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IEEE

2022 IEEE INTERNATIONAL WORKSHOP ON

METROLOGY FOR LIVING ENVIRONMENT

UNIVERSITY OF CALABRIA, ITALY / MAY 25-27, 2022

WORKSHOP PROGRAM

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2022 IEEE INTERNATIONAL WORKSHOP ON

METROLOGY FOR LIVING ENVIRONMENT

UNIVERSITY OF CALABRIA, ITALY / MAY 25-27, 2022

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Welcome Message from the General Chairs

On behalf of the Organizing Committee, we cordially welcome you to the 2022 IEEE International Workshop on Metrology for Living Environment (*MetroLivEnv 2022*).

MetroLivEnv 2022 intends to create an active and stimulating forum where academics, researchers, and industry experts in measurement and data processing techniques for Structural Health, Comfort, Energy, Efficiency, BIM, Pollutions, and Innovative Construction Materials can meet and share new advances and research results.

Attention is paid, but not limited to, on new technologies for metrology assisted solutions for design, construction, efficient, safe, comfortable and healthy operation of the built environment including active and assisted living (AAL). Innovative solutions can be based on the IoT paradigm, BIM, sensors, signal processing, data analytics, artificial intelligence, sensor networks, interoperability standards.

The program is designed to raise the interest of a wide group of researchers, operators and decision makers from metrology and several different research fields, presenting the cutting edge solutions in the living environment from the scientific and technological point of view. The Workshop covers all aspects of the living environment focusing on its design and life cycle, energy efficiency, structural health monitoring, measurement for comfort assessment, indoor pollution, chemical and physical parameters monitoring.

This is the first edition of *MetroLivEnv* hosted by University of Calabria, Italy, with the support of the Department of Computer Science Engineering, Modelling, Electronics and Systems (DIMES) and the patronage of Calabria Region, Province of Cosenza, Common of Rende and Common of Cosenza, Order of Engineer of Cosenza, Arpa Calabria, Arpa Puglia, Arpa Lazio, Arpa Piemonte e several international and national research institutes.

The *MetroLivEnv* Technical Program consists of 61 oral presentations scheduled over three days. Presentations are organized in a General Session, 8 Special Sessions. Special Sessions aim to create a focus on specific topics, where researchers can make knowledge, familiarize, exchange ideas, and build cooperation.

The received extended abstracts were submitted to a peer-review process. Relevance, quality, significance, and novelty of the scientific contribution were the main attributes taken into consideration for acceptance and publication in the Proceedings. The Proceedings are going to be submitted for publication in the IEEEXplore Digital Library and indexed by SCOPUS. We would like to thank all the reviewers who actively contributed to the selection and quality improvement of the presented works.

Technically extended versions of presented papers can be submitted to:

- Special Issue on MDPI Sensors.
- Special Issue on MDPI Buildings.
- Special Issue on Communications (*Communications - Scientific Letters of the University of Žilina*).
- Special Issue on ACTA IMEKO

MetroLivEnv 2022 is honoured to have experts in smart structures and living environment as Invited Speakers.

- Prof. Vasilis Sarhosis of School of Civil Engineering, University of Leeds, United Kindom, will open *MetroLivEnv 2022* with a lecture on "Structural inspection and assessment of our ageing masonry infrastructure stock ".
- Prof. Alberto De Capua , University of Reggio Calabria, Italy, will open the second day of works with a talk about "Designing after COVID-19. Strategies for the evaluation, monitoring and control of indoor air quality ".

We are grateful to the Invited Speakers for joining the Workshop.

To recognize the most outstanding paper presented at the annual *IEEE International Workshop on Metrology for Living Environment*, the Best Conference Paper Award sponsored by Alma Software will be assigned. The Best Conference Paper Award is dedicated to the memory of Prof. Domenico Grimaldi, whose passion, enthusiasm, and commitment for science will be of inspiration for all the recipients of this prize.

Other awards will be assigned to the Best Paper second and third classified, sponsored by MDPI Buildings Journal, Best Poster, Best Paper presented by a Young Researcher sponsored by MDPI Sensor Journal, to the Best Standardization Paper sponsored by CEI Comitato Elettrotecnico Italiano, and to the Best Paper Presented by a Woman, this last sponsored by IEEE Women in Engineering and Gibertini srl, to recognize the full engagement of women in all aspects of the Metrology for Living Environment. We sincerely want to thank all the sponsors and the patronages who made this event possible.

The *2022 IEEE International Workshop on Metrology for Living Environment* is about to begin. Metrologists, mathematicians, biologists, physics, chemistries, psychologists, and engineers, enjoy the Workshop!

May 2022

Francesco Lamonaca, University of Calabria, Italy
Gabriele Milani, Polytechnic of Milan, Italy
***MetroLivEnv 2022* General Chairs**

Message from the Technical Program Chairs

Welcome to the *2022 IEEE International Workshop on Metrology for Living Environment* (*MetroLivEnv 2022*), organized by the University of Calabria. *MetroLivEnv 2022* is the first edition the workshop and wants to establish itself as an important world forum for discussing the latest advances in metrology for the built environment, where people spend about the 90% of their time. A special focus, in particular after the pandemic, has been given in the general to the person as the centre of our living environments. .

The Technical Program of *MetroLivEnv 2022* has 61 papers divided into 9 sessions distributed over the three days of the workshop, among which a general session, and 8 special sessions on specific themes. The general session is divided in four parts. Special sessions aim at creating mini-workshops on specific topics where researchers working on the same area can be aware with each other's contributions to the creation of knowledge beyond the current state of the art. *MetroLivEnv* launched a call for special sessions and received a variety of different proposals from the session chairs.

1. General Session (2.2, 4.1, 4.2 and 4.3)
2. Multi-domain measurements for personalized comfort management in buildings (1.1)
3. Thermography and hyperspectral imaging for building and urban diagnosis (1.2)
4. Active and assisted living environments (1.3)
5. Measurement techniques and procedures for quick and emergency diagnostics of buildings (2.1)
6. Probability and mathematical statistics for living environment and metrology (2.3)
7. The challenge of resilient structures: From traditional approaches to Internet of Things (IoT) and SHM (3.1)
8. Well-being and comfort of users based on environmental conditions (3.2)
9. Measurement techniques in urban, fluvial and coastal living environments (3.3)

The Technical Program includes also 2 invited speeches, about relevant topics such as the structural inspection and the monitoring and control of indoor air quality, and 2 tutorial sessions on applied infrared thermography and measurement of blast wave propagation. Finally, we are pleased to announce the MetroLivEnv Round Table where international experts will discuss about directions of technological research for the living and built environment, presenting real experiences in multi-disciplinary projects.

We gratefully acknowledge the hard work of the Technical Program and Organizing Committees in the process of reviewing the papers and helping to shape the program and other activities, such as keynotes and tutorials. The International Program Committee is composed of almost forty internal experts in the area of measurements applied to the built environment. Also, we thank the dozens of reviewers who accepted to review papers in their specific expertise. Finally, we especially thank authors who honored the 1st edition of *MetroLivEnv*, submitting high-quality contributions with their research results. All these people played an important role in making this Workshop to come through.

We wish all participants a very enjoyable and professionally fruitful experience at *MetroLivEnv 2022*, where finally we have the opportunity to meet you all in person!!

Thanks to you all for your participation.

May 2022

Marco Arnesano, *eCampus University, Italy*
Gian Marco Revel, *Polytechnic University of Marche, Italy*
Stefano della Torre, *Polytechnic of Milan, Italy*
***MetroLivEnv2022* Technical Program Chairs**

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Vasilis Sarhosis, *School of Civil Engineering, University of Leeds, UK*
Emiliano Schena, *Università Campus Bio-Medico di Roma, Italy*
Maddalena Schirone, *ARPA Puglia, Italy*
Luís C. Silva, *University Lusófona, Portugal*

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Francesco Demarco, *University of Calabria, Italy*
Stefano Laureti, *University of Calabria, Italy*
Michela Ricca, *University of Calabria, Italy*
Carmelo Scuro, *University of Calabria, Italy*

IEEE MetroLivEnv 2022 Plenary Speakers

Plenary - Thursday, May 26, 2022 - H 10:00

Structural inspection and assessment of our ageing masonry infrastructure stock

Vasilis Sarhosis
School of Civil Engineering, University of Leeds, UK

ABSTRACT

Inevitably, all structures deteriorate towards a state of unserviceability and collapse. Maintenance is the art of controlling the rate at which our structures deteriorate. Proficiency in this filed relies on judgement derived from regular inspection, monitoring and experience. This talk will give a practical view on the assessment and maintenance strategies of our existing and ageing masonry infrastructure (i.e., masonry arch bridges). It will deal from identification of defects and their diagnosis to their treatment and the monitoring of its costs effectiveness. It will also bring together information from proven techniques and illustrate these through case studies.

SPEAKER BIO

Dr **Vasilis Sarhosis** is an Associate Professor in Structural Engineering at the School of Civil Engineering, University of Leeds. He holds both undergraduate and postgraduate degrees in Civil Engineering from the University of Leeds, and worked as a consultant Civil Engineer in the UK. Dr Sarhosis is a Chartered Engineer (CEng), Fellow of the Institute of Civl Engineering (FICE), and Fellow of the Higher Education Academy (FHEA) in UK. He is currently chairing the National Scientific Committee on the Analysis and Restoration of Structures of Architectural Heritage in UK (ISCARSAH-UK) which is part of the ICOMOS-UK. He is currently undrtaking research to quantify degradation and understand the long-term behaviour of existing ageing masonry structures subjected to different environmental conditions and loads. He works together with industry to develop technologies and tools to reduce maintenance demands and improve the life-span of ageing masonry infrastructures and buildings.

Plenary - Thursday, May 27, 2022 - H 09:20

Designing after COVID-19. Strategies for the evaluation, monitoring and control of indoor air quality

Alberto De Capua
Università Mediterranea di Reggio Calabria, Italy

ABSTRACT

The speech presents urban and domestic living and how these have been modified by the new needs, concerns and fears connected to the most recent global pandemic. The contribution highlights how urban and domestic dimensions are key elements of our existence and resistance. The present contribution aim to explore the assessment of "Indoor Environmental Quality" in the living space.The issue of Indoor Air Quality (IAQ) is highly underestimated in relation to the magnitude of the potential consequences on the healthiness of inhabited spaces.

Today, the health effects associated with poor air quality in buildings are well known and classified, such as the Sick Building Syndrome, a symptomatic picture that occurs in many occupants of homes, offices, schools, hospitals, etc.. equipped with mechanical ventilation systems and global air conditioning.

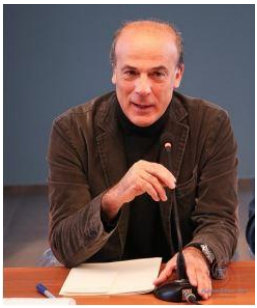
A condition of adequate IAQ is absolutely achievable in new buildings, given the possibility of selecting appropriate materials, furnishings and technical systems, as well as design according to criteria of ventilation, hygrometric control and air quality of passive type.

Greater difficulties are found on the built, where the options for intervention are complex and often related to significant economic burden. In these cases, a careful evaluation of the boundary conditions is necessary, in order to understand which problems can be solved with simple technical-design measures and which ones instead require substantial interventions, but which cannot be ignored if the polluting factor is particularly dangerous.

The speach - also thanks to a wide comparative examination of studies, technical norms and international projects - provides an adequate knowledge of the problem as well as the tools for the evaluation of the different options and technical solutions able to guarantee the control, through design choices in order to the specific material-constitutive characteristics and physical structure of the confined environment.

SPEAKER BIO

Alberto De Capua, Associate Professor in the SSD Technology of Architecture, is PhD in Technology of Architecture. He has been Director of the Department DASTEC of the Mediterranean University and Pro-rector for orientation activities. He has been designated Scientific Responsible of the Innovation Pole for Sustainable Building Green Home for the Mediterranea University (Senate and BoD April 2018) he is also part of the Scientific Committee of the Pole, since 2016 he is Chief Technical Officer and promoter of the academic spin-off M.A.D.E. Concept (Marketing Architecture Design Event).From 1990 to 2012 he



carries out research at the Department of Art, Science and Technology of Building (DASTEC) of the Mediterranean University of Reggio Calabria, from 2012 to date at the Department of Architecture and Territory (dArTe). The activity is carried out with continuity, through an articulated iter always congruent with the contents of the SSD of Technology of Architecture, generally oriented to the progressive deepening of the themes concerning the productive processes that in the various aspects regulate the construction and the transformation of the settlement environment. He has been coordinating a research unit, which deals with the theme of living, investigated from an architectural and urban, technological and environmental point of view.

- of the control and improvement of environmental quality in construction with particular reference to the requirements of hygiene and safety of the environment and the "sustainability" of the processes of construction;
- urban regeneration actions aimed at creating environmentally sustainable public spaces in relation to the peculiarities of places, smart technologies, communication networks;
- methodologies and techniques for urban design.

Wednesday, May 25, 2022 - H 15:30

Passive and active infrared thermography: live comparison of cutting edge excitation strategies and post-processing for investigating masonry materials and wood samples

Stefano Laureti
University of Calabria, Italy - The University of Warwick, UK

ABSTRACT

Passive and active infrared thermography are increasingly used for a quick and reliable identification of potential detachments, voids, water ingress/humidity, and structural inhomogeneities in buildings. In particular, the passive approach can aid for the quick identification of the features of interest, thus helping for selecting smaller regions of interest where active thermography can be then performed to gain further information.

The aims of this tutorial are:

- To show the working principle of various active thermography schemes including step-heating, long pulse, lock-in and the pulse-compression thermography (also known as thermal-wave radar imaging). The design of the heating waveform plays a key role – this will be here considered and explained in detail;
- To introduce various cutting-edge post-processing that can be applied to the raw acquired data for enhancing the identification of different features. In particular, time and frequency domains analyses, principal component analysis, virtual wave, and time-phase analyses will be here shown and compared.

Note that the thermography inspection and related post-processing will be performed in real time over a ceramic tile and a wood inlay, both containing artificial defects of different nature and embedded at different depths within the samples.

SPEAKER BIO

Dr **Stefano Laureti** has significant experience in Pulse-Compression (PuC) theory for Nondestructive Testing (NDT) and Evaluation (NDE), coded signals, signal and image processing. In 2014, he was fully founded with a PhD grant from the University of Warwick, UK, and successfully carried out his PhD research activity on "Acoustic Metamaterials for Medical Ultrasound and Non-Destructive Evaluation" via a co-tutelle program with the University of Perugia, Italy. During his PhD, he had the chance to keep active in NDT research, applying PuC in ultrasonic testing for evaluating highly-attenuating materials

such as thick polymers samples, concrete and steel forgings. He was then involved in Eddy Current (EC) testing, EC-stimulated Active Thermography, Pulse-compression Thermography applied to the NDE of cultural heritage items and composite materials, near infrared spectroscopy for polymer and food NDE, identification of non-linear systems by means of PuC, and signal conditioning and post-processing for the mentioned applications. He has been the Project Manager of the "NDTonAIR" project (Training Network in Non-Destructive Testing and Structural Health Monitoring of Aircraft structures), funded under the action H2020-MSCA-ITN-2016- GRANT N° 722134 for 3.8 million of Euro. He is currently a Researcher at the DIMES Dept., University of Calabria, Italy, and an Honorary Research Fellow within the School of Engineering, University of Warwick, UK.

Wednesday, May 25, 2022 - H 16:40

Measurement of blast wave propagation and evaluation of structural resistance under the blast load

Lucia Figuli
University of Zilina, Faculty of Security Engineering, Slovakia

ABSTRACT

Blast is considered as one of the accidental loads on the structures together with impact, fire and earthquake. In European Union there is missing a common approach how to evaluate the structural resistance and how to design the structures against the blast load.

The aims of this tutorial are:

- To introduce accidental loads on the structures, to present experimental open blast field tests, methods how to measure the principal characteristics of blast wave and behavior of blast loaded structures.
- To introduce methodology of blast loaded structure design, from the simplest to the complex ones and evaluate the resistance of blast loaded structures.

SPEAKER BIO

Assoc. Prof. Ing. **Lucia Figuli**, PhD has significant experience in the area of setting parameters of blast wave from the explosion of explosive substances, with the propagation of blast wave in environment, with the effects on structures and the behaviour of blast loaded structures, which dedicates the last 10 years of her research carrier. She graduated from civil engineering with specialization on the bridges and tunnels. Her PhD study was focused on the optimization of cross-section of filler beam deck bridges.

She obtained the fellowships from Ministry of Foreign Affairs of Italy, Slovak National Fellowship programme, CEEPUS programme, Erasmus+ programme and as a student or researcher worked at Università degli Studi di Roma, Università degli Studi di Parma, Università per Stranieri di Siena, or University of Maribor.

She is a member of the NATO Science for Peace and Security Programme´s Independent Scientific Evaluation Group for the period 2016 – 2019 and 2021-2024, more an evaluator of research projects for Slovak National Research Agency (APVV), Croatian Science Foundation (EPP), programme for EU commissions etc.

She is author of many publications, recently published book: Explosives and protection against their destructive effects. Part I: Explosives, precursors and improvised explosives devices. Part II: Effects of explosives on structures and protection against them.

IEEE MetroLivEnv 2022 Workshop Venue

The IEEE MetroLivEnv 2022 will be held at the **Conference Center** of the **University of Calabria**.
Address: University of Calabria
Via Pietro Bucci - 87036 Rende CS


The University has a system of venues for conferences, seminars, exhibitions and meetings for any type of activity and number of participants.

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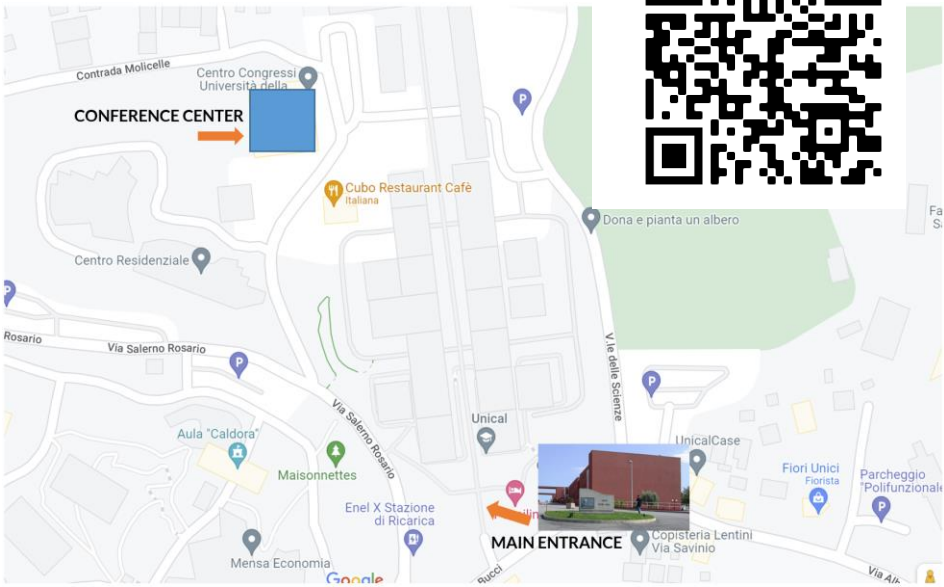

IEEE MetroLivEnv 2022 Social Events

WELCOME PARTY

Wednesday, May 25, 2022
19:00 - 21:00

The IEEE MetroLivEnv 2022 Welcome Party will be held at Bar Colosseo
Address: Piazza Santo Sergio, 1 - Rende (CS)

GALA DINNER

Thursday, May 26, 2022
20:00 – 23:00

The IEEE MetroLivEnv 2022 Gala Dinner will be held at Restaurant **Cuoco & Fiamme**
Address: Colle Degli Ulivi, 6 - Mendicino (CS)

A shuttle service will be available for Conference attendees. The meeting point and time will be announced during the Conference.

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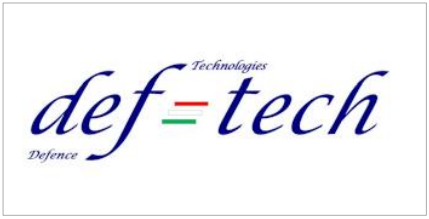
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Program Schedule - Wednesday May 25

WEDNESDAY - MAY 25, 2022	
15:00	**REGISTRATIONS**
15:30 - 16:10	**TUTORIAL #1** Passive and active infrared thermography: live comparison of cutting edge excitation strategies and post-processing for investigating masonry materials and wood samples *Stefano Laureti, University of Calabria, Italy - The University of Warwick, UK* *Aula Magna "B. Andreatta" - Conference Center*
16:10 - 16:40	COFFEE BREAK
16:40 - 17:20	**TUTORIAL #2** Measurement of blast wave propagation and evaluation of structural resistance under the blast load *Lucia Figuli, University of Zilina, Faculty of Security Engineering, Slovakia* *Aula Magna "B. Andreatta" - Conference Center*
19:00	WELCOME PARTY

Program Schedule - Thursday May 26

THURSDAY - MAY 26, 2022			
08:30	**REGISTRATIONS**		
09:00 - 10:00	Opening Ceremony - Welcome Addresses Aula Magna "B. Andreatta" - Conference Center		
10:00 - 10:50	**INVITED SPEAKER** Structural inspection and assessment of our ageing masonry infrastructure stock *Vasilis Sarhosis, School of Civil Engineering, University of Leeds, UK* *Aula Magna "B. Andreatta" - Conference Center*		
10:50 - 11:10	COFFEE BREAK		
	Aula Magna "B. Andreatta"	Room A	Sala Stampa
11:10 - 12:50	Session #1.1 SS3 - Multi-domain measurements for personalized comfort management in buildings	Session #1.2 SS4 - Thermography and hyperspectral imaging for building and urban diagnosis	Session #1.3 SS5 - Active and assisted living environments
12:50 - 14:00	LUNCH		
	Aula Magna "B. Andreatta"	Room A	Sala Stampa
14:00 - 15:20	Session #2.1 SS8 - Measurement techniques and procedures for quick and emergency diagnostics of buildings	Session #2.2 General Session - Part 1	Session #2.3 SS9 - Probability and mathematical statistics for living environment and metrology
15:20 - 15:50	COFFEE BREAK		
15:50 - 17:30	Session #3.1 SS6 - The challenge of resilient structures: From traditional approaches to Internet of Things (IoT) and SHM	Session #3.2 SS1 - Well-being and comfort of users based on environmental conditions	Session #3.3 SS11 - Measurement techniques in urban, fluvial and coastal living environments
20:00	SOCIAL DINNER		

Program Schedule - Friday May 27

FRIDAY - MAY 27, 2022			
08:30	**REGISTRATIONS**		
09:20 - 10:00	**INVITED SPEAKER** Designing after COVID-19. Strategies for the evaluation, monitoring and control of indoor air quality *Alberto De Capua, Università Mediterranea di Reggio Calabria* *Aula Magna "B. Andreatta" - Conference Center*		
10:00 - 11:30	**ROUND TABLE** What's next? Directions of technological research for the living and built environment presenting real experiences in multi-disciplinary projects and generating active networking by the participants Aula Magna "B. Andreatta" - Conference Center		
11:30 - 11:50	COFFEE BREAK		
	Aula Magna "B. Andreatta"	Room A	Sala Stampa
11:50 - 13:10	Session #4.1 General Session PART 2	Session #4.2 General Session PART 3	Session #4.3 General Session PART 4
13:10 - 13:30	**CLOSING AND AWARD CEREMONY** Aula Magna "B. Andreatta" - Conference Center		
13:30 - 14:30	LUNCH		

Technical Sessions - Wednesday, May 25

15:00 - 17:30
REGISTRATION
Room: Conference Center - University of Calabria

15:30 - 16:10
TUTORIAL - SESSION #1
Room: Aula Magna "B. Andreatta" - Conference Center
Chairs: Francesco Lamonaca, *University of Calabria, Italy*
Gabriele Milani, *Politecnico di Milano, Italy*

Passive and active infrared thermography: live comparison of cutting edge excitation strategies and post-processing for investigating masonry materials and wood samples

Stefano Laureti, *University of Calabria, Italy - The University of Warwick, UK*

16:10 - 16:40
COFFEE BREAK
Room: Conference Center - University of Calabria

16:40 - 17:20
TUTORIAL - SESSION #2
Room: Aula Magna "B. Andreatta" - Conference Center
Chairs: Francesco Lamonaca, *University of Calabria, Italy*
Gabriele Milani, *Politecnico di Milano, Italy*

Measurement of blast wave propagation and evaluation of structural resistance under the blast load

Lucia Figuli, *University of Zilina, Faculty of Security Engineering, Slovakia*

19:00 - 21:00
WELCOME PARTY
Bar Colosseo, Piazza Santo Sergio, 1 - Rende CS

Technical Sessions - Thursday, May 26

08:30 - 16:00
REGISTRATION
Room: Conference Center - University of Calabria

09:00 - 10:00
OPENING SESSION - WELCOME ADDRESSES
Room: Aula Magna "B. Andreatta" - Conference Center

10:00 - 10:50
PLENARY SESSION
Room: Aula Magna "B. Andreatta" - Conference Center
Chair: Gabriele Milani, *Politecnico di Milano, Italy*

Structural inspection and assessment of our ageing masonry infrastructure stock

Vasilis Sarhosis, *School of Civil Engineering, University of Leeds, UK*

10:50 - 11:10
COFFEE BREAK
Room: Conference Center - University of Calabria

11:10 - 12:50
SESSION 1.1
Special Session - Multi-domain measurements for personalized comfort management in buildings
Room: Aula Magna "B. Andreatta" - Conference Center
Chair: Marco Arnesano, *eCampus University, Italy*

11:10 **Combined use of wearable devices and Machine Learning for the measurement of thermal sensation in indoor environments**
Gloria Cosoli, *Università Politecnica delle Marche, Italy*
Silvia Angela Mansi, *Università degli studi di eCampus, Italy*
Marco Arnesano, *Università degli studi di eCampus, Italy*

11:30 **Application of a multi-field sensor into an office building**
Thomas Ashworth, *Politecnico di Torino, Delta Controls Italy Srl, Italy*
Antonio Catalano, *Delta Controls Italy Srl, Italy*
Enrico Fabrizio, *Politecnico di Torino, Italy*
Marco Filippi, *Politecnico di Torino, Italy*

11:50 **Long-term thermal comfort monitoring using wearable devices**
Veronica Martins Gnecco, *University of Perugia, Italy*
Ilaria Pigliautile, *University of Perugia, Italy*
Anna Laura Pisello, *University of Perugia, Italy*

12:10 **Improving Mean Radiant Temperatures Sensing Using Multidirectional Non-Contacting Temperature Sensors to Avoid Convective Errors With Globe Thermometers**
Forrest Meggers, *Princeton University, US*
Alexander Kim, *Princeton University, US*
Sean Rucewicz, *Princeton University, US*
Coleman Merchant, *Princeton University, US*
Kianwee Chen, *Princeton University, US*
Eric Teitelbaum, *Princeton University, US*

12:30 **Modelling the thermal response of the human body for thermal comfort assessment in indoor spaces: an experimental validation**
Giovanni Barone, *Università degli studi di Napoli Federico II, Italy*
Annamaria Buonomano, *Università degli studi di Napoli Federico II, Italy*

Gianluca Del Papa, *Università degli studi di Napoli Federico II, Italy*
Cesare Forzano, *Università degli studi di Napoli Federico II, Italy*
Giovanni Francesco Giuzio, *Università degli studi di Napoli Federico II, Italy*
Adolfo Palombo, *Università degli studi di Napoli Federico II, Italy*
Ilaria Pigliautile, *Università degli Studi di Perugia, Italy*
Anna Laura Pisello, *Università degli Studi di Perugia, Italy*
Giuseppe Russo, *Università degli studi di Napoli Federico II, Italy*

11:10 - 12:50
SESSION 1.2
Special Session - Thermography and hyperspectral imaging for building and urban diagnosis
Room: Room A - Conference Center
Chair: Stefano Laureti, *University of Calabria, Italy*

11:10 Possibilities and limits of human temperature measurement by thermographic methods
Michal Švantner, *University of West Bohemia, Czech Republic*
Vladislav Lang, *University of West Bohemia, Czech Republic*
Jiří Skála, *University of West Bohemia, Czech Republic*
Tomáš Kohlschütter, *University of West Bohemia, Czech Republic*
Milan Honner, *University of West Bohemia, Czech Republic*
Lukáš Muzika, *University of West Bohemia, Czech Republic*
Eliška Kosová, *University of West Bohemia, Czech Republic*

11:30 Monitoring of Thermal Dispersion in Indoor Environments: an InfraRed Scanner Technique
Filippo Ruffa, *Mediterranea University of Reggio Calabria, Italy*
Mariacarla Lugarà, *Mediterranea University of Reggio Calabria, Italy*
Gaetano Fulco, *Mediterranea University of Reggio Calabria, Italy*
Valentina Palco, *Mediterranea University of Reggio Calabria, Italy*
Claudio De Capua, *Mediterranea University of Reggio Calabria, Italy*

11:50 Spatial Distribution of Indoor Air Temperature Through Infrared Thermography
Paolo Bison, *National Research Council, Italy*
Alessandro Bortolin, *National Research Council, Italy*
Gianluca Cadelano, *National Research Council, Italy*
Giovanni Ferrarini, *National Research Council, Italy*

12:10 **The use of halogen lamps and pulse-compression thermography for the non-destructive evaluation of a ceramic tile**
Stefano Laureti, *University of Calabria, Italy*
Serena Calvelli, *University of Calabria, Italy*
Stefano Sfarra, *University of L'Aquila, Italy*
Marco Ricci, *University of Calabria, Italy*

12:30 **Resolving the Full Radiant Spectrum: Solving the Shortwave Imaging Problem for Enhanced Radiant Energy Analysis**
Coleman Merchant, *Princeton University, US*
Forrest Meggers, *Princeton University, US*

11:10 - 12:50
SESSION 1.3
Special Session - Active and assisted living environments
Room: Sala Stampa - Conference Center
Chair: Sara Casaccia, *Università Politecnica delle Marche, Italy*

11:10 **Towards supervised real-time human activity recognition on embedded equipment**
Houda Najeh, *IMT Atlantique, Lab-STICC, France*
Christophe Lohr, *IMT Atlantique, Lab-STICC, France*
Benoit Leduc, *Delta Dore Company, France*

11:30 **Multidimensional assessment of daily living activities in a shared Augmented Reality environment**
Alessandro Luchetti, *University of Trento, Italy*
Isidro III Butaslac, *Nara Institute of Science and Technology, Japan*
Manuel Rosi, *University of Trento, Italy*
Damiano Fruet, *University of Trento, Italy*
Giandomenico Nollo, *University of Trento, Italy*
Patrizia Gabriella Ianes, *Azienda Provinciale Servizi Sanitari, Pergine Valsugana, Italy*
Francesco Pilla, *Azienda Provinciale Servizi Sanitari, Pergine Valsugana, Italy*
Barbara Gasperini, *Azienda Provinciale Servizi Sanitari, Pergine Valsugana, Italy*
Giovanni Maria Achille Guandalini, *Azienda Provinciale Servizi Sanitari, Italy*
Jacopo Bonavita, *Azienda Provinciale Servizi Sanitari, Pergine Valsugana, Italy*
Hirokazu Kato, *Nara Institute of Science and Technology, Japan*
Mariolino De Cecco, *University of Trento, Italy*

11:50 Validation and accuracy estimation of a novel measurement system based on a mobile robot for human detection in indoor environment
Ilaria Ciuffreda, *Università Politecnica delle Marche, Italy*
Nicole Morresi, *Università Politecnica delle Marche, Italy*
Sara Casaccia, *Università Politecnica delle Marche, Italy*
Gian Marco Revel, *Università Politecnica delle Marche, Italy*

12:10 Assessment of normal and abnormal behaviour of people with dementia in living environment through non-invasive sensors and unsupervised AI
Arman Farsi, *Politecnico di Torino, Italy*
Sara Casaccia, *Università Politecnica delle Marche, Italy*
Gian Marco Revel, *Università Politecnica delle Marche, Italy*

12:30 Real-time Gait Pattern Classification Using Artificial Neural Networks
Diego Robles, *Universidad de Valparaíso, Chile*
Mouna Benchekroun, *Université de technologie de Compiègne, France*
Andrea Lira, *Universidad Andrés Bello, Chile*
Carla Taramasco, *Universidad de Valparaíso, Chile*
Vincent Zalc, *Université de technologie de Compiègne, France*
Igor Irazzoky, *Universidad Diego Portales, Chile*
Dan Istrate, *Université de technologie de Compiègne, France*

12:50 - 14:00
LUNCH
Room: Conference Center - University of Calabria

14:00 - 15:20
SESSION 2.1
Special Session - Measurement techniques and procedures for quick and emergency diagnostics of buildings
Room: Aula Magna "B. Andreatta" - Conference Center
Chair: Giulio D'Emilia, *University of L'Aquila, Italy*

14:00 Calibration issues of a total station for the assessment of buildings in emergency conditions
Giulio D'Emilia, *University of L'Aquila, Italy*
Antonella Gaspari, *Polytechnic of Bari, Italy*
Stefano Marsella, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Marcello Marzoli, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Emanuela Natale, *University of L'Aquila, Italy*

14:20 Assessment of the provisional structures efficacy, for the conservation of monuments after an earthquake: metrological evaluations
Luciano Chiominto, *University of L'Aquila, Italy*
Giulio D'Emilia, *University of L'Aquila, Italy*
Stefano Marsella, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Marcello Marzoli, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Emanuela Natale, *University of L'Aquila, Italy*

14:40 Ensuring safety of cultural heritage experts while safeguarding historical buildings: the 3D survey of the Sacro Convento di Assisi as benchmark to test innovative emergency management procedures
Stefano Marsella, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Marcello Marzoli, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Danilo Anastasi, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*

15:00 Use of laser scanner and total station systems in fire resistance test of a closing element
Massimo Bonfatti, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Marcello Lombardini, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Carmine Castaldo, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Fabio Mazzarella, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*
Marcello Marzoli, *Ministry of the Interior, Corpo Nazionale dei Vigili del Fuoco, Italy*

14:00 - 15:20
SESSION 2.2
General Session - Part 1
Room: Room A - Conference Center
Chairs: Filippo Ruffa, *Mediterranea University of Reggio Calabria, Italy*
Domenico Luca Carnì, *University of Calabria, Italy*

14:00 Blockchain Based Social Commitment - Secure & Reliable Web Services

Robert Manthey, *Hochschule Mittweida, Germany*
Richard Vogel, *Hochschule Mittweida, Germany*
Falk Schmidsberger, *Hochschule Mittweida, Germany*
Matthias Baumgart, *Hochschule Mittweida, Germany*
Christian Roschke, *Hochschule Mittweida, Germany*
Marc Ritter, *Hochschule Mittweida, Germany*
Matthias Vodel, *Hochschule Mittweida, Germany*

14:20 IoT and IAQ monitoring systems for healthiness of dwelling

Valentina Palco, *Mediterranea University of Reggio Calabria, Italy*
Gaetano Fulco, *Mediterranea University of Reggio Calabria, Italy*
Claudio De Capua, *Mediterranea University of Reggio Calabria, Italy*
Filippo Ruffa, *Mediterranea University of Reggio Calabria, Italy*
Mariacarla Lugarà, *Mediterranea University of Reggio Calabria, Italy*

14:40 An IoT sensor node for health monitoring of artwork and ancient wooden structures

Elia Landi, *University of Siena, Italy*
Lorenzo Parri, *University of Siena, Italy*
Riccardo Moretti, *University of Siena, Italy*
Ada Fort, *University of Siena, Italy*
Marco Mugnaini, *University of Siena, Italy*
Valerio Vignoli, *University of Siena, Italy*

15:00 Measurements and Characterization of Energy Related Behaviors and Indoor Environment Quality in Residential Buildings Using a Wireless Sensor Network

Mathieu Bourdeau, *Univ Gustave Eiffel, France*
Elyes Nefzaoui, *Univ Gustave Eiffel, France*
Philippe Basset, *Univ Gustave Eiffel, France*
Julien Waeytens, *Univ Gustave Eiffel, France*
Amine Bouzidi, *Univ Gustave Eiffel, France*

14:00 - 15:40
SESSION 2.3
Special Session - Probability and mathematical statistics for living environment and metrology
Room: Sala Stampa - Conference Center
Chairs: Antonella Iuliano, *University of Basilicata, Italy*
Francesco Lamonaca, *University of Calabria, Italy*

14:00 **Graph Machine Learning and its Applications in Urban Planning**
Felix L. Opolka, *University of Cambridge, UK*
Pietro Lio, *University of Cambridge, UK*

14:20 **Living Environment Quality Monitoring: Image preprocessing to improve the human lymphocyte micronucleus detection**
Francesco Lamonaca, *University of Calabria, Italy*
Alessia Verdile, *University of Sannio, Italy*
Marina Paolucci, *University of Sannio, Italy*
Roberta Imperatore, *University of Sannio, Italy*

14:40 **Challenges of the Age of Information Paradigm for Metrology in Cyberphysical Ecosystems**
Alberto Zancanaro, *University of Padova, Italy*
Giulia Cisotto, *University of Milano-Bicocca, Italy*
Leonardo Badia, *University of Padova, Italy*

15:00 **A Mathematical Model for a Radon Detection Method Based on Carbon Nanotube Sensor**
Adrian Eracle Nicolescu, *Ovidius University of Constanta, Romania*
Francesco Lamonaca, *University of Calabria, Italy*
Antonella Iuliano, *University of Basilicata, Italy*
Monica Vasile, *Ovidius University of Constanta, Romania*

15:20 **Environmental measurements and genetic effects for cancer survival integration data**
Antonella Iuliano, *University of Basilicata, Italy*
Annalisa Occhipinti, *Teesside University, UK*

15:20 - 15:50
COFFEE BREAK
Room: Conference Center - University of Calabria

15:50 - 17:30
SESSION 3.1
Special Session - The challenge of resilient structures: From traditional approaches to Internet of Things (IoT) and SHM
Room: Aula Magna "B. Andreatta" - Conference Center
Chair: Domenico Camassa, *Polytechnic University of Bari, Italy*

15:50 SHM for failure propagation detection in steel truss bridges
Jose M. Adam, *Universitat Politècnica de València, Spain*
Giacomo Caredda, *Universitat Politècnica de València, Spain*
Elisa Bertolesi, *Brunel University London, UK*
Manuel Buitrago, *Universitat Politècnica de València, Spain*
M. Cristina Porcu, *University of Cagliari, Italy*

16:10 Innovative Fiber Optic Sensor monitoring of delamination phenomenon for FRCM reinforced curved masonry pillars
Elisa Bertolesi, *Brunel University London, UK*
Mario Fagone, *University of Florence, Italy*
Ernesto Grande, *University Guglielmo Marconi, Italy*
Gabriele Milani, *Politecnico di Milano, Italy*
Tommaso Rotunno, *University of Florence, Italy*

16:30 A novel fast and low-cost masonry monitoring strategy for masonry arches
Yu Yuan, *Politecnico di Milano, Italy*
Gabriel Stockdale, *Masonry Methods, Inc, US*
Gabriele Milani, *Politecnico di Milano, Italy*

16:50 Interactive Software for Behaviour Mapping of Masonry Arches
Yu Yuan, *Politecnico di Milano, Italy*
Gabriel Stockdale, *Masonry Methods, Inc, US*
Gabriele Milani, *Politecnico di Milano, Italy*

17:10 Ambient vibration tests of a historical masonry bridge by means of radar interferometry

Domenico Camassa, *Polytechnic University of Bari, Italy*
Anna Castellano, *Polytechnic University of Bari, Italy*
Aguinaldo Fraddosio, *Polytechnic University of Bari, Italy*
Michela Silla, *Polytechnic University of Bari, Italy*
Mario Daniele Piccioni, *Polytechnic University of Bari, Italy*

15:50 - 17:30
SESSION 3.2
Special Session - Well-being and comfort of users based on environmental conditions
Room: Room A - Conference Center
Chair: Gian Marco Revel, *Università Politecnica delle Marche, Italy*

15:50 Well-being and comfort of ageing people based on indoor environmental conditions: preliminary study on human-coach conversation

Sara Casaccia, *Università Politecnica delle Marche, Italy*
Kristiina Jokinen, *National Institute of Advanced Industrial Science and Technology, Japan*
Riccardo Naccarelli, *Università Politecnica delle Marche, Italy*
Gian Marco Revel, *Università Politecnica delle Marche, Italy*

16:10 Innovative measurements for Indoor Environmental Quality (IEQ) assessment in residential buildings

Gianmarco Battista, *Università Politecnica delle Marche, Italy*
Serena Serroni, *Università Politecnica delle Marche, Italy*
Milena Martarelli, *Università Politecnica delle Marche, Italy*
Marco Arnesano, *Università Telematica eCampus, Italy*
Gian Marco Revel, *Università Politecnica delle Marche, Italy*

16:30 Low-Cost Smart Living Environment Monitoring Systems from a Metrological Point of View

Juan-José Jimenez, *Università della Calabria, Italy*
Domenico Luca Carnì, *Università della Calabria, Italy*
Lionel Trojman, *Institut Supérieur d'Électronique de Paris, France*
Luis-Miguel Prócel, *Universidad San Francisco de Quito, Ecuador*
Francesco Lamonaca, *Università della Calabria, Italy*

16:50 Understanding the gap between Efficiency and Comfort
Kipp Bradford, *Princeton University, US*
James Coleman, *Princeton University, US*
Forrest Meggers, *Princeton University, US*

17:10 Thermal comfort in wooden buildings in Mediterranean area. A field study
Piero Bevilacqua, *University of Calabria, Italy*
Roberto Bruno, *University of Calabria, Italy*
Daniela Cirone, *University of Calabria, Italy*
Antonino Rollo, *University of Calabria, Italy*
Natale Arcuri, *University of Calabria, Italy*

15:50 - 17:50
SESSION 3.3
Special Session - Measurement techniques in urban, fluvial and coastal living environments
Room: Sala Stampa - Conference Center
Chair: Nadia Penna, *University of Calabria, Italy*

15:50 A Laboratory Analysis of Solitary Wave run-up in the presence of Submerged Barriers
Federico Casella, *University of Calabria, Italy*
Giuseppe Tripepi, *University of Calabria, Italy*
Francesco Aristodemo, *University of Calabria, Italy*
Luana Gurnari, *Mediterranea University of Reggio Calabria, Italy*
Pasquale Filianoti, *Mediterranea University of Reggio Calabria, Italy*

16:10 Experimental Study on Pore Pressure Attenuation in Rubble Mound Breakwater in Depth-Limited Water Conditions
Giulio Scaravaglione, *Politecnico di Bari, Italy*
Stefano Marino, *Politecnico di Bari, Italy*
Leonardo Damiani, *Politecnico di Bari, Italy*
Antonio Francone, *Università del Salento, Italy*
Giuseppe Roberto Tomasicchio, *Università del Salento, Italy*
Alessandra Saponieri, *Università del Salento, Italy*

16:30 Implementation of an Intelligent Transport System for Road Monitoring and Safety

Pasquale Daponte, *University of Sannio, Italy*
Luca De Vito, *University of Sannio, Italy*
Gianluca Mazzilli, *University of Sannio, Italy*
Enrico Picariello, *University of Sannio, Italy*
Sergio Rapuano, *University of Sannio, Italy*
Ioan Tudosa, *University of Sannio, Italy*

16:50 Reliability of ADV measurements for the analysis of the universal laws of turbulence

Domenico Ferraro, *Università della Calabria, Italy*
Francesco Coscarella, *Università della Calabria, Italy*
Roberto Gaudio, *Università della Calabria, Italy*

17:10 Reliability evaluation of different procedures and techniques for measuring the scouring process induced by a rotating ship propeller

Giuseppe Curulli, *Università della Calabria, Italy*
Nadia Penna, *Università della Calabria, Italy*
Roberto Gaudio, *Università della Calabria, Italy*

17:30 Sampling Design for a correct calibration of water distribution networks

Attilio Fiorini Morosini, *University of Calabria, Italy*
Olga Caruso, *University of Calabria, Italy*

20:00 - 23:00
GALA DINNER
Cuoco & Fiamme
Via Colle Degli Ulivi, 6 - Mendicino CS

Technical Sessions - Friday, May 27

08:30 - 12:00
REGISTRATION
Room: Conference Center - University of Calabria

09:20 - 10:00
PLENARY SESSION
Room: Aula Magna "B. Andreatta" - Conference Center
Chair: Francesco Lamonaca, *University of Calabria, Italy*

Designing after COVID-19. Strategies for the evaluation, monitoring and control of indoor air quality

Alberto De Capua, *Università Mediterranea di Reggio Calabria, Italy*

10:00 - 11:30
ROUND TABLE
Room: Aula Magna "B. Andreatta" - Conference Center
Moderator: Gian Marco Revel, *Università Politecnica delle Marche, Italy*

What's next? Directions of technological research for the living and built environment presenting real experiences in multi-disciplinary projects and generating active networking by the participants

- **Dr. André van Delft**, *Director and founder of DEMO Consultants* - Adopt BIM to speed up and increase the energy saving potential of the deep renovation projects, BIMSPEED project
- **Prof. Lucia Figuli**, *Department of Security Management, Faculty of Security Engineering, University of Žilina* – Maintenance and inspection of civil infrastructure, IRIS project
- **Prof. Anna Laura Pisello**, *Associate Professor at Università degli studi di Perugia* – HELIOS ERC project on Urban heat Island mitigation

- **Prof. Marco Arnesano**, *Associate Professor at Università eCampus* - NEXT.COM - a new measurement approach for the generation of multiphysics and multidomain environmental comfort models progetto PRIN
- **Dr. Henk Herman Nap**, *Expert eHealth & Coordinator Digital Care* – Vilans (Expertise Centre on Long-Term Care)– Dementia Friendly Technologies for Active & Assisted Living
- **Dr. Oscar Zanutto**, *FABER coordinator of I.S.R.A.A. Istituto per Servizi di Ricovero e Assistenza agli Anziani* – Towards a Value Based Health Care model transformation of integrated care supported by ICT solutions, the H2020 ValueCare Project experience.
- **Prof. Sara Casaccia**, *Assistant Professor at Università Politecnica delle Marche* – Virtual coaching and sensor network for ageing well in smart living environment: e-VITA project

11:30 - 11:50
COFFEE BREAK
Room: Conference Center - University of Calabria

11:30 - 11:50
POSTER SESSION
Room: Conference Center - University of Calabria

PS 1 **Structural Healt Monitoring Systems: An Overview**
Carmelo Scuro, *University of Calabria, Italy*
Pierpaolo Antonio Fusaro, *University of Calabria, Italy*

PS 2 **Advanced Structural Investigation Through Structural Health Monitoring and Adaptive Limit Analysis: The Case of a Damaged Masonry Arch Bridge in India**
Nicola Grillanda, *Politecnico di Milano, Italy*
Gabriele Milani, *Politecnico di Milano, Italy*

PS 3 **Preliminary Study of a Neural Network Procedure for the Timely Detection of the Collapse of Historical Cultural Heritage Structures**
Peixuan Wang, *Politecnico di Milano, Italy*
Carmelo Scuro, *University of Calabria, Italy*
Francesco Demarco, *University of Calabria, Italy*
Domenico Luca Carnì, *University of Calabria, Italy*
Francesco Lamonaca, *University of Calabria, Italy*
Giuseppe Alì, *University of Calabria, Italy*
Gabriele Milani, *Politecnico di Milano, Italy*

11:50 - 13:10
SESSION 4.1
General Session - PART 2
Room: Aula Magna "B. Andreatta" - Conference Center
Chairs: Nicola Pasquino, *University of Naples Federico II, Italy*
Marco Arnesano, *eCampus University, Italy*

11:50 IoT Powered Detection and Alarming System for Hazardous Gases in Domestic Environment
Giovanni Gugliandolo, *University of Messina, Italy*
Giovanni Crupi, *University of Messina, Italy*
Giuseppe Campobello, *University of Messina, Italy*
Nicola Donato, *University of Messina, Italy*

12:10 An early-warning system for fire spreading by monitoring simple climate conditions and combining Cellular Automata with Digital Twins
Nikolaos I. Dourvas, *Information Technologies Institute - CERTH, Greece*
Andromachi Papagianni, *Information Technologies Institute - CERTH, Greece*
Ilias Koulalis, *Information Technologies Institute - CERTH, Greece*
Konstantinos Ioannidis, *Information Technologies Institute - CERTH, Greece*
Stefanos Vrochidis, *Information Technologies Institute - CERTH, Greece*
Ioannis Kompatsiaris, *Information Technologies Institute - CERTH, Greece*

12:30 How to Characterize Power Lock Systems for Limiting Exposure to Electromagnetic Radiation Generated by 5G MaMIMO Systems
Sara Adda, *ARPA Piemonte, Italy*
Tommaso Aureli, *ARPA Lazio, Italy*
Stefano Coltellacci, *ARPA Lazio, Italy*
Stefano D'Elia, *Vodafone Networks, Mobile Access Engineering, Vodafone Italia, Italy*
Daniele Franci, *ARPA Lazio, Italy*
Enrico Grillo, *ARPA Lazio, Italy*
Nicola Pasquino, *University of Naples Federico II, Italy*
Settimio Pavoncello, *ARPA Lazio, Italy*
Riccardo Suman, *Vodafone Networks, Mobile Access Engineering, Vodafone Italia, Italy*
Mattia Vaccarono, *ARPA Piemonte, Italy*

12:50 Assessment of Population Exposure to Electromagnetic Fields Due to Systems That Implement Dynamic Spectrum Sharing Between 4G and 5G: Definition of Methods and On-Site Measurements

Sara Adda, *ARPA Piemonte, Italy*
Tommaso Aureli, *ARPA Lazio, Italy*
Tiziana Cassano, *ARPA Puglia, Italy*
Daniele Franci, *ARPA Lazio, Italy*
Marco D. Migliore, *University of Cassino and Southern Lazio, Italy*
Nicola Pasquino, *University of Naples Federico II, Italy*
Settimio Pavoncello, *ARPA Lazio, Italy*
Fulvio Schettino, *University of Cassino and Southern Lazio, Italy*
Maddalena Schirone, *ARPA Puglia, Italy*

11:50 - 13:20
SESSION 4.2
General Session - PART 3
Room: Room A - Conference Center
Chairs: Giovanni Scavello, *University of Calabria, Italy*
Gabriele Milani, *Politecnico di Milano, Italy*

11:50 3D modelling of existing asset based on point clouds: A comparison of Scan2BIM approaches
Sonia Álvarez-Díaz, *CARTIF Technology Centre, Spain*
Javier Román-Cembranos, *CARTIF Technology Centre, Spain*
Agnieszka Łukaszewska, *Pre Fasada, Poland*
Piotr Dymarski, *Mostostal Warszawa S.A., Poland*

12:10 Line Segments Matching Algorithm for BIM Applications
Giovanni Scavello, *University of Calabria, Italy*
Giuseppe Fedele, *University of Calabria, Italy*
Andrea Aiello, *Alma S.r.l., Italy*

12:30 The first Urban Seismic Observatory based on MEMS accelerometers in central Italy
Giovanni Vitale, *ONT - INGV, Italy*
Antonino D'Alessandro, *ONT - INGV, Italy*
Antonio Costanzo, *ONT - INGV, Italy*
Stefano Speciale, *ONT - INGV, Italy*

12:50 Combination of Building Information Modeling and Infrared Point Cloud for Nondestructive Evaluation
Marco Angelosanti, Sapienza University of Rome, Italy

Nitin Nagesh Kulkarni, University of Massachusetts Lowell, US
Alessandro Sabato, University of Massachusetts Lowell, US

13:10 A support for signal compression in livin environments: the Analog-to-Information Converter
Grazia Iadarola, *Polytechnic University of Marche, Italy*
Susanna Spinsante, *Polytechnic University of Marche, Italy*
Luca De Vito, *University of Sannio, Italy*
Francesco Lamonaca, *University of Calabria, Italy*

11:50 - 13:10
SESSION 4.3
General Session - PART 4
Room: Sala Stampa - Conference Center
Chair: Piero Bevilacqua, *University of Calabria, Italy*
Roberto Bruno, *University of Calabria, Italy*

11:50 A power signal alteration analyzer based on empirical mode decomposition
Domenico Luca Carnì, *Univesity of Calabria, Italy*
Mostafa Kermani, *Chalmers University of Technology, Sweden*
Francesco Lamonaca, *Univesity of Calabria, Italy*

12:10 Measurement of Relative Humidity and Hygrometer Calibration in Low Temperature Environments
Zhanyuan Li, *National Institute of Metrology, China*
Hai Lin, *National Institute of Metrology, China*
Ju Yang, *National Institute of Metrology, China*
Changqing Ren, *National Institute of Metrology, China*
William Huang, *GTM China Office, China*

12:30 Garden building diagnostic systems for sustainable preservation
Isabella Sannino, *Politecnico di Torino, Italy*
Sabrina Grassini, *Politecnico di Torino, Italy*
Marco Parvis, *Politecnico di Torino, Italy*
Emma Angelini, Politecnico di Torino, Italy

12:50 Estimation of Electricity Savings Achievable with Automatic Artificial Lighting According to Window Orientation and Size

Francesco Nicoletti, *University of Calabria, Italy*
Vittorio Ferraro, *University of Calabria, Italy*
Dimitrios Kaliakatsos, *University of Calabria, Italy*
Mario Antonio Cucumo, *University of Calabria, Italy*
Antonino Rollo, *University of Calabria, Italy*
Natale Arcuri, *University of Calabria, Italy*

13:10 - 13:30
CLOSING AND AWARD CEREMONY
Room: Aula Magna "B. Andreatta" - Conference Center

13:30 - 14:30
LUNCH
Room: Conference Center - University of Calabria