETRO, Brazil*
Ronaldo Salles, *Military Institute of Engineering, Brazil*

11:20 Evaluation on Passive System Identification and Covert Misappropriation attacks in Large Pressurized Heavy Water Reactors
Alan Oliveira de Sá, *Brazilian Navy, Federal University of Rio de Janeiro, Brazil*
Luiz F. R. da C. Carmo, *National Institute of Metrology, Quality and Technology, Federal University of Rio de Janeiro, Brazil*
Raphael C. S. Machado, *National Institute of Metrology, Quality and Technology, Federal University of Rio de Janeiro, Brazil*

11:45 Implementation of cybersecurity procedures in remote calibration for PNT services
Leonardo C. Ribeiro, *Inmetro, Brazil*
Luiz V. G. Tarelho, *Inmetro, Brazil*
Giovanni D. Rovera, *Observatoire de Paris, France*
Luiz P. Damaceno, *University of São Paulo, Brazil*
Daniel V. Magalhães, *University of São Paulo, Brazil*
Guilherme A. Garcia, *Inmetro, Brazil*
Raphael C. S. Machado, *Inmetro, Brazil*

12:10 True random number generators for batch control sampling in Smart Factories
Leonardo Costa Ribeiro, *Inmetro, Brazil*
Desiree S. Gonçalves, *Inmetro, Brazil*
Wladmir A. Chapetta, *Inmetro, Brazil*
Ana C. O. Marcelino, *Inmetro, Brazil*
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Leandro P. Correa, *Inmetro, Brazil*
Guilherme A. Garcia, *Inmetro, Brazil*
Alan de Oliveira Sá, *UFRJ, Brazil*

12:30 - 14:00 LUNCH
Place: *"I Silvani" Restaurant*

14:00 - 16:00
Special Session on Measurement Systems in the Industrial IoT Era - PART II
Chairs: Emiliano Sisinni, *University of Brescia, Italy*
Dennis Brandão, *Universidade de São Paulo, Brazil*
Room: *"Sala Consiliare" Hall, University of Brescia*

14:00 Challenges of Securing the Industrial Internet of Things Value Chain
Stefan Forsstrom, *Mid Sweden University, Sweden*
Ismail Butun, *Mid Sweden University, Sweden*
Mohamed Eldefrawy, *Mid Sweden University, Sweden*
Ulf Jennehag, *Mid Sweden University, Sweden*
Mikael Gidlund, *Mid Sweden University, Sweden*

14:25 Evaluation of communication delay in IoT applications based on OPC UA
Paolo Ferrari, *University of Brescia, Italy*
Alessandra Flammini, *University of Brescia, Italy*
Stefano Rinaldi, *University of Brescia, Italy*
Emiliano Sisinni, *University of Brescia, Italy*
Davide Maffei, *Siemens Spa*
Matteo Malara, *Siemens Spa*

14:50 A Flexible Framework for Debugging IoT Wireless Applications
Francesco Gringoli, *University of Brescia, Italy*
Nahla Ali, *University of Brescia, Italy*
Fabrizio Guerrini, *University of Brescia, Italy*
Paul Patras, *University of Edinburgh, Scotland*

15:15 Comparison Between MQTT and WebSocket Protocols for IoT Applications Using ESP8266
Guilherme M. B. Oliveira, *Universidade Federal do Rio Grande do Norte, Brazil*
Danielly C. M. Costa, *Universidade Federal do Rio Grande do Norte, Brazil*
Ricardo J. B. V. M. Cavalcanti, *Universidade Federal do Rio Grande do Norte, Brazil*
Josiel P. P. Oliveira, *Universidade Federal do Rio Grande do Norte, Brazil*
Diego R. C. Silva, *Universidade Federal do Rio Grande do Norte, Brazil*
Marcelo B. Nogueira, *Universidade Federal do Rio Grande do Norte, Brazil*
Marconi C. Rodrigues, *Universidade Federal do Rio Grande do Norte, Brazil*

15:40 Implementation of A Production-Control System using Integrated AutomationML and OPC UA
Xun Ye, *Hanyang University, Republic of Korea*
Tae Yang Park, *Hanyang University, Republic of Korea*
Seung Ho Hong, *Hanyang University, Republic of Korea*
Yuemin Ding, *Tianjin University of Technology, China*
Aidong Xu, *Chinese Academy of Sciences, China*

14:00 - 16:00
General Session
Chairs: Mauro Serpelloni, *University of Brescia, Italy*
Alessandro Pozzebon, *University of Siena, Italy*
Room: *"Aula N. 8" Hall, University of Brescia*

14:00 A test bench for evaluating communication delays in LoRaWAN applications
Dhiego F. Carvalho, *University of Brescia, Italy*
Paolo Ferrari, *University of Brescia, Italy*
Alessandra Flammini, *University of Brescia, Italy*
Emiliano Sisinni, *University of Brescia, Italy*

14:25 Experimental Characterization of Long Term Evolution Multiple Input Multiple Output Performance in Urban Propagation Scenarios
Stefano Avallone, *Università degli Studi di Napoli Federico II, Italy*
Nicola Pasquino, *Università degli Studi di Napoli Federico II, Italy*
Giorgio Ventre, *Università degli Studi di Napoli Federico II, Italy*
Stefania Zinno, *Università degli Studi di Napoli Federico II, Italy*

14:50 Lightweight synchronization algorithm with self-calibration for Industrial LoRa Sensor Networks
Luca Tessaro, *University of Trento, Italy*
Cristiano Raffaldi, *Adige S.P.A., BLM Group, Italy*
Maurizio Rossi, *University of Trento, Italy*
Davide Brunelli, *University of Trento, Italy*

15:15 Study for the integration of a measuring system to an automated platform for monitoring the growth of bacterial cultures
Michele Bona, *University of Brescia, Italy*
Paolo Bellitti, *University of Brescia, Italy*
Emilio Sardini, *University of Brescia, Italy*
Mauro Serpelloni, *University of Brescia, Italy*

15:40 An IoT framework for the pervasive monitoring of chemical emissions in industrial plants
Alessandro Pozzebon, *University of Siena, Italy*
Tommaso Addabbo, *University of Siena, Italy*
Ada Fort, *University of Siena, Italy*
Marco Mugnaini, *University of Siena, Italy*
Lorenzo Parri, *University of Siena, Italy*
Stefano Parrino, *University of Siena, Italy*
Valerio Vignoli, *University of Siena, Italy*

16:00 - 16:30 CLOSING AND AWARD CEREMONY
Room: *"Sala Consiliare" Hall, University of Brescia*

POSTER SESSION

"Smart Street" Pilot Site: a RAMS Analysys for a Scale-up Configuration

Enrico Petritoli, *Università degli Studi "Roma Tre", Italy*
Fabio Leccese, *Università degli Studi "Roma Tre", Italy*
Martina Botticelli, *Università Politecnica delle Marche, Italy*
Stefano Pizzuti, *ENEA, Italy*
Francesco Pieroni, *ENEA, Italy*

In-line monitoring of laser welding using a smart vision system

Simone Pasinetti, *University of Brescia, Italy*
Giovanna Sansoni, *University of Brescia, Italy*
Franco Docchio, *University of Brescia, Italy*

Innovative methodology for detecting of possible harmful compounds for wastewater treatment

Massimo Blonda, *CNR-IRSA, Italy*
Angelantonio Calabrese, *CNR-IRSA, Italy*
Angelo Cardellicchio, *Politecnico di Bari, Italy*
Barbara Casale, *CNR-IRSA, Italy*
Giuseppe Dentamaro, *Politecnico di Bari, Italy*
Vincenzo Di Lecce, *Politecnico di Bari, Italy*
Antonietta Dimucci, *Omnitech Srl, Italy*
Cataldo Guaragnella, *Politecnico di Bari, Italy*
Diego Matrino, *Secure to Future Srl, Italy*
Dian Palagachev, *Politecnico di Bari, Italy*
Domenico Petruzzelli, *Politecnico di Bari, Italy*
Tiziano Politi, *Politecnico di Bari, Italy*
Maria Rizzi, *Politecnico di Bari, Italy*
Vincenzo Sarcina, *Omnitech Srl, Italy*
Vito Felice Uricchio, *CNR-IRSA, Italy*

Indoor localization for evacuation management in emergency scenarios

Alessandro Depari, *University of Brescia, Italy*
Alessandra Flammini, *University of Brescia, Italy*
Daniela Fogli, *University of Brescia, Italy*
Paola Magrino, *University of Brescia, Italy*

Evaluation of Open Data Models for the Exchange of Sensor Data in Cognitive Building

Markus Scheffer, *Ruhr Universitat Bochum, Germany*
Markus Konig, *Ruhr Universitat Bochum, Germany*
Tabea Engelmann, *Ruhr Universitat Bochum, Germany*
Lavinia Chiara Tagliabue, *University of Brescia, Italy*
Angelo Luigi Camillo Ciribini, *University of Brescia, Italy*
Stefano Rinaldi, *University of Brescia, Italy*
Marco Pasetti, *University of Brescia, Italy*

A Survey of Measurement Applications based on IoT

Pasquale Daponte, *University of Sannio, Italy*
Luca De Vito, *University of Sannio, Italy*
Francesco Lamonaca, *University of Sannio, Italy*
Gianluca Mazzilli, *University of Sannio, Italy*
Francesco Picariello, *University of Sannio, Italy*
Ioan Tudosa, *University of Sannio, Italy*

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