

AUTO MOTIVE

Modena, Italy
July 17-19, 2023

University of Modena
and Reggio Emilia



International Conference on Electrical and Electronic Technologies for Automotive

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AEIT AUTOMOTIVE 2023 Conference will be held on July 17-19, 2023 in Modena to host regular papers in several areas of the multiform automotive field. The 7th AEIT International Conference on Electrical and Electronic Technologies for Automotive (**AEIT AUTOMOTIVE 2023**) 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 6 tracks:

- **Track 1: Energy storage, fuel cells, and batteries**
- **Track 2: Advanced driver assistance systems and autonomous driving, safety and connectivity**
- **Track 3: Smart mobility and energy grid**
- **Track 4: Power Electronics, active and passive components, sensors and transducers**
- **Track 5: AI for automotive: Hardware and software architectures**

- **Track 6: Electric Motors and Drives for green transportation**

AEIT AUTOMOTIVE 2023 will bring together the Electrical and Electronic Automotive specialists with the Information and Communication Technology ones. The Executive and the Technical Program Committee include experts from the Academic world, Associations, Key Industrial Stakeholders and Regulatory Authorities.

AEIT AUTOMOTIVE 2023 will be structured in Scientific Sessions, including both lectures and poster sessions, Key-note Speeches, Round tables and Panel discussions, covering current electric automotive scenario with its national and international perspectives, development trends and the regulatory framework.

AEIT AUTOMOTIVE 2023 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.

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PROGRAMME OVERVIEW

Monday, July 17

08:30	Registration
09:30-10:00	Welcome Statements
10:00-10:40	Room A • Plenary • Keynote speech <i>Chair: Enrico Sangiorgi - University of Bologna, Italy</i> <i>Speaker: Giorgio Cornacchia - Stellantis, Italy</i>
10:40-13:00	Room A • TECHNICAL SESSION A1 <ul style="list-style-type: none"> • Advanced driver assistance systems and autonomous driving, safety and Connectivity <i>Chair: Paolo Burgio - University of Modena and Reggio Emilia, Italy</i> 8 Technical Papers
10:40-11:30	Room B • TECHNICAL SESSION B1 <ul style="list-style-type: none"> • Energy storage, fuel cells, and batteries <i>Chair: Massimo Ceraolo - University of Pisa, Italy</i> 3 Technical Papers
11:30-13:00	Room B • Keynote speech <ul style="list-style-type: none"> • Telecommunications networks, digital platforms and technologies to support the mobility of the future <i>Alessandro Vizzari - University of Rome Tor Vergata, Italy</i> PANEL • Advanced mobility (assisted/autonomous) and technologies: the state of art, opportunities, challenges and market trends <i>Chair: Giovanni Cancellieri - AEIT-AICT, Italy</i>
13:00-14:30	Lunch
14:30-16:00	Room A • TECHNICAL SESSION A2 <ul style="list-style-type: none"> • Smart mobility and energy grid I <i>Chair: Carlo Alberto Nucci - University of Bologna, Italy</i> Keynote speech <ul style="list-style-type: none"> • The bottleneck for the electrification of heavy duty trucks <i>Claudio Rossi - University of Bologna, Italy</i> 5 Technical Papers
14:30-16:00	Room B TUTORIAL <ul style="list-style-type: none"> • WAN Communication Standards in Automotive <i>Pierpaolo Marchese - Independent Consultant, AEIT Member, Italy</i>
16:15-16:30	HPE Venue Coffee Break
16:30-18:30	Room HPE SPECIAL SESSION <ul style="list-style-type: none"> • Funded Projects and future in the frame of ECSEL/KDT for Automotive <i>Organizers: Livio Baldi, Antonio Imbruglia - AEIT-AMES, Italy</i> <i>Chair: Livio Baldi - AEIT-AMES, Italy</i> Keynote speech <ul style="list-style-type: none"> • Smart Charging and V2X: an opportunity for the e-mobility and energy industry <i>Davide De Michino - ENEL</i>

PROGRAMME OVERVIEW

Tuesday, July 18

09:20-10:00	Room A • Plenary Keynote speech <i>Chair: Antonio Imbruglia - AEIT-AMES, Italy</i> <i>Speaker: Andrea Pontremoli - Dallara, Italy</i>
10:00-11:15	Room A • TECHNICAL SESSION A3 • Smart mobility and energy grid II <i>Chair: Fabrizio Pilo - University of Cagliari, Italy</i> 5 Technical Papers
10:00-11:15	Room B • TECHNICAL SESSION B2 • AI for automotive: Hardware and software architectures <i>Chair: Angelo Garofalo - University of Bologna, Italy</i> 3 Technical Papers
11:15-11:30	Coffee Break
11:30-13:00	Room A • TECHNICAL SESSION A4 • Power Electronics, active and passive components, sensors and transducers I <i>Chair: Matteo Meneghini - University of Padua, Italy</i> 5 Technical Papers
11:30-13:00	Room B PANEL • The electrification of depots intended for local public transport: From the Feasibility technical-economic to future development forecasts <i>Chair: Alessandro Ruvio - Sapienza University of Rome, Italy</i>
13:00-14:30	Lunch
14:30-16:00	Room A • TECHNICAL SESSION A5 • Power Electronics, active and passive components, sensors and transducers II <i>Chair: Matteo Meneghini - University of Padua, Italy</i> 4 Technical Papers
14:30-16:00	Room B PANEL • Advanced mobility (assisted/autonomous) in the smart cities of the future: experiences, projects and initiatives <i>Chair: Alessandro Vizzari - University of Rome Tor Vergata, Italy</i>
16:00-16:15	Coffee Break
16:15-17:00	Room A • Plenary • MUNER: a four wheel drive university for the next generation vehicle engineer
17:00-18:00	Room A • Plenary • Formula Driverless the new challenge for the UNIMORE passionate students
20:30	Conference Dinner

PROGRAMME OVERVIEW

Wednesday, July 19

09:00-09:40	Room A • Plenary Keynote speech <i>Chair: Giovanni Franceschini - University of Modena and Reggio Emilia, Italy</i> <i>Speaker: Luca Poggio - Ferrari, Italy</i>
09:40-11:00	Room A • TECHNICAL SESSION A6 <ul style="list-style-type: none"> • Electric motors and drives for green transportation I <i>Chair: Davide Barater - University of Modena and Reggio Emilia, Italy</i> 4 Technical Papers
09:40-11:00	Room B Tutorial <ul style="list-style-type: none"> • Charging electric vehicles in the business and residential environment <i>Giuseppe Mauri, Andrea Cazzaniga, Francesco Fasana, Piersilvio Marcolin - Ricerca sul Sistema Energetico- RSE</i>
11:00-11:15	Coffee Break
11:15-12:30	Room A • TECHNICAL SESSION A7 <ul style="list-style-type: none"> • Electric motors and drives for green transportation II <i>Chair: Davide Barater - University of Modena and Reggio Emilia, Italy</i> 4 Technical Papers
12:30-13:00	Room A • Plenary Awards Ceremony of the Student Contest
13:00-15:00	Lunch
15:00-18:00	Room A • Plenary Workshop SCAPE <i>Chair: Davide Barater - University of Modena and Reggio Emilia, Italy</i>
18:00	Conference Closure

EXECUTIVE COMMITTEE

Enrico Sangiorgi • *General Chair, Italy*
 Giovanni Franceschini • *Technical Program Co-Chair, Italy*
 Enrico Macii • *Technical Program Co-Chair, Italy*
 Giovanni Cancellieri • *Co-Chair, Italy*
 Antonio Imbruglia • *Co-Chair, Italy*
 Stefano Massucco • *Co-Chair, Italy*
 Giuseppe Parise • *Co-Chair, Italy*
 Gaia Petrelli • *Publication Chair, Italy*
 Gianni Pasolini • *Local Committee Chair, Italy*
 Adamo Nicola Panzanella • *Logistics Chair, Italy*
 Stefano Pirani • *Web Services Chair, Italy*
 Gianfranco Veglio • *Finance Chair, Italy*

TECHNICAL PROGRAM COMMITTEE

Program Co-Chairs:

Giovanni Franceschini • *University of Modena and Reggio Emilia, Italy*
 Enrico Macii • *Politecnico di Torino, Italy*

• Track 1: Energy storage, fuel cells, and batteries

• **Track Chair:** Massimo Ceraolo, *University of Pisa, Italy*

• Track Components:

Federico Baronti, *University of Pisa, Italy*
 Sergio Bruno, *Politecnico di Bari, Italy*
 Gianfranco Chicco, *Politecnico di Milano, Italy*
 Giovanni Lutzemberger, *University of Pisa, Italy*

Track 2 • Advanced driver assistance systems and autonomous driving, safety and Connectivity

• Track Chair:

Marko Bertogna, *University of Modena and Reggio Emilia, Italy*

• Track Components:

Francesco Braghin, *Politecnico di Milano, Italy*
 Vincenzo Cortese, *Sirti, Italy*
 Martin Duncan, *STMicroelectronics, Italy*
 Vittorio Fra', *Politecnico di Torino, Italy*
 Giovanni Garbo, *University of Palermo, Italy*
 Giorgio Giacinto, *University of Cagliari, Italy*
 Romeo Giuliano, *University Guglielmo Marconi, Italy*
 Francesco Matera, *Fondazione Ugo Bordoni, Italy*
 Franco Mazzenga, *University of Rome Tor Vergata, Italy*
 Luca Mottola, *Politecnico di Milano, Italy*
 Giorgio Parladori, *Italy*
 Valentino Peluso, *Politecnico di Torino, Italy*
 Andrea Penza, *Italy*
 Maria Rita Spada, *Italy*

Track 3 • Smart mobility and energy grid

• Track Chair:

Carlo Alberto Nucci, *University of Bologna, Italy*

• Track Components:

Livio Baldi, *Italy*
 Luca Barbierato, *Politecnico di Torino, Italy*
 Claudia De Vizia, *Politecnico di Torino, Italy*
 Giorgio Graditi, *ENEA, Italy*
 Samuele Grillo, *Politecnico di Milano, Italy*
 Antonio Lionetto, *STMicroelectronics, Italy*
 Lucia Lo Bello, *University of Catania, Italy*

Michela Longo, *Politecnico di Milano, Italy*

Pierpaolo Marchese, *Italy*

Fabrizio Pilo, *University of Cagliari, Italy*

Alessandro Ruvio, *Sapienza University of Rome, Italy*

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

Track 4 • Power Electronics, active and passive components, sensors and transducers

• **Track Chair:** Matteo Meneghini, *University of Padua, Italy*

• Track Components:

Mauro Ciappa, *ETH Zurich, Switzerland*
 Patrick Fiorenza, *CNR, Italy*
 Francesco Iannuzzo, *Aalborg University, Denmark*
 Ferdinando Iucolano, *STMicroelectronics, Italy*
 Paolo Mattavelli, *University of Padua, Italy*
 Salvatore Musumeci, *Politecnico di Torino, Italy*
 Paolo Pavan, *University of Modena and Reggio Emilia, Italy*
 Francesco Ponzio, *Politecnico di Torino, Italy*
 Luigi Rovati, *University of Modena and Reggio Emilia, Italy*
 Andrea Tallarico, *University of Bologna, Italy*
 Federico Tramarin, *University of Modena and Reggio Emilia, Italy*
 Nicola Trivellin, *University of Padua, Italy*

Track 5 • AI for automotive: Hardware and software architectures

• Track Chair:

Angelo Garofalo, *University of Bologna, Italy*

• Track Components:

Alessandro Aliberti, *Politecnico di Torino, Italy*
 Giovanni Ansaloni, *École Polytechnique Fédérale de Lausanne, EPFL, Switzerland*
 Simone Benatti, *University of Modena and Reggio Emilia, Italy*
 Alessandro Biondi, *Scuola Universitaria Superiore Sant'Anna di Pisa, Italy*
 Alessio Burrello, *Politecnico di Torino, Italy*
 Francesco Conti, *University of Bologna, Italy*
 Francesco Ponzio, *Politecnico di Torino, Italy*
 Pasquale Davide Schiavone, *École polytechnique fédérale de Lausanne, Switzerland*
 Federica Zonzini, *University of Bologna, Italy*

Track 6 • Electric Motors and Drives for green transportation

• Track Chair:

Davide Barater, *University of Modena and Reggio Emilia, Italy*

• Track Components:

Luigi Alberti, *University of Padua, Italy*
 Sergio Busquets Monge, *Universitat Politècnica de Catalunya, Spain*
 Carlo Cecati, *University of L'Aquila, Italy*
 Jose Alfonso Antonino Daviu, *Universitat Politècnica de Valencia, Spain*
 Mauro di Nardo, *The University of Nottingham, UK*
 Alber Filbà Martínez, *Catalonia Institute for Energy Research IREC, Spain*
 Shafiqh Nategh, *Polestar, Sweden*
 Stefano Nuzzo, *University of Modena and Reggio Emilia, Italy*
 Sandro Rubino, *Politecnico di Torino, Italy*
 Jose Enrique Ruiz Sarrió, *Universitat Politècnica de Valencia, Spain*
 Tianjie Zou, *The University of Nottingham, UK*

Technical Programme

Monday, July 17

08:30 Registration

09:30 - 10:00 Welcome Statements

Carlo Adolfo Porro • *Magnifico Rettore University of Modena and Reggio Emilia*

Giuseppe Parise • *AEIT General President*

Enrico Sangiorgi • *AEIT Automotive 2023 General Chair*

Gianfranco Chicco • *IEEE Italy Section Chair*

10:00 - 10:40 Room A • Plenary

Keynote speech

Chair: Enrico Sangiorgi • University of Bologna, Italy

Speaker: Giorgio Cornacchia • Stellantis, Italy

10:40-13:00 Room A

TECHNICAL SESSION A1

• Advanced driver assistance systems and autonomous driving, safety and Connectivity

Chair: Paolo Burgio • University of Modena and Reggio Emilia, Italy

A1_01 • A family of error correcting codes for automotive applications • Massimo Battaglioni, Giovanni Cancellieri - *Università Politecnica delle Marche, Italy*

A1_02 • Advanced Intelligent deep learning-based system for Robust Driving Assistance • Francesco Rundo, Carmelo Pino, Giulia Castagnolo - *STMicroelectronics, Italy*; Concetto Spampinato - *University of Catania, Italy*

A1_03 • Intelligent Deep Motion Magnification Analysis in Advanced Driving Assistance Systems • Francesco Rundo, Carmelo Pino, Giulia Castagnolo, Angelo Alberto Messina - *STMicroelectronics, Italy*; Concetto Spampinato - *University of Catania, Italy*; Michele Calabretta - *STMicroelectronics, Italy*

A1_04 • Integration of Terrestrial and Non-Terrestrial Networks for Automotive: challenges and perspectives within the S11 RESTART project • Luigi Alfredo Grieco, Giuseppe Piro, Antonio Petrosino - *Politecnico di Bari, Italy*; Simone Morosi - *University of Florence, Italy*; Alessandro Guidotti - *CNIT, Italy*; Daniele Tarchi, Alessandro Vanelli-Coralli - *University of Bologna, Italy*; Ernestina Cianca, Marina Ruggieri - *University of Rome Tor Vergata, Italy*; Pierpaolo Salvo, Francesco Matera, Valeria Petrini, Simona Valbonesi - *Fondazione Ugo Bordoni, Italy*

A1_05 • Design and Implementation of On-Device AI for Dangerous Driving Behavior Recognition • Taegu Kim, Chanwoo Kim, Dongkeun Jeon, Kihun Shin, Yunju Baek - *Pusan National University, South Korea*

A1_06 • Thermal Camera-based Driver Monitoring in the Automotive Scenario • Veronica Mattioli, Luca Davoli, Laura Belli, Gianluigi Ferrari, Riccardo Raheli - *University of Parma, Italy*

A1_07 • A Stochastic Model of the Acoustic Response inside the Cabin of an Automobile • Anatolij Borroni - *University of Parma, Italy*; Marco Martalò - *University of Cagliari, Italy*; Alessandro Costalunga, Carlo Tripodi - *ASK Industries, Italy*; Riccardo Raheli - *University of Parma, Italy*

A1_08 • Performance of PTS reduction technique using a Stepped-Carrier OFDM scheme for JARC applications • Didem Aydogan, Charles Tatkeu - *Université Gustave Eiffel, France*; Yassin El Hilali - *Université Polytechnique Hauts-de-France, France*

10:40-11:30 Room B**TECHNICAL SESSION B1 • Energy storage, fuel cells, and batteries**

Chair: Massimo Ceraolo • *University of Pisa, Italy*

B1_01 • Theoretical Design Model and the Optimization of Regenerative Blower in Fuel Cell System •

Chan Lee - *University of Suwon, South Korea*; Kyung Ho Chung - *Hwang-Hae Electric, South Korea*

B1_02 • Modelling lithium battery packs from single cell electro-thermal equivalent circuit model •

Massimo Ceraolo, Davide Fioriti, Giovanni Lutzemberger, Claudio Scarpelli - *University of Pisa, Italy*; Federico Bianchi - *Ricerca sul Sistema Energetico - RSE, Italy*

B1_03 • Digital Twins for Electric Vehicle SoX Battery Modeling: Status and Proposed Advancements •

Khaled Sidahmed Sidahmed Alamin - *Politecnico di Torino, Italy*; Yukai Chen - *IMEC, Belgium*; Enrico Macii, Massimo Poncino, Sara Vinco - *Politecnico di Torino, Italy*

11:30-13:00 Room B**Keynote speech****• Telecommunications networks, digital platforms and technologies to support the mobility of the future**

Alessandro Vizzarri - *University of Rome Tor Vergata, Italy*

PANEL • Advanced mobility (assisted/autonomous) and technologies: the state of art, opportunities, challenges and market trends

Chair: Giovanni Cancellieri - *AEIT-AICT, Italy*

PANELISTS

Carlo Costa - *Autostrada del Brennero*

Luigi Mazzola - *Social Self Driving*

Giovanni Romano - *TIM*

Alessandro Vizzarri - *University of Rome Tor Vergata, Italy*

13:00-14:30 Lunch**14:30-16:00 Room A****TECHNICAL SESSION A2 • Smart mobility and energy grid I**

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

Keynote Speech**The bottleneck for the electrification of heavy duty trucks**

Claudio Rossi - *University of Bologna, Italy*

A2_01 • Smart Charging of Electric Vehicles in Park&Ride Stations • Farnaz Goudarzi, Samuele Grillo, Michela Longo, Dario Zaninelli, Cristian Giovanni Colombo - *Politecnico di Milano, Italy***A2_02 • Optimizing EV Company Fleet Management in an Energy District •** Tommaso Bragatto, Marco Antonio Bucarelli, Mohammad Ghoreishi - *Sapienza University of Rome, Italy*; Francesca Santori - *ASM Terni, Italy***A2_03 • Comparative assessment of Time-Sensitive Networking transmission schemes in automotive applications •** Giuseppe Testa, Giuliano Canzonieri, Luca Leonardi, Lucia Lo Bello, Gaetano Patti - *University of Catania, Italy***A2_04 • Regional and long haul heavy-duty truck: energy consumptions and recharging needs •** Massimo Ceraolo, Giovanni Lutzemberger - *University of Pisa, Italy*; Giuseppe Mauri, Sara Salamone - *Ricerca sul Sistema Energetico-RSE, Italy***A2_05 • The HELMET project: the business perspective •** Alessandro Vizzarri - *University of Rome Tor Vergata, Italy*; Roberto Capua - *Sogei, Italy*; Alessia Vennarini, Arianna Persia, Alessandro Neri - *Radiolabs Consortium, Italy***14:30-16:00 Room B****TUTORIAL**

WAN Communication Standards in Automotive • Pierpaolo Marchese - *Independent Consultant, AEIT Member, Italy*

16:15-16:30 HPE Venue
Coffee Break

16:30-18:30 Room HPE

SPECIAL SESSION

Funded Projects and future in the frame of ECSEL/KDT for Automotive

Organizers: Livio Baldi, Antonio Imbruglia - *AEIT-AMES, Italy*

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

Keynote Speech

Smart Charging and V2X: an opportunity for the e-mobility and energy industry • Davide De Michino - *ENEL*

The ECSEL - TRANSFORM project: the role of the Italian cluster in the European SiC Value Chain •

G. Franceschini - *University of Modena and Reggio Emilia, Italy*; A. Imbruglia - *STMicroelectronics, Italy*;

G.P. Schiapparelli - *HPE, Italy*; A. Tallarico - *University of Bologna, Italy*

Highly efficient and trustworthy electronics, components and systems for the next generation energy supply infrastructure • Holger Schmidt, Antonio Antonio Javier Cabrera Gutierrez - *Infineon Technologies AG, Germany*; Aldo Romani, Marco Crescentini - *University of Bologna, Italy*; Kris Borger - *GreenFlux, The Netherlands*;

Raffael Schwanninger, Thomas Eberle - *Friedrich Alexander Universität, Germany*

Heterogeneous Integration for Connectivity and Sustainability for the Automotive Power Electronics Sector •

Angelo Alberto Messina, Antonio Imbruglia, Michele Calabretta, Francesco Rundo - *STMicroelectronics, Italy*

The ENERGY ECS project: Smart and Secure Energy Solutions for Future Mobility • Aldo Romani, Marco

Crescentini - *University of Bologna, Italy*; Cristina Rusu, Henrik Staaf - *RISE, Sweden*; Marco Ambrosio, Marcello

Chiaberge, Anna Piacibello, Marco Pirola, Gemma Giliberti, Federica Cappelluti, Giovanni Ghione - *Politecnico di*

Torino, Italy; Michael Hayes, Eoin Ahern, Prateek Asthana - *Tyndall National Institute, Ireland*; Gerd vom Bögel -

Fraunhofer IMS, Germany; Marco Galiazzo - *Applied Materials Italia, Italy*; Leena Rynänen, Mika Penttilä, Heini

Siekkinen - *Nokian Tyres Plc, Finland*; Stefano Saggini, Federico Iob, Giulia Segatti - *University of Udine, Italy*;

Rahul Tomar, Mohith Bhargav Sunkara, Rucha Mangesh Kathe - *DigitalTwin Technology, Germany*; Paolo

Mezzanotte - *University of Perugia, Italy*; Iftikhar Ahmad, Ksenia Avetisova - *TietoEVRY, Finland*

Aim and Perspectives of the KDT JU Project Powerized • Andrea Cavallini - *University of Bologna, Italy*, Ernesto

Colizzi, Daniele Miatton, Claudio Villani - *Infineon, Italy*

Tuesday, July 18

09:20-10:00 Room A • Plenary

Keynote Speech

Chair: Antonio Imbruglia - AEIT-AMES, Italy

Speaker: Andrea Pontremoli - Dallara, Italy

10:00-11:15 Room A

TECHNICAL SESSION A3 • Smart mobility and energy grid II

Chair: Fabrizio Pilo - University of Cagliari, Italy

A3_01 • Kinetic Energy Storage based Advanced Charging Station with Reduced Grid Impact • Alessandro Faro, Alessandro Lidozzi - University of Roma TRE, Italy; Fernando Ortenzi - ENEA, Italy, Marco Di Benedetto, Luca Solero - University of Roma TRE, Italy

A3_02 • Literature Review on Electric Grid Resilience: Electric Vehicles as a Possible Support? • Alessandro Saldarini, Michela Longo, Dario Zaninelli - Politecnico di Milano, Italy; Valentina Consolo, Emanuele Crisostomi, Massimo Ceraolo, Ekaterina Dudkina - University of Pisa, Italy; Seyed Mahdi Miraftebzadeh - Politecnico di Milano, Italy

A3_03 • Application of Bus as a Service and Analysis of Electric Bus Consumption in Urban Areas • Alessandro Saldarini; Marina Olivieri - Politecnico di Milano, Italy; Stefano Rossi - Autoguidovie, Italy; Wahiba Yaici - Natural Resources Canada, Canada; Michela Longo, Federica Foadelli - Politecnico di Milano, Italy

A3_04 • Solar and Grid Power Integration for Dynamic Energy Management in Electric Vehicle Charging and Load Fulfilment with Fuzzy Logic • Syeda Shafia Zehra, Michael James Wood, Francesco Grimaccia, Sonia Leva, Marco Mussetta - Politecnico di Milano, Italy

A3_05 • Operations on Railyard Sites, the Dutch Case: in between Landscape Design and Engineering • Sara Anna Sapone, Michela Longo, Dario Zaninelli - Politecnico di Milano, Italy; Saskia de Wit - TU Delft, Italy

10:00-11:15 Room B

TECHNICAL SESSION B2 • AI for automotive: Hardware and software architectures

Chair: Angelo Garofalo - University of Bologna, Italy

Invited: Scalable Heterogeneous Architectures for AI in Automotive SoC

Angelo Garofalo - University of Bologna, Italy

B2_01 • Intelligent Optical Microscopy Defects Assessment of Silicon-Carbide Power Modules embedded in Next Generation Electric Cars • Francesco Rundo, Carmelo Pino, Giulia Castagnolo - STMicroelectronics, Italy; Concetto Spampinato - University of Catania, Italy

B2_02 • Fuel Consumption Classification for Heavy-Duty Vehicles: A Novel Approach to Identifying Driver Behavior and System Anomalies • Mehmet Emin Mumcuoglu, Shawqi Mohammed Othman Farea, Mustafa Unel - Sabanci University, Turkey; Serdar Mise, Simge Unsal, Metin Yılmaz, Kerem Köprübaşı - Ford OTOSAN, Turkey

B2_03 • Towards driving-independent prediction of fuel consumption in heavy-duty trucks • Shawqi Mohammed Othman Farea, Mehmet Emin Mumcuoglu and Mustafa Unel - Sabanci University, Turkey; Serdar Mise, Simge Unsal, Metin Yılmaz and Kerem Köprübaşı - Ford OTOSAN, Turkey

11:15-11:30 Coffee Break

11:30-13:00 Room A

TECHNICAL SESSION A4 • Power Electronics, active and passive components, sensors and transducers I

Chair: Matteo Meneghini - University of Padua, Italy

A4_01 • Decision Tree Regressor-Based Approach for DCLink Electrolytic Capacitors Health Monitoring • Acacio Manuel Amaral - Polytechnic Institute of Coimbra and University of Beira Interior, Portugal; Khaled Laadjal, Antonio J. Marques Cardoso - University of Beira Interior, Portugal

A4_02 • Enhanced Low-Voltage GaN for e-Mobility Motor Control Improvements • Vincenzo Barba, Salvatore Musumeci - Politecnico di Torino, Italy; Marco Palma - Efficient Power Conversion, Italy

A4_03 • Impact of Gate and Drain Leakage on VTH Drift and Dynamic-ROn of 100V p-GaN Gate AlGaN/GaN HEMTs • Marcello Cioni - *STMicroelectronics, Italy*, Giovanni Giorgino - *STMicroelectronics, Italy and University of Modena and Reggio Emilia, Italy*; Alessandro Chini - *University of Modena and Reggio Emilia, Italy*; Antonino Parisi - *STMicroelectronics, Italy*; Giacomo Cappellini, Lorenzo Modica - *University of Modena and Reggio Emilia, Italy*; Giuseppe Luongo, Cristina Miccoli, Maria Eloisa Castagna, Maurizio Moschetti, Cristina Tringali, Ferdinando Iucolano - *STMicroelectronics, Italy*

A4_04 • Monolithic GaN for a High-Efficiency Interleaved Boost Converter PFC in Automotive Applications • Filippo Scrimizzi, Federica Cammarata, Giuseppe D'Agata - *STMicroelectronics, Italy*; Salvatore Musumeci, Vincenzo Barba - *Politecnico di Torino, Italy*; Santi Agatino Rizzo - *University of Catania, Italy*

A4_05 • GaN-on-Si Power HEMTs for Automotive: Current Status and Perspectives • Davide Favero, Alberto Marcuzzi, Carlo De Santi, Gaudenzio Meneghesso, Enrico Zanoni, Matteo Meneghini - *University of Padova, Italy*

11:30-13:00 Room B

PANEL • The electrification of depots intended for local public transport: from the technical-economic feasibility to future development forecasts

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

PANELISTS

Alessandro Avenali - *Sapienza University of Rome*

Fabrizio Caripppo - *Steer*

Antonio Coccia - *Enel X Way*

Alessandro Ruvio - *Sapienza University of Rome*

13:00-14:30 Lunch

14:30-16:00 Room A

TECHNICAL SESSION A5 • Power Electronics, active and passive components, sensors and transducers II

Chair: Matteo Meneghini - *University of Padua, Italy*

A5_01 • A Review of SiC Commercial Devices for Automotive: Properties and Challenges • Alberto Marcuzzi, Davide Favero, Carlo De Santi, Gaudenzio Meneghesso, Enrico Zanoni, Matteo Meneghini - *University of Padova, Italy*

A5_02 • Optoelectronic technologies for lighting in automotive: state of the art and perspectives • Nicola Trivellin, Matteo Buffolo, Carlo De Santi, Gaudenzio Meneghesso, Enrico Zanoni, Matteo Meneghini - *University of Padova, Italy*

A5_03 • Thermal Impedance Computation of a SiC Power Module for Traction Inverter in Electric Vehicle Applications • Giuseppe Mauromicale, Alessandro Sitta, Francesco Rundo, Angelo Alberto Messina, Michele Calabretta - *STMicroelectronics, Italy*

A5_04 • DC Link Voltage Control based Energy Management Strategy for Standalone Solar PV Fed Hybrid System • Suganthi Ramasamy - *University of Cagliari, Italy*; Vigneselvan Sivasubramaniyam - *Pollachi IET, India*; Gianluca Gatto, Amit Kumar - *University of Cagliari, Italy*

14:30-16:00 Room B

PANEL • Advanced mobility (assisted/autonomous) in the smart infrastructures and smart cities of the future: experiences, projects and initiatives

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

PANELISTS

Vincenzo Angelillo - *Tuc Technology, Italy*

Roberto Montanari - *RE:Lab, Italy*

Francesco Pasquale - *University of Modena and Reggio Emilia, Italy*

16:00-16:15 Coffee Break

16:15-17:00 Room A • Plenary

• **MUNER: a four wheel drive university for the next generation vehicle engineer**

17:00-18:00 Room A • Plenary

• **Formula Driverless the new challenge for the UNIMORE passionate students**

20:30 Conference Dinner

Wednesday, July 19

9:00-9:40 Room A • Plenary

Keynote speech

Chair: Giovanni Franceschini - University of Modena and Reggio Emilia, Italy

Speaker: Luca Poggio - Ferrari, Italy

9:40-11:00 Room A

TECHNICAL SESSION A6 • Electric motors and drives for green transportation I

Chair: Davide Barater - University of Modena and Reggio Emilia, Italy

A6_01 • High-Frequency Rotor Excitation System Part 1: Modeling Method and Optimization • Irene Santantonio, Shafiqh Nategh and Andreas Carlsson - Polestar Performance AB, Sweden; Giovanni Franceschini - University of Modena and Reggio Emilia, Italy; Didier Zefack - Powersys, France

A6_02 • High-Frequency Rotor Excitation System Part 2: Material Selection • Irene Santantonio, Shafiqh Nategh - Polestar Performance AB, Sweden; Giovanni Franceschini - University of Modena and Reggio Emilia, Italy; Didier Zefack - Powersys, France

A6_03 • Optimized Modular Design of Neutral-Point-Clamped Traction Inverters for Multiple Electric Vehicles • Roya Rafiezadeh, Sergio Busquets-Monge - Universitat Politècnica de Catalunya, Spain; Salvador Alepuz - Universitat Pompeu Fabra, Spain

A6_04 • Upgrade of Exciter for Synchronous Generators basing on the Hybrid Excitation Concept • Stefano Nuzzo - University of Modena and Reggio Emilia, Italy; Paolo Bolognesi, Valerio Arces - University of Pisa, Italy

9:40-11:00 Room B

TUTORIAL

Charging electric vehicles in the business and residential environment

Giuseppe Mauri, Andrea Cazzaniga, Francesco Fasana, Piersilvio Marcolin – Ricerca sul Sistema Energetico- RSE

11:00-11:15 Coffee Break

11:15-12:30

TECHNICAL SESSION A7 • Electric motors and drives for green transportation II

Chair: Davide Barater - University of Modena and Reggio Emilia, Italy

A7_01 • e-Motor cooling with oil jets: impact of flowrates and oil properties • Michele Merelli - EnginSoft, Italy

A7_02 • Rare Earth Reduction in a Hypercar Propulsion System • Giampaolo Devito, Francesco Puglisi, Davide Barater, Stefano Nuzzo, Mauro Giacalone, Giovanni Franceschini - University of Modena and Reggio Emilia, Italy

A7_03 • Potential of Powertrain Electrification in a mid-size Tractor for a more sustainable agriculture • Riccardo Sassetti - University of Modena and Reggio Emilia, Italy; Simone Ferrante, Nicola Lenzini - CNH Industrial, Italy; Stefano Nuzzo - University of Modena and Reggio Emilia, Italy; Stefano Fiorati - CNH Industrial, Italy; Davide Barater - University of Modena and Reggio Emilia, Italy

A7_04 • Preliminary Sensitivity Analysis and Optimisation of a Wound Field Synchronous Motor for Traction Applications • Gaia Petrelli, Stefano Nuzzo, Davide Barater - University of Modena and Reggio Emilia, Italy; Tianjie Zou - University of Nottingham, United Kingdom; Giovanni Franceschini - University of Modena and Reggio Emilia, Italy; Chris Gerada - University of Nottingham, United Kingdom

12:30-13:00 Room A • Plenary

Awards Ceremony of the Student Contest

13:00-15:00 Lunch

15:00-18:00 Room A • Plenary

Workshop SCAPE

Modular and Scalable EV Power Converter Design

Unlocking a future of reliable, lightweight, and affordable EVs?

Chairs: Davide Barater - University of Modena and Reggio Emilia, Italy

15:00 - 15:15 Introduction and Welcome

Davide Barater- University of Modena and Reggio Emilia, Italy

15:15 - 15:30 Presentation of the SCAPE Project

Muhammad Attique - IREC, Spain

15:30 - 16:00 SCAPE's Modular and Scalable Power-Converter Design Approach

Sergio Busquets Monge - UPC, Spain and Sebastian Rosado - AVL, Spain

16:00 - 16:30 Coffee Break

16:30 - 17:00 The Interest of a Modular and Scalable Power-Converter Design

Methodology for the EV and Power Electronics Industries

Guided open discussion

Moderators: Davide Barater- University of Modena and Reggio Emilia, Italy; Sergio Busquets Monge - UPC, Spain

17:00 - 17:30 An Overview of Chip Embedding Technologies for Power Systems Integration

Xavier Jordà - CSIC, Spain

17:30 - 18:00 Benefits and Challenges of Chip Embedding in EV Power Conversion

Guided open discussion

Moderators: Davide Barater, UNIMORE/Xavier Jordà, CSIC

18:00 Conference Closure

VENUE

University of Modena and Reggio Emilia • "Enzo Ferrari" Department of Engineering
Via Pietro Vivarelli, 10 • Modena • Italy

HPE Group • Via Raimondo Dalla Costa, 620 • Modena • Italy

ON SITE SECRETARIAT

The Conference Secretariat will be open on site as follows

Monday, July 17, 2023 08:00 • 16:00

Tuesday, July 18, 2023 08:15 • 18:30

Wednesday, July 19, 2023 08:15 • 18:00

SECRETARIAT

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Associazione **IMQ**

