2022 IEEE International Workshop on Metrology for Automotive (MetroAutomotive 2022)

Modena, Italy
4 – 6 July 2022

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

CURRAN ASSOCIATES INC.
proceedings
.com

WORKSHOP PROGRAM

Tuesday, July 5

TECHNICAL SESSION 1 - Innovative sensors and systems for the near future automotive world
Room: Building 25 - Room P1.2
Chairs: Elia Landi, *University of Siena, Italy*
        Lorenzo Parri, *University of Siena, Italy*

  1 **High Performance Analog MEMS for IoT Based Condition Monitoring, Characterization with a Bearing Failure Emulation Test Bench**
     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

  6 **A Wirelessly-Powered Embedded System for Temperature Measurements of a High Performance Electric Motor Rotor**
     Mariano Nerone, HPE Coxa, Italy
     Igor Valic, HPE Coxa, Italy
     Matteo Zauli, University of Bologna, Italy
     Alberto Leonardi, HPE Coxa, Italy
     Nicola Matteazzi, HPE Coxa, Italy
     Luca De Marchi, University of Bologna, Italy

 12 **Roller Bearing Failures Classification with Low Computational Cost Embedded Machine Learning**
     Matteo Bertocco, University of Padova, Italy
     Ada Fort, University of Siena, Italy
     Elia Landi, University of Siena, Italy
     Marco Mugnaini, University of Siena, Italy
     Lorenzo Parri, University of Siena, Italy
     Giacomo Peruzzi, University of Siena, Italy
     Alessandro Pozzebon, University of Padova, Italy

TECHNICAL SESSION 2 - Sensors and instruments for improving the sustainability of e-vehicles on the distribution grid
Room: Building 25 - Room P1.2
Chairs: Marco Pasetti, *University of Brescia, Italy*
        Stefano Rinaldi, *University of Brescia, Italy*
        Carmine Landi, *University of Campania L. Vanvitelli, Italy*

 18 **A TinyML Soft-Sensor for the Internet of Intelligent Vehicles**
     Thommas Flores, Federal University of Rio Grande do Norte, Brazil
     Marianne Silva, Federal University of Rio Grande do Norte, Brazil
     Pedro Andrade, Federal University of Rio Grande do Norte, Brazil
     Jord~ao Silva, Federal University of Rio Grande do Norte, Brazil
     Ivanovitch Silva, Federal University of Rio Grande do Norte, Brazil
     Emiliano Sisinni, University of Brescia, Italy
     Paolo Ferrari, University of Brescia, Italy
     Stefano Rinaldi, University of Brescia, Italy

 24 **The Role of Vehicle to Grid Technology for Enhancing Power Distribution System Flexibility**
     Antonio Pepiciello, University of Sannio, Italy
     Alfredo Vaccaro, University of Sannio, Italy

TECHNICAL SESSION 3 - General Session Part 1

Room: Building 25 - Room P1.2
Chair: Pier Andrea Traverso, *University of Bologna, Italy*

TECHNICAL SESSION 4 - Measurement for improving Quality, Reliability and Safety in Automotive Applications

Room: Building 25 - Room P1.2
Chairs: Lorenzo Ciani, *University of Florence, Italy*
          Gabriele Patrizi, *University of Florence, Italy*

70 **Research on the Verification Method of the Electronic Police System for Capturing the Illegal Distance Between Vehicles**

Hao Tang, Hunan Institute of Metrology and Test, China
Weixian Zeng, Hunan Institute of Metrology and Test, China
Wenhui Lin, Hunan Institute of Metrology and Test, China
Lan Yin, Hunan Institute of Metrology and Test, China
Yihong Xia, Hunan Institute of Metrology and Test, China
Qiuxi Deng, Hunan Institute of Metrology and Test, China
Zheng Peng, Hunan Institute of Metrology and Test, China
Fu Lin, Hunan Institute of Metrology and Test, China
Jiawei Yue, Hunan Institute of Metrology and Test, China
Feilong Wang, Potelissom Company Limited, China

76 **Entangled Bimodal Vision in Vehicles for Decision During Risk Situation**

Amit K. Kumar, Beijing Institute of Technology, China
Mansour H. Assaf, The University of the South Pacific, Republic of Fiji
Voicu Z. Groza, University of Ottawa, Canada
Emil M. Petriu, University of Ottawa, Canada

82 **Remaining Useful Life estimation for electric vehicle batteries using a similarity-based approach**

Marcantonio Catelani, University of Florence, Italy
Lorenzo Ciani, University of Florence, Italy
Francesco Grasso, University of Florence, Italy
Gabriele Patrizi, University of Florence, Italy
Alberto Reatti, University of Florence, Italy

88 **Assessment of the Efficiency Measurement Uncertainty and the Impact on Validation for Electric Drive Systems**

Uday Akasapu, AVL List GmbH, Austria
Michael Leighton, AVL List GmbH, Austria

Wednesday, July 6

TECHNICAL SESSION 5 - Electrical and mechanical measurement techniques for vehicles and automotive production

Room: Building 25 - Room P1.2
Chairs: Grazia Iadarola, *Polytechnic University of Marche, Italy*
Susanna Spinsante, *Polytechnic University of Marche, Italy*

94 **Driver Drowsiness Detection based on Variation of Skin Conductance from Wearable Device**

Andrea Amidei, University of Modena and Reggio Emilia, Italy
Angelica Poli, Polytechnic University of Marche, Italy
Grazia Iadarola, Polytechnic University of Marche, Italy
Federico Tramarin, University of Modena and Reggio Emilia, Italy
Paolo Pavan, University of Modena and Reggio Emilia, Italy
Susanna Spinsante, Polytechnic University of Marche, Italy
Luigi Rovati, University of Modena and Reggio Emilia, Italy

99 **Using Periodic Sequences for HRTFs Measurement Robust Towards Nonlinearities in Automotive Audio Applications**

S. Cecchi, Università Politecnica delle Marche, Italy
V. Bruschi, Università Politecnica delle Marche, Italy
S. Nobili, Università Politecnica delle Marche, Italy
A. Terenzi, Università Politecnica delle Marche, Italy
A. Carini, University of Trieste, Italy

105 **Analysis of vehicle vibration through automotive radar signal**
Gianluca Ciattaglia, Polytechnic University of Marche, Italy
Grazia Iadarola, Polytechnic University of Marche, Italy
Lorenzo Minelli, Polytechnic University of Marche, Italy
Filippo Pimpini, Polytechnic University of Marche, Italy
Noemi Tridenti, Polytechnic University of Marche, Italy
Linda Senigagliesi, Polytechnic University of Marche, Italy
Susanna Spinsante, Polytechnic University of Marche, Italy
Ennio Gambi, Polytechnic University of Marche, Italy

TECHNICAL SESSION 6 - Electrical and mechanical measurement techniques for vehicles and automotive production
Room: Building 25 - Room P1.2
Chair: Alberto Morato, *IEIIT-CNR, Italy*

111 **A flexible machine learning based framework for state of charge evaluation**
Mattia Stighezza, University of Parma, Italy
Valentina Bianchi, University of Parma, Italy
Andrea Toscani, University of Parma, Italy
Ilaria De Munari, University of Parma, Italy

116 **On the Use of Artificial Intelligence and Sensor Fusion to Develop Accurate Eye Tracking and Driver's Emotional State Estimation Systems**
Tommaso Fedullo, University of Padova, University of Modena and Reggio Emilia, Italy
Valentina Di Pinto, University of Modena and Reggio Emilia, Italy
Alberto Morato, CNR-IEIIT, Italy
Federico Tramarin, University of Modena and Reggio Emilia, Italy
Stefano Cattini, University of Modena and Reggio Emilia, Italy
Luigi Rovati, University of Modena and Reggio Emilia, Italy

122 **Artificial Intelligence - Based Measurement Systems for Automotive: a Comprehensive Review**
Tommaso Fedullo, University of Padova, University of Modena and Reggio Emilia, Italy
Alberto Morato, CNR-IEIIT, Italy
Federico Tramarin, University of Modena and Reggio Emilia, Italy
Stefano Cattini, University of Modena and Reggio Emilia, Italy
Luigi Rovati, University of Modena and Reggio Emilia, Italy

128 **Drivers' Attention Assessment by Blink Rate Measurement from EEG Signals**
Antonio Affanni, University of Udine, Italy
Taraneh Aminosharieh Najafi, University of Udine, Italy

TECHNICAL SESSION 7 - General Session - Part 2
Room: Building 25 - Room P1.2
Chair: Stefano Cattini, *University of Modena and Reggio Emilia, Italy*

133 **Simulating optical properties to access novel metrological parameter ranges and the impact of different model approximations**
Patrick Muller, University of Applied Sciences Dusseldorf, Germany
Alexander Braun, University of Applied Sciences Dusseldorf, Germany

139 **A vehicle integrated thermal management system for electric busses**
Luca Muratori, University of Bologna, Italy
Lorenzo Peretto, University of Bologna, Italy
Beatrice Pulvirenti, University of Bologna, Italy
Raffaella Di Sante, University of Bologna, Italy
Giovanni Bottiglieri, Webasto Thermo & Comfort, Italy
Federico Coiro, Webasto Thermo & Comfort, Italy

145 **Optical techniques applied to internal combustion engines for soot detection – a review**
Luca Marchitto, STEMS-CNR, Italy
Cinzia Tornatore, STEMS-CNR, Italy