2026 IEEE International Workshop on Metrology for Living Environment (MetroLivEnv 2026)

Cambridge, United Kingdom
14-16 July 2026

IEEE Catalog Number: CFP26BK9-POD
ISBN: 979-8-3195-2116-3

IEEE
Advancing Technology for Humanity

Copyright © 2026, IEEE

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:	CFP26BK9-POD
ISBN (Print-On-Demand):	979-8-3195-2116-3
ISBN (Online):	979-8-3195-2115-6

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

Simplified Ruled Explicit Meshing Procedure for the Pushdown Analysis of a Bare Arch Under Heyman Hypotheses 1
Alessandro Gandolfi, Gabriele Milani

Integrated Structural Assessment and Conservation Strategy for the Church of Santa Maria di Piazza in Ostra Vetere (Italy) 6
Francesco Monni, Francesco Clementi, Mattia Schiavoni

A Bond-Slip Approach for Cyclic Debonding Assessment of Composite-To-Substrate Interfaces 11
Li Zhang, Ernesto Grande, Gabriele Milani

Debonding Failure-Domains in Natural Textile Reinforced Mortar Systems 16
Francesca Roscini, Giulia Misseri, Francesco Clementi

IoT Based Monitoring System for Cultural Heritage: The Case of the Roman Villa of Casignana 21
Marco Antonio Mauro, Vincenzo Coniglio, Francesco Branca, Francesco Felicetti
Antonio Francesco Gentile, Domenico Luca Carnì, Laura Fabbiano, Francesco Lamonaca

A Sensing Platform for Personal Comfort Model Development and Application Based on Wearable and Environmental Sensors 27
Dianel Ago, Gloria Cosoli, Silvia Angela Mansi, Marco Arnesano

Spatial Mapping of Thermal Comfort for Data-Driven Indoor Spaces Design 33
Sara Meletani, Nicole Morresi, Vittoria Cipollone, Serena Serroni, Gian Marco Revel

Edge-Cloud Architecture for Sensor-Based Indoor Acoustic Monitoring in Buildings 39
Alessandra Galassi, Chiara Marchionni, Marianna Rotilio

Towards Privacy-Preserving Ladder-Walking Detection in Construction Environments Using Differential Privacy and Visual Data Protection 45
Eftichia Badeka, Ilias Koulalis, Konstantinos Ioannidis, Stefanos Vrochidis

Non-Destructive Investigation of Autoclaved Aerated Concrete by Shearography 50
Chiara Saltarelli, Melania Paturzo, Gianluca Coda, Vito Pagliarulo

From Material Development to Real-Scale Monitoring: An Integrated Methodological Framework for Innovative Construction Materials 55
Aggeliki Skaropoulou, Nikolaos Makris, Lampros Karalis, Maria Taxiarhou

Traceability and Uncertainty in Moisture Monitoring of Built/Urban Green Infrastructures: A Critical Scoping Review 61
Laura Fabbiano, Francesco Lamonaca, Rosario Morello

A Methodological Framework for Integrated Metrology Services Within an Open Innovation Test Bed 67
Maria Teresa Calcagni, Gian Marco Revel

Scalable and Secure Edge Video Surveillance without Cloud Dependency: An Open-Source, Forensic-Capable Architecture Based on Standard Protocols 73
Antonio Francesco Gentile, Emilio Greco, Davide Macri, Francesco Lamonaca, Peppino Fazio

Address Management for Dccs-Enabled Daas-Iot Distributed Measurement Systems in Cultural Heritage Monitoring 79
Peppino Fazio, Lorenzo Grillo, Pierpaolo Sestito, Sebastiano Meduri, Francesco Lamonaca

Securing IoT and Wireless Sensor Network Communications: A Comprehensive Performance Analysis of Layer 2/3 Tunneling and VPN Technologies in Linux-Based Edge Computing 85
Antonio Francesco Gentile, Emilio Greco, Davide Macrì, Peppino Fazio

Spatial-Resolution Harmonization and Bias Decomposition of Open Global Climate Datasets over European Built-Up Areas: the Case of ERA5-Land and TerraClimate 90
Alessandro Vitale, Francesco Lamonaca, Enrico Corrado Borgogno Mondino

T-CPSOCB: Transformers-Based CPSO Optimised CatBoost for Multimodal Emotion Recognition 96
Mario Collotta, Giuseppe L. Di Prima, Giovanni G. Iacuzzo, Angela Ricciardello, Marianna Ruggieri

Reinforcement Learning-Driven Optimal Uav Selection Framework for Efficient Uav-To-Uav Communication 101
Divyanshu Bhardwaj, Angel Kanjiya, Nilesh Kumar Jadav, Rajesh Gupta, Sudeep Tanwar Valerio Mario Salerno, Mario Collotta, Giovanni Pau

Quantum-Secured Onion Routing with Federated Learning for 5G-Enabled Spaceborne IoT Networks 107
Samiksha Gharmalkar, Bhavya Vora, Lakshin Pathak, Rajesh Gupta, Nilesh Kumar Jadav, Sudeep Tanwar Fabio Arena, Mario Collotta, Giovanni Pau

Evaluating Pre-Trained Audio Models for Activities of Daily Living Recognition 113
Amani Arioui, Christophe Lohr, Mihai Andries, Plinio Moreno

A Hybrid LSTM-AFT Approach for Environmental Nonconformity Prediction 119
Maura Mecchi, Valerio Colonnese

A Measurement Method for the Evaluation of the Muscular Fatigue During Physical Exercise 124
Francesco Felicetti, Simone Lanzino, Donato Ferrari, Simone Leone, Francesco Lago, Angelo Pellicori Giuseppe Carbone, Francesco Lamonaca

Quantifying Semantic Stability in AI-Mediated Emotional Support Environments 130
Donato Ferrari, Antonella Iuliano, Francesco Felicetti

BCG Integration on a Smart Toilet: Performance Evaluation 134
Ana Vieira, Pedro Correia, Florinda Costa, António Teixeira, Ana L. Silva, Cátia Leitão

Sensorized Glove for Local Hand Temperature Monitoring and Smart Heating 140
Carmine Ciofi, Riccardo Caponetto, Graziella Scandurra, Marco Pappalardo

Statistical Characterization of Jerk Magnitude for Human Activity Recognition Using Wearable Sensors 145
Gianluca Sartini, Sara Meletani, Sara Casaccia, Gian Marco Revel

A Measurement Framework for Distinguishing Human Activities Using Time-Frequency Analysis of Ultrasonic Sensors Data 151
Sara Meletani, Gianluca Sartini, Sara Casaccia, Gian Marco Revel

CogAAL: A Privacy-Preserving, Full-Stack Cognitive Architecture Integrating Local VLMs, Heterogeneous Robotics, and IoT for Proactive Ambient Assisted Living 157
Karameldeen Omer, Francesco Ferracuti, Andrea Monteriù

Numerical Investigation of the Role of Clapping and Friction in Cracks on Sideband Peak Count-Index Results 162
Luca Ferrulli, Anna Castellano, Aguinaldo Fraddosio

Image-Based Directional Characterization of Masonry Panels via Diagonal Compression Testing 167
Alessandro Montanino, Michele Betti, David Bru Orts, Luca Facchini, Mario Fagone Salvador Ivorra Chorro

Output-Only Dynamic Experimental Investigation of a Stand-Alone Trees 172
Giacomo Zini, Gianni Bartoli, Michele Betti, Francesco Clementi, Andrea Giachetti

Predictive Modeling for Urban Dynamics 176
Angela Ricciardello, Marianna Ruggieri, Carmelo Scuro

Neural Networks for Solving a PDE-Based Wildfire Propagation Model 182
Riccardo Scida, Giuseppe Alì, Francesco Lamonaca, Carmelo Scuro

Comparative Analysis of Finite Difference and Finite Element Methods for a Wildfire Spread Mathematical Model 188
Giuseppe Alì, Angela Ricciardello, Marianna Ruggieri, Carmelo Scuro

GIS-Based Wildfire Risk Mapping in Tourist WUI Areas of Calabria 194
Pierpaolo Antonio Fusaro, Pascale Vacca, Elsa Pastor, Francesco Demarco, Raffaele Mangiardi Pietro Pantano

Zero-Shot Degradation Segmentation on Historical Buildings Using Vision LLM and SAM2 200
Francesco Demarco, Federico De Francesca, Pierpaolo Antonio Fusaro, Pasquale De Nisi, Pietro Pantano

Denoising Autoencoder for Removing Noise From Radar Interferometric Signals on Historic Masonry Bridges 206
Antonietta Varasano, Anna Castellano, Aguinaldo Fraddosio, Gregorio Andria, Mario Daniele Piccioni

From Terrestrial Laser Scanner Survey to Finite Element Modelling for the Dynamic Assessment of a Historic Masonry Tower: The Torre Del Borgo Case Study 212
Ramona Quattrini, Renato Angeloni, Chiara Mariotti, Mattia Schiavoni, Francesco Clementi

Vibration-Based Damage Detection of Masonry Arch by Machine Learning 218
Mariella Diaferio, Anna Castellano

Preliminary Assessment of a Low-Cost DeepTag-Based Vision System for Structural Dynamic Testing 224
Sushant Chalise, Basanta Joshi, Francesco Picariello, Eulalia Balestrieri, Michela Monaco Arman Neyestani, Mauro D'Arco

Estimating the Fundamental Frequency of Masonry Towers Through Experimental Data and Physics-Guided Predictive Models 230
Francesca Roscini, Giulia Misseri, Silvia Monchetti, Michele Betti, Francesco Clementi

A Smart Device for Airborne Particulate Matter: An IoT Node to Improve the Quality of Life 236
Fabio Leccese, Carlo Venettacci, Mariagrazia Leccisi, Federico Fina, Simone Bernardini Giancarlo Della Ventura

Human-in-the-Loop AI, Distributed Sensing System, and LOLE.K Robotic Beds for Personalized Cardiac Rehabilitation: The ACCELERATE Study Protocol 242
Giovanni Granata, Gloria Cosoli, Antonio Luca Alfeo, Michele Bernardini, Chiara Buono Mariaconsiglia Calabrese, Nicola Ivan Giannoccaro, Vito Domenico Bruno, Giuseppe Tradigo Ornella Piazza, Gennaro Galasso

Wearable Sensors for Pediatrics: Evolution, Challenges, and Opportunities in Living Environments 248
Gloria Cosoli, Chiara Bencivenga, Marco Arnesano, Federica Verdini, Livio D'Alvia

A Time-Series AI Framework for Predictive Risk Assessment from Heterogeneous Sensor Data 254
Nicola Capece, Gilda Manfredi, Ugo Erra, Marika Pia Salvato, Hiba Youssef

Immersive VR Training for Fire Safety and Evacuation in Indoor Office Environments 260
Moatasim Mahmoud, Athanasios Papanikolaou, Stamatia Rizou

Evaluating Heatwave Risks in Barcelona: A Quantitative MULTICLIMACT Method and Spatial CLIMRES Strategy 265
Cristina Attanasio, Sabrina Febbraro, Florencia Victoria De Maio, Iason C. Dimitriou Apostolos Arsenopoulos, Alexandros Xenakis, Ruben Valsecchi, Celina Solari, Saimir Osmani

Towards Climate-Resilient Buildings: A Statistical Analysis to Identify Crucial Comfort Measurement Parameters for Occupant Well-Being 271
Nibras Abo Alzahab, Richard Kaculi, Gianluca Sartini, Gloria Cosoli, Rifat Seferi, Mina Moayyedi Rania Christoforou, Dianel Ago, Marco Arnesano, Marcel Schweiker, Gian Marco Revel

Personalised Comfort Metrology: Measuring the Reliability of Augmented Thermal Sensation Vote Data 277
Nibras Abo ALzahab, Richard Kaculi, Sara Casaccia, Serena Serroni, Gian Marco Revel

Integrating AI into Time-Sensitive Clinical Workflows: A BPMN-Driven Case Study on Acute Stroke Care 283
Alessandro Russo, Laura Cutrì, Salvatore Ammirato, Alberto Michele Felicetti, Domenico Conforti

Overcoming Modality Scarcity in Parkinson's Diagnosis Via Generative Geometric Deep Learning 289
Emanuele Barbieri, Simone Monaco, Daniele Apiletti

Wearable Monitoring for Early Cardiotoxicity Detection in Cancer Patients: The COMPASS Vision 295
Vincenzo Barbuto, Claudio Savaglio, Ivy S. Curren, Giovanna Liuzzo, Luigi Natale, Saverio Gravina Stephen J. Archibald, Raffaele Gravina

Metrologically Grounded Graph-Augmented Multimodal AI for Surgical Video Documentation in Smart Healthcare Environments 301
Cristian Cosentino, Fabrizio Marozzo, Francesco Felicetti, Francesco Lamonaca, Pietro Liò

An Immersive Virtual Reality Serious Game for Preparing Citizens to Flood Emergencies in Urban Built Environments 305
Gessica Sparvoli, Gabriele Bernardini, Leonardo Crescimbeni, Simone Balducci, Alberto Bussaglia Enrico Quagliarini, Serena Serroni

Integrating Machine Learning and Smart Wayfinding Solutions for Riverine Flood Emergency and Evacuation Management in Urban Built Environments 311
Alberto Bussaglia, Gabriele Bernardini, Matteo Postacchini, Serena Serroni, Tijs Maes, Enrico Quagliarini

Data-Driven Mean Radiant Temperature Measurement Using Ensemble Machine Learning: A Multi-Site Validation Study 317
Edoardo Sulpizii, Vittoria Cipollone, Serena Serroni, José L. Hernández García Juan Carlos Del Castillo García, Gian Marco Revel

Environmental Monitoring of the Santuario Della Beata Vergine Dei Miracoli Using a Self-Powered Hybrid System 323
Carlo Trigona, Giuliano A. Salerno, Rosaria Galvagno, Giuseppe Politi, Valeria Comite, Mattia Borelli Andrea Bergomi, Paola Fermo, Anna M. Gueli

LiveBetter: Accelerating Deep Renovation Through High-Quality Data and AI-Based Data-Driven Services 328
Daniela Stoian, Vasilis Michalakopoulos, Elissaios Sarmas, Efstathios Stamatopoulos Michalis Rachmanidis, Vangelis Marinakis

Real-Time Residential Energy Monitoring: Data Characterization and Quality Enforcement 334
Efstathios Sarantinopoulos, Vasilis Michalakopoulos, Konstantinos Perifanos, Elissaios Sarmas Vangelis Marinakis, Zoi Mylona, Athanasios Papakonstantinou

Indoor comfort measurement and User-Centered Dashboard for real world residential applications: A Comfort-as-a-Service Framework 340
Nibras Abo Alzahab, Vittoria Cipollone, Serena Serroni, Blanca Larraz Sancho-Tello, Ana Sanchis Huertas Gian Marco Revel, Miriam Navarro Escudero

A Co-Creation Approach to User Requirements for Data-Driven Living Environment Services 346
Adrienn Gelesz, Vittoria Cipollone, Julia Oravecz, Nibras Abo Alzahab, Daniela Stoian, Serena Serroni Andras Reith, Gian Marco Revel, Vasilis Michalakopoulos

Towards Intelligent Digital Building Logbooks and Transparency of the Built Environment: AI, Semantic Knowledge, and Digital Twins for Structural Resilience 352
Noémi Friedman, Petar Kochovski, Filippo Landi, Bence Popovics

A Hybrid IoT Network for Residential Energy Monitoring in Augmented Reality Environments 358
Annalisa Liccardo, Francesco Bonavolontá, Rosario Schiano Lo Moriello

Protecting Archaeological Heritage from Wildfire: Reaction–Diffusion Model at the Roman Villa of Casignana 364
Francesco Felicetti, Donato Ferrari, Francesco Lamonaca, Cristian Granata, Tommaso Ruga Carmelo Scuro, Luigi Teti, Eugenio Vocaturo, Ester Zumpano

Design of a Low-Cost Embedded Measurement System for Power Quality Event Detection and Classification 370
Domenico Luca Carní, Francesco Lamonaca

A Dual-Station IoT Monitoring System for Assessing Indoor Air Quality Variations Induced by FDM 3D Printing in Non-Industrial Environments 376
Giovanni Rianna, Alessandro Scognamiglio, Giorgio de Alteriis, Rosario Schiano Lo Moriello Adelaide Marzano, Alessia Teresa Silvestri

Comparative Numerical Modelling of Masonry Arches Using Simplified and High-Fidelity Interface Approaches 382
Natalia Pingaro, Ali Güney Özcebe, Barbara Borzi

A Low-Cost Portable Spectrophotometer Based on Hamamatsu C12880MA for Interior Design Applications 387
Federico Fina, Mariagrazia Leccisi, Fabio Leccese

Mathematical Modelling for Risk Mitigation: Designing Innovative Monitoring Systems for Infrastructure and the Environment 393
Carmelo Scuro