2023 IEEE International Workshop on Metrology for Living Environment (MetroLivEnv 2023)

Milano, Italy
29-31 May 2023

IEEE Catalog Number: CFP23BK9-POD
ISBN: 978-1-6654-5694-4

Copyright © 2023 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP23BK9-POD
ISBN (Print-On-Demand):	978-1-6654-5694-4
ISBN (Online):	978-1-6654-5693-7

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Propagation of the Measurement Uncertainty of Wearable Sensors for Thermal Comfort Assessment 1
Gloria Cosoli, Silvia Angela Mansi, Gian Marco Revel, Marco Arnesano

Metrological Characterization of Commercial Smartwatches: Are These Sensors Suitable for the Assessment of Well-Being? 6
Luca Antognoli, Luna Panni, Gloria Cosoli, Lorenzo Scalise

IoT-Based Indoor Air Quality Monitoring and Analysis Under Different Strategies of COVID-19 Transmission Mitigation: A Field Experiment 12
Nedia Aouani, Armande Hervé, Elyes Nefzaoui

Preliminary Results on the Plantar Flexion During Grand-Plié in Ballet Dancing with Inertial Measurement Units 18
Davide Paloschi, Beatrice Anchisi, Luca Zanotto, Alex Patten Moorhead, Mario Cigada, Stefania Ballone, Omar De Bartolomeo, Alfredo Cigada, Paola Saccomandi

Energy Community Management System Based on Real-Time Measurements and Genetic Algorithms 23
Massimiliano Proietti, Alberto Garinei, Federico Bianchi, Alessandro Vispa, Andrea Marini, Stefano Speziali, Marcello Marconi, Roberto Ricci, Pierluigi Cernieri, Emanuele Piccioni

From Silos to Open, Federated and Enriched Data Lakes for Smart Building Data Management 29
José L. Hernández, Susana Martín, Vangelis Marinakis, Ignacio De Miguel

Predicting Thermal Comfort in Buildings with Machine Learning and Occupant Feedback 34
Panagiotis Skaloumpakas, Elissaios Sarmas, Zoi Mylona, Alessio Cavadenti, Francesca Santori, Vangelis Marinakis

Development of a Methodology to Define Data-Driven and Measurement-Based Services for the Built Environment 40
Vittoria Cipollone, Nicole Morresi, Serena Serroni, Sara Casaccia, Gian Marco Revel, Nina Costa, Birgitte Holt Andersen, Diego Arnone

Fiber Bragg Gratings Embedded Inside 3D-Printed Patches – Sensor Design and Mechanical Characterization 45
Davide Paloschi, Andrea Polimadei, Sanzhar Korganbayev, Valerio Orsetti, Alfredo Cigada, Michele Caponero, Paola Saccomandi

U-Shaped Fiber Optic Lossy Mode Resonance Sensor for the Detection of Antibiotics 50
Vikas, Paola Saccomandi

Graphene-Antimonene Coated Tapered Fiber Optic Surface Plasmon Resonance Sensor for the Detection of Hg^{2+} Heavy Metal Ions 55
Vikas, Paola Saccomandi

SPR Fiber Optic Sensor for Simultaneous Temperature and Humidity Measurement Using AuNPs 60
Qi Zhang, Taotao Hu, Paola Saccomandi, Bin Li, Fang Wang, Tonglei Cheng

Smart Building Digital Twin: Wireless Sensing and Actuation Architecture at Rey Juan Carlos University 65
Adrián Zeus Román-García, Rubén Nieto, Pablo Villoria Hernandez, María Cristina Rodriguez-Sanchez, Micael Gallego Carrillo

Critical Use of Terrestrial Laser Scanners for the Survey of Buildings in Emergency Conditions 70
Luciano Chiominto, Giulio D'Emilia, Antonella Gaspari, Stefano Marsella, Marcello Marzoli, Emanuela Natale

RIS Optimal Element Selection for Enhanced Indoor Positioning Systems..... 75
Somayeh Bazin, Keivan Navaie

Wireless Crack Detection System Based on IoT and Acoustic Emission..... 80
Mohamad Issam Sayyaf, Domenico Luca Carnì, Francesco Lamonaca

A Tool for the Data Notarization with the Blockchain to Ensure Security and Privacy 85
Alessandro Rossi, Andrea Natalini, Lorenzo Cristofori, Marzia Mammina

Enhancing the Performance of the Photovoltaic Cells Employing Computer Vision..... 91
Amir Baniamerian, Ali Bostani

Towards Digital Twins of Buildings and Smart Energy Networks: Current and Future Trends..... 96
Tancredi Testasecca, Marilena Lazzaro, Antonino Sirchia

A Monitoring Platform for the Built Environment: Towards the Development of an Early Warning System in a Seismic Context 102
Adriano Mancini, Gloria Cosoli, Alessandro Galdelli, Luca Violini, Giuseppe Pandarese, Alessandra Mobili, Elisa Blasi, Francesca Tittarelli, Gian Marco Revel

Survey and Research Challenges in Monocular Visual Odometry 107
Arman Neyestani, Francesco Picariello, Amin Basiri, Pasquale Daponte, Luca De Vito

Digital Twin for a Resilient Management of the Built Environment.....113
Marianna Rotilio, Valentina Villa, Alessandra Corneli

Blockchain Based Social Commitment System for Regional Environments 118
Robert Manthey, Richard Vogel, Falk Schmidsberger, Matthias Baumgart, Christian Roschke, Marc Ritter, Matthias Vodel

Statistical Analysis of the Riverbed Roughness Structures 123
Nadia Penna, Roberto Gaudio

Regression Models as a Tool for Genome-Wide Association Studies of Environmental Exposures and DNA Methylation 128
Annamaria Carissimo, Luca De Martino, Immacolata Garzilli, Biancamaria Pierri, Mauro Esposito, Claudia Angelini

Statistical Approach and Territorial Analysis on the Covid-19 Emergency: The Case Study of the Municipality of Tito..... 133
Fausto Bisaccia, Valentina Santarsiero, Luigi Santopietro, Simone Corrado, Antonella Iuliano, Beniamino Murgante

Measurement of Noise Correlation Through Superconducting Josephson Junctions..... 137
O. V. Pountougnigni, C. Barone, G. Carapella, V. Granata, C. Guarcello, C. Mauro, S. Pagano, V. Pierro, C. Tchawoua, R. Yamapi, G. Filatrella

Information Theory to Support Planning on Regionalization Issue 142
Simone Corrado, Francesco Scorza, Beniamino Murgante

Recent Advances on Data-Driven Services for Smart Energy Systems Optimization and Pro-Active Management..... 146
Tancredi Testasecca, Marilena Lazzaro, Elissaios Sarmas, Stathis Stamatopoulos

The Monitoring of the Indoor Environmental Quality of a Straw House in the Village of Pescomaggiore, L'Aquila 152
Mariangela De Vita, Marianna Rotilio, Gianni Di Giovanni

Experimental Prototype and Measurement Driven Study of Indoor Air Quality 157
Shaikha Alkaabi, Fatema S. Suhail, Haleema Almansoori, Asma Alhammadi, Shriya Kulkarni, Bivin Pradeep, Parag Kulkarni

Influence of Different Photovoltaic Cooling Strategies on Its Average Monthly Performance 162
Antonino Rollo, Jessica Settino, Piero Bevilacqua, Vittorio Ferraro

Experimental Tests to Assess the Effects of Phase Change Materials in Building Envelopes 168
Roberto Bruno, Vittorio Ferraro, Piero Bevilacqua, Jessica Settino, Antonino Rollo

Evaluation of Durability and Properties of Construction Materials Through a Multianalytical Approach: Case Study on Industrial Floor 173
Chiara Gallo, Nicolino Messuti, Carmine Napoli, Eduardo Caliano

Development and Metrological Characterization of a Multi-Sensor Device for Indoor Environmental Quality (IEQ) Monitoring 179
Arianna Astolfi, Alessio Carullo, Virginia Fissore, Giuseppina Emma Puglisi, Giuseppina Arcamone, Louena Shtrepi, Erica Raviola, Alberto Barbaro, Gustavo Ramirez Espinosa, Pietro Chiavassa, Edoardo Giusto, Gabriele Piccablotto, Fabio Saba, Davide Paesante, Giovanni Durando, Alice Lorenzati, Stefano Fantucci, Antonio Servetti, Bartolomeo Montrucchio, Franco Fiori, Anna Pellegrino, Vincenzo Corrado, Simona Paduos, Nicolas Sassoli, Jana Clerici

Sustainable, Assistive, Residential Architectural Units for Active Ageing 185
Giovanni Gibilisco, Gianluca Rodonò, Angelo Monteleone, Vincenzo Sapienza

Estimating Energy Consumption in Households for Non-Intrusive Elderly Monitoring 191
Álvaro Hernández, Laura De Diego, Daniel Pizarro, M. Carmen Pérez-Rubio, J. Manuel Villadangos, Rubén Nieto

e-VITA Use Cases Configurator: A Tool to Identify the Optimal Configuration of the Sensor Network and Coaching Devices to Enable Older People to Age Well at Home 196
Riccardo Naccarelli, Sara Casaccia, Keiko Homma, Roberta Bevilacqua, Gian Marco Revel

Appliance Identification in NILM Applications by Means of a Convolutional Auto-Encoder 202
Laura De Diego-Otón, Álvaro Hernández, Daniel Pizarro, Rubén Nieto

Localization of Older People in an Indoor Scenario: A Measurement System Based on PIR Sensors Installed in a Social Robot 208
Ilaria Ciuffreda, Sara Casaccia, Gian Marco Revel

Global Vipassana Pagoda: Main Features and History of Construction 213
Nandalal Rameshwar Varma, Radhey Shyam Jangid, Siddhartha Ghosh, Gabriele Milani, Giuseppe Alfredo Cundari, Mahesh Varma

Global Vipassana Pagoda: Finite Element Thrust Line FETLA Analyses 219
Mahesh Varma, Radhey Shyam Jangid, Siddhartha Ghosh, Gabriele Milani, Giuseppe Alfredo Cundari, Tejaswini Bakliwal

Global Vipassana Pagoda: Exterior Geometry Envelope Extraction Using UAV Photogrammetry 225
Samarjeet Salunke, Raaj Ramsankaran, Siddhartha Ghosh, Gabriele Milani, Bhumik Halani, Giuseppe Alfredo Cundari, Mahesh Varma, Venkata Santosh Kumar Delhi, Nikita Gangurde

Crack Detection in Historical Masonry Structures Using Efficient Image Processing: Application on a Masonry Bridge in Iran 230
Morteza Saadatmorad, Ramazan-Ali Jafari Talookolaei, Gabriele Milani, Samir Khatir, Thanh Cuong-Le

Global Vipassana Pagoda: Medium Term IoT Based Structural Health Monitoring 236
Siddhartha Ghosh, Gabriele Milani, Bhumik Halani, Mahesh Varma, Giuseppe Alfredo Cundari

Dynamic Identification and Automatic Updating of the Numerical Model of a Masonry Tower 241
Georgios Panagiotis Salachoris, Gianluca Standoli, Mattia Schiavoni, Francesco Clementi

Damage Identification of a Wind Turbine Blade from Interferometric Radar Tests 246
Domenico Camassa, Anna Castellano, Gennaro Fraccalvieri, Aguinaldo Fraddosio, Silvia Ieva, Nataliia Pinchuk, Mario Daniele Piccioni

In-Situ Estimation of Axial Force in Tie Rods of Masonry Structures by Radar Interferometry 251
Domenico Camassa, Antonio Curri, Aguinaldo Fraddosio, Mario Daniele Piccioni

A Mathematical Model for the Propagation of Wildfires 257
Giuseppe Ali, Francesco Demarco, Domenico Gaudio, Pierpalo Antonio Fusaro, Renato Sante Olivito, Carmelo Scuro

Experimental Damage Identification in Masonry Structures by OMA 263
David Bru, Salvador Ivorra, Domenico Camassa

Development and Characterization of an IoT Cloud Platform Operating in 5G Network for Structural Health Monitoring of Civil Constructions 269
Antonietta Varasano, Aguinaldo Fraddosio, Mario Daniele Piccioni, Gregorio Andria

Author Index