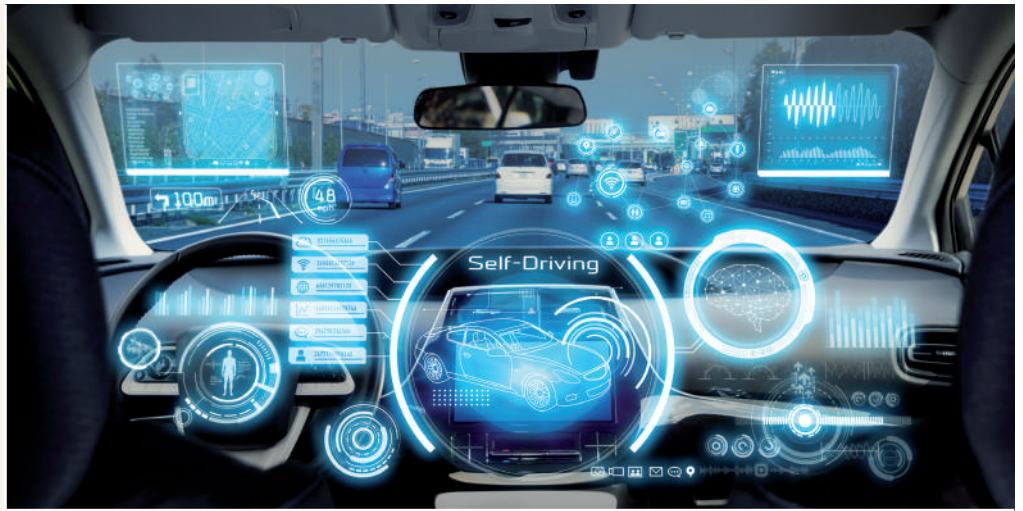


AUTO MOTIVE

Virtual Conference
17-19, November 2021



Organized by



International Conference on Electrical and Electronic Technologies for Automotive

Programme

AEIT AUTOMOTIVE 2021 Conference, after 5 successful editions, will be held on November, 17-19 to host regular papers in several areas of the multiform automotive and e-mobility fields.

In light of the escalating spread of the Coronavirus (Covid-19) around the world, **AEIT AUTOMOTIVE** will be a virtual conference: technical sessions will be virtually held and speakers and attendants will be worldwide connected. The 6th AEIT International Conference on Electrical and Electronic Technologies for Automotive (**AEIT AUTOMOTIVE 2021**) aims to be a solid

reference of the technical community to present and discuss the most recent results of scientific and technological research for the automotive industry, with particular emphasis to applications and new trends. The Conference covers all aspects of the segment focusing on electrical vehicles, connected autonomous cars, special vehicles, and e-mobility.

AEIT AUTOMOTIVE 2021 will bring together in an annual event the Electrical and Electronic specialists, Mechanical and Systems Engineers, and the Information and Communication Technology specialists. The Steering and the Technical Program Committee include experts from the Academic world, Associations,

Key Industrial Stakeholders and Regulatory Authorities.

Scientific Sessions Key tracks are:

1. **Hybrid and electric powertrains and emission regulations**
2. **Energy infrastructures, fuel cells, and batteries**
3. **Advanced driver assistance systems and autonomous driving, safety and connectivity**
4. **Mobility, smart cities, energy grid, and communication networks**
5. **Power Electronics, Active and Passive Components, sensors and transducers**

AEIT AUTOMOTIVE 2021 is aimed at an academic and industrial audience, professionals active in automotive, including designers, manufacturers and users of technology, as well as analysts and investors interested in this sector in great development and of high social impact.

in cooperation with



technical co sponsorship of



JOINT ITALY CHAPTER



IEEE ITALY SECTION
IA/PEL C&S Italy Joint Chapter
IA34/PEL35



Wednesday, November 17, 2021

9:00-9:30 **Plenary Room**

Welcome Statements

Angelo Raciti - *AEIT Automotive 2021 General Chair*

Debora Stefani - *AEIT General President*

Riccardo Lama - *CEI President*

Sergio Rapuano - *IEEE Italy Section Chair*

9:30-10:10 **Plenary Room**

Opening Plenary Session - Keynote speech 1

Chair: Giuseppe Buja - *University of Padoa, Italy*

Advances in Wireless Power Transfer

Chun T. Rim - *GIST, Gwangju, Korea (South)*

10:20-11:20 **Room A**

Technical Session 1 Power Converters for Automotive Applications

Chair: Carlo Cecati - *University of L'Aquila, Italy*

1.1 - Effects of Control Strategies on AC-DC Conversion Efficiency in EV Wireless Charging

Fabio Corti and Alberto Reatti (University of Florence, Italy), Salvatore Musumeci (Politecnico di Torino, Italy)

1.2 - Class-E Inverters for Capacitive Wireless Power Transfer in Charger Circuit Applications

Fabio Corti and Alberto Reatti (University of Florence, Italy), Salvatore Musumeci (Politecnico di Torino, Italy)

1.3 - Impact of Nonlinear Inductor on Efficiency and Power Losses in a SMPS: a Case Study

Daniele Scirè and Giuseppe Lullo (University of Palermo, Italy), Gianpaolo Vitale (Consiglio Nazionale delle Ricerche, Italy)

1.4 - Interleaved Bidirectional Buck Converter for Mild Hybrid Applications adopting Monolithic

GaN technology

Mario Cacciato, Gabriele Nicolosi, Santi Agatino Rizzo and Giuseppe Scarcella (University of Catania, Italy), Federica Cammarata, Giuseppe Longo and Filippo Scrimizzi (STMicroelectronics, Italy)

11:30-13:00 **Room B**

Technical Session 2 Advanced and Wide Band Gap device applications in automotive

Chair: Giuseppe Gattavari - *AEIT-AMES, Italy*

2.1 - Wide SOA MOSFET technology for hot swap and inrush current limiter solutions

Filippo Scrimizzi, Carmelo Mistretta and Giusy Gambino (STMicroelectronics, Italy)

2.2 - Silicon and Wide Bandgap technologies in automotive power electronics and their applications

Antonio Imbruglia, Francesco Gennaro and Gianfranco Di Marco (STMicroelectronics, Italy)

2.3 - Low-Voltage GaN Based Inverter for Power Steering Application

Salvatore Musumeci and Fabio Mandrile (Politecnico di Torino, Italy),

Marco Palma (EPC Europa, Italy), Vincenzo Barba (Politecnico di Torino, Italy)

2.4 - High Frequency Model of a SiC based DC-DC converter for on Board Electric Systems

Enrico Bottaro (University of Catania, Italy), Andrea Del Pizzo and Luigi Pio Di Noia (University of

Naples Federico II, Italy), Domenico Nardo (STMicroelectronics, Italy), Santi Agatino Rizzo

(University of Catania, Italy), Alfio Scuto (STMicroelectronics, Italy)

2.5 - Experimental investigation on a cascode-based three-phase inverter for AC drives

Filippo Pellitteri, Antonino Oscar Di Tommaso, Rosario Miceli, Alessandro Busacca and

Giorgio Vassallo (University of Palermo, Italy)

13:00-14:30 **Interval**

14:30-15:45 Room A - Technical Session 3 Battery

Chair: Giuseppe Mauri - *Ricerca sul Sistema Energetica - RSE*

3.1 - High-rate cycling performance of lead-acid batteries with nanostructured electrodes
Roberto Luigi Oliveri, Mariagrazia Insinga, Daniela Tamburrino, Fabrizio Ganci, Bernardo Patella, Giuseppe Aiello, Patrizia Livreri and Rosalinda Inguanta (University of Palermo, Italy)

3.2 - Charging Infrastructure Sizing for the Electrification of a Bus Line

Carola Leone, Michela Longo, Luca Corradini, Marco Monti and Dario Zaninelli (Politecnico di Milano, Italy)

3.3 - Measuring electric properties of a conductive electric road

David Wenander, Philip Abrahamsson, Francisco J. Márquez-Fernández and Mats Alakula (Lund University, Sweden)

3.4 - A 2.6 V-10 uA Nanorectenna Harvester based on thermal radiation of the car exhaust system

Patrizia Livreri (University of Palermo, Italy)

3.5 - Battery sources and power converters Interface in waterborne transport applications

Michele Pastorelli, Fabio Mandrile and Salvatore Musumeci (Politecnico di Torino, Italy)

16:00-16:30 Room B

Technical Session 4 Next Generation Electric Vehicle Charging Stations

Chair: Giuseppe Mauri - *Ricerca sul Sistema Energetica - RSE*

4.1 - Voltage Sag Mitigation using DVR in Grid fed EV Fast Charging Station

Manmadha Rao, R j Satputaley, Ritesh Keshri and Nita R Patne (Visvesvaraya National Institute of Technology, India), Giuseppe Buja (University of Padoa, Italy)

4.2 - Technologies for Electric Vehicle Utilization for Electric Power Optimal Management

Mario Mezzarobba, Alberto Tessarolo, Nicola Blasuttigh, Alessandro Massi Pavan, Simone Castellan and Stefano Pastore (University of Trieste, Italy)

16:30-18:30 Panel I/II (in parallel)

Plenary Room - Panel I The future of distribution system with e-mobility

Organizers: Regina Lamedica - *Sapienza University of Rome, Italy,*

Fabrizio Pilo - *University of Cagliari, Italy*

Chair: Fabrizio Pilo - *University of Cagliari, Italy*

Speakers:

Marco di Clerico - *e-distribuzione - ENEL, Italy*

Ricardo Prata - *e-redes, Portugal*

Bendik Torsater - *SINTEF, Norway*

Mattia Marinelli - *Technical University of Denmark (DTU), Denmark*

Andrea Ruffini - *Unareti, Italy*

Gianluca Serale - *IREN, Italy*

Room A - Panel II Technology and innovation for answering the Vehicle-to-grid Market, Regulation, and Standardization challenges

Organizers: Fabrizio Pilo - *University of Cagliari, Italy,*

Giuseppe Tomasso - *University of Cassino and Southern Lazio, Italy*

Chair: Giuseppe Tomasso - *University of Cassino and Southern Lazio, Italy*

Speakers:

Stephan Hell - *KOSTAL Industrie Elektrik GmbH, Germany*

Manuel Di Frangia - *MODIS, Italy*

Luca Dalessandro - *CLEMAP, Switzerland*

Salvatore Pirozzi - *Kineton, Italy*

Emanuele Regalini - *ARERA, Italy*

Thursday, November 18, 2021

9:00-9:50 *Plenary Room*

Keynote Speech 2

Chair: Giovanni Cancellieri - AEIT-AICT, Italy

Adaptable Communication System (ACS): an alternative approach for the future communications in the transport sector

Romeo Giuliano - *University of Rome Guglielmo Marconi, Italy*, Anna Maria Vegni - *University of Rome TRE, Italy*, Franco Mazzenga, Alessandro Vizzari - *University of Rome Tor Vergata, Italy*

Speaker: Franco Mazzenga - *University of Rome Tor Vergata, Italy*

10:00-11:00 *Room A*

Technical Session 5 Advanced driver assistance systems and autonomous driving, safety and connectivity: environmental perception

Chair: Giovanni Cancellieri - AEIT-AICT, Italy

5.1 - Intelligent Saliency-based Deep Pedestrian Tracking System for Advanced Driving Assistance

Francesco Rundo and Sabrina Conoci (STMicroelectronics, Italy), Roberto Leotta and Sebastiano Battiato (University of Catania, Italy)

5.2 - Integrated Path Planning and Lateral-Longitudinal Control for Autonomous Electric Vehicles
Adorjan Kovacs and Istvan Vajk (Budapest University of Technology and Economics, Hungary)

5.3 - Two algorithms for vehicular obstacle detection in sparse pointcloud

Simone Mentasti, Matteo Matteucci, Stefano Arrigoni and Federico Cheli (Politecnico di Milano, Italy)

5.4 - Gradient Reversal Domain Adaptation Pipeline in Advanced Driver Assistance Systems
Francesco Rundo (STMicroelectronics, Italy), Roberto Leotta, Sebastiano Battiato and Concetto Spampinato (University of Catania, Italy), Sabrina Conoci (University of Messina, Italy)

11:10-12:10 *Room B*

Technical Session 6 Advanced driver assistance systems and autonomous driving, safety and connectivity: user acceptance

Chair: Alessandro Vizzari - *University of Rome Tor Vergata, Italy*

6.1 - Intelligent Road Surface Categorization for Self Adaptive Driving Assistance Systems
Francesco Rundo (STMicroelectronics, Italy), Roberto Leotta and Sebastiano Battiato (University of Catania, Italy)

6.2 - A decision support framework for autonomous driving in normal and emergency situations
Wei Xu, Rémi Sainct, Dominique Gruyer and Olivier Orfila (University Gustave Eiffel, France)

6.3 - An interactive human-machine control interface for an autonomous shuttle
Satyesh Shanker Awasthi, Pawas Awasthi, Stefano Arrigoni and Francesco Braghin (Politecnico di Milano, Italy)

6.4 - Battery Electric Vehicles Platooning: Assessing Capability of Energy Saving and Passenger Comfort Improvement

Matteo Spano, Alessia Musa, Pier Giuseppe Anselma, Daniela Misul, Giovanni Belingardi (Politecnico di Torino, Italy)

12:20-13:00 Room A

Technical Session 7 Advanced driver assistance systems and autonomous driving, safety and connectivity: motion planning

Chair: Romeo Giuliano - *University of Rome Guglielmo Marconi, Italy*

7.1 - Adaptable Communication System (ACS) for Flexible Communications in the Transport Sector: the AB4Rail project experience

Romeo Giuliano (University of Rome Guglielmo Marconi, Italy), Franco Mazzenga, Alessandro Vizzari, University of Rome Tor Vergata), Anna Maria Vegni (University of Rome TRE, Italy)

7.2 - Design of a prototypical platform for autonomous and connected vehicles

Stefano Arrigoni, Simone Mentasti, Federico Cheli, Matteo Matteucci and Francesco Braghin (Politecnico di Milano, Italy)

7.3 - On the use of code-based cryptography in automotive applications

Massimo Battaglioni, Giovanni Cancellieri and Paolo Santini (Università Politecnica delle Marche, Italy)

13:00-14:30 Interval

14:30-16:00 Plenary Room

Panel III Industry trends in automotive connectivity (perspectives from Industry leaders, OEM, System Integrators)

Organizers: Pierpaolo Marchese - *AEIT-AICT, Italy*, Lucia Lo Bello - *University of Catania, Italy*

Chair: Lucia Lo Bello - *University of Catania, Italy*

Speakers:

Luca Russotti - *STMicroelectronics, Italy*

Gabriele Elia - *TIM, Italy*

Federico Veggia Bombardi - *Politecnico di Torino, Italy*

Gianluca Cerio - *Teoresi, Italy*

16:10- 18:10 Room A

Panel IV Funded Projects and future in the frame of ECSEL for Automotive: Lighthouse projects

Organizers: Livio Baldi - *AEIT-AMES, Italy*, Lucia Lo Bello - *University of Catania, Italy*

Chair: Livio Baldi - *AEIT-AMES, Italy*

Speakers:

Jean-Luc di Paola Galloni - *Valeo, France*

Cristina Deluca - *INFINEON technologies AG, Germany*

Fabio Tango - *Centro Ricerche Fiat, Italy*

Filippo Di Giovanni - *STMicroelectronics, Italy*

Reiner John - *AVL List GmbH Graz, Austria*

18:20-19:30 Room B

Panel VI Infrastructures development for zero-impact vehicles: where are we now?

Organizers: Regina Lamedica and Alessandro Ruvio - *Sapienza University of Rome, Italy*

Chair: Alessandro Ruvio - *Sapienza University of Rome, Italy*

Speakers:

Pablo Arboleya – *Oviedo University, Spain*

Cristina Faustino Agreira – *Polytechnic Institute of Coimbra, Portugal*

Antonio Coccia – *ENEL X, Italy*

Livio De Santoli – *Sapienza University of Rome, Italy*

Friday, November 19, 2021

9:00-10:30 **Tutorials I/II/III (in parallel)**

Plenary Room

Tutorial I Proactive training tool in driver training – teaching assistance systems of various automation levels

Aleksandra Rodak, Mikolaj Kruszewski, Malgorzata Pelka - *Motor Transport Institute, Poland*
Chair: Antonio Imbruglia - *STMicroelectronics, Italy*

Room A

Tutorial II The energy needs of the circulating fleet as an enabling factor for the transition to zero-emission vehicles

Claudio Rossi - *University of Bologna, Italy*
Chair: Massimo Ceraolo - *University of Pisa, Italy*

Room B

Tutorial III The vehicle as a communication hub: state of the art of the technical standardisation

Pierpaolo Marchese - *AEIT-AICT, Italy*, Lucia Lo Bello - *University of Catania, Italy*
Chair: Franco Mazzenga - *University of Rome Tor Vergata*

11:00-12:00 **Room B**

Technical Session 8 Mobility, smart cities, energy grid, and communication networks I

Chair: Carlo Alberto Nucci - *University of Bologna, Italy*

8.1 - Improved Person Counting Performance Using Kalman Filter Based on Image Detection and Tracking

Daniele Vignarca, Jai Prakash, Michele Vignati and Edoardo Sabbioni (Politecnico di Milano, Italy)

8.2 - In the City-as-a-Platform: the case of Mobility-as-a-Service

Giorgio Pizzi (Ministry of Infrastructure and Sustainable Mobility, Italy)

8.3 - Experimental assessment of TSN support in heterogeneous platforms with virtualization for automotive applications

Bartolomeo Caruso, Luca Leonardi, Lucia Lo Bello and Gaetano Patti (University of Catania, Italy)

8.4 - Private Wireless Networks for Automotive: spectrum analysis in 5G frequency bands

Claudia Carciofi, Valeria Petrini, Manuel Faccioli, Marcello Folli, P. Eng and Simona Valbonesi (Fondazione Ugo Bordoni, Italy)

12:00-13:00 **Room A**

Technical Session 9 Mobility, smart cities, energy grid, and communication networks II

Chair: Carlo Alberto Nucci - *University of Bologna, Italy*

9.1 - The major opportunities of Blockchain for Automotive Industry: a Review

Franco Mazzenga and Alessandro Vizzarri (University of Rome Tor Vergata, Italy), Romeo

Giuliano (University of Rome Guglielmo Marconi, Italy)

9.2 - The Regulation of both Algorithms and Artificial Intelligence under the GDPR: Case Law and Proposed Legislation

Raffaele Zallone - *Studio Legale Zallone, Italy*

9.3 E-mobility for persons with disabilities: a project for the Sapienza University of Rome

Regina Lamedica, Fabio Massimo Gatta, Marco Maccioni, Nicola Mortelliti and

Alessandro Ruvio (Sapienza University of Rome, Italy)

9.4 - Impact of e-mobility participation in the ancillary service market on the operation of high-density urban low voltage distribution networks

Fabrizio Pilo, Giuditta Pisano, Simona Ruggeri and Gian Giuseppe Soma (University of Cagliari, Italy), Davide Falabretti, Samuele Grillo and Francesco Gulotta (Politecnico di Milano, Italy)

9.5 - Modular Distribution System for EV Parks

Giuseppe Parise (Sapienza University of Rome, Italy), Marco Allegri (Italferr, Italy), Raffaele Pennacchia (Italian Parliament, Italy)

13:00-14:30 Interval

14:30-15:00 Room B

Technical Session 10 Hybrid and electric powertrains and emission regulations

Chair: Davide Tarsitano - Politecnico di Milano

10.1 - A novel turbo-assisted mild-hybrid configuration for a city car: compressor electric drive Characterization

Giovanni Mercurio Casolino, Sara Perna and Mario Russo (University of Cassino and Southern Lazio, Italy), Roberto Capata (Sapienza University of Rome, Italy)

10.2 - Modeling of a single wheel test bench for blended electric and hydraulic brake testing
Michele Vignati, Davide Tarsitano and Edoardo Sabbioni (Politecnico di Milano, Italy)

15:15-16:30 Plenary Room

Student Contest

Chair: TBD

1 - Access Control in woodland through Blockchain and LoRaWAN

Lorenzo Felli and Romeo Giuliano (University of Rome Guglielmo Marconi, Italy)

2 - Emulation of Rail and Automotive Applications based on Adaptable Communication System

Antonino Calderone and Romeo Giuliano (University of Rome Guglielmo Marconi, Italy)

3 - CNN-based Passenger Detector for Public Transport Vehicles

Eros Innocenti and Romeo Giuliano (University of Rome Guglielmo Marconi, Italy)

4 - Self-Sovereign Identity and Blockchain applications for the automotive sector

Marta L. Alessandria and Alessandro Vizzarri (University of Rome Tor Vergata, Italy)

5 - Integrated Wi-Fi and LoRa network on UAVs for localizing people during SAR operations

Antonello Calabrò (CNR, Italy), Romeo Giuliano (University of Rome Guglielmo Marconi, Italy)

16:30-16:45 Plenary Room

Awards Ceremony of the Student Contest

17:00-19:00 Panel V/VII (in parallel)

Room A

Panel V Education and lifelong learning in Automotive: present status and future perspective

Organizers: Francesco Leali - University of Modena & Reggio Emilia, Italy, Lorenzo

Peretto - University of Bologna, Italy

Chairs: Francesco Leali - University of Modena & Reggio Emilia, Italy, Lorenzo

Peretto - University of Bologna, Italy

Speakers:

Alberto Bassi - Dallara, Italy

Giovanni Belingardi - Polytechnic of Turin, Italy

Gianpiero Mastinu - Polytechnic of Milan, Italy

Enrico Sangiorgi - University of Bologna, Italy

Roberto Fedeli - Silk, Italy

TBD - Ducati Academy, Italy

Room B

Panel VII Future Trend of mobility: Pilot Projects

Organizers: Morris Brenna and Michela Longo - *Politecnico di Milano, Italy*

Chairs: Morris Brenna and Michela Longo - *Politecnico di Milano, Italy*

Speakers:

Marta Stellin - *RFI, Italy*

Andrea Vezzoli - *Brebemi, Italy*

Alessandro Borselli - *Trenord, Italy*

Silvia Verace - *A2A, Italy*

19:00

Conference Closure