

INTERACT PROJECT SHORT DESCRIPTION (www.interact.utcluj.ro)

In today's economy, more than ever, the need to implement the sustainability principle in designing new products has become of utmost importance. Sustainability represents nowadays innovation's new frontier. Becoming environmentally friendly through the development of sustainable products, the industrial actors end up by reducing inputs they use and, thus, lower the costs. Moreover, with better "greener" products, additional revenues are generated. As the automotive industry is one of the most technologically interesting domains to face the societal challenges, the automotive manufacturers are accelerating the development of new sustainable technologies for products to comply with the most stringent standards of efficiency, reliability, safety and sustainability. The trend for more electrified automotive applications (MEAs) asks for a new generation of automotive electrical actuation systems, allowing for a more efficient and environmentally friendly mobility and enhancing the driving experience, making it safer, more comfortable and sustainable.

INTERACT's overall objective is to answer the further enhancement of the next generation of high-performance sustainable automotive electric actuators (SAEAs) by combining high-level scientific research and training activities in a joint academia-industry doctoral programme, focused on solving critical issues (see Section 1.1.2) of the automotive electrical actuation Research & Development (R&D) cycle.

The project is a natural continuation of a fruitful collaboration between the beneficiaries: two universities (UTCN and ULB) and three industrial actors. What started as staff exchange collaboration for technological know-how and transfer of knowledge in the field of electrical machines (EMs) and drives (EMDs) for automotive applications^{1, 2} has now developed, through INTERACT, into a joint doctoral programme, based on common interests and goals, in the field of R&D of the next generation of SAEAs. More specifically, INTERACT takes advantage of the well-established intersectoral collaboration achievements and of the solid research and training competences and facilities at the beneficiaries for: (i) giving new career perspectives and increasing the employability of six young researchers, by enhancing their creative and innovative potential; (ii) pushing forward and/or extend the industrial partners' portfolio with new technological developments to be integrated into the R&D process such that they remain and/or enter as an important player in the automotive industry ; (iii) strengthening innovation capacity of UTCN and ULB with commercial exploitation of the research.

It is clear that energy-efficient, reliable, robust, low-cost and low-noise electrical machines, along with highly-integrated, energy-efficient power electronics and control modules, are required in order to reduce the impact of automotive electrical actuated powertrain and/or auxiliaries on the overall performance and cost of vehicles, no matter if they are fuel- (fossil or alternative), hybrid- or electric-powered. INTERACT aims at the development of R&D and engineering specialists and services to deal with the design and development of advanced electrical actuation technologies for sustainable automotive applications.

¹ <http://www.emda-loop.com>

² <http://www.demotest-ev.com/>, <http://www.researchgate.net/project/DeMoTestEV-DEsign-Modelling-and-TESTing-tools-for-Electrical-Vehicles>

TRAINING EVENT SHORT DESCRIPTION

Instrumentation and test systems play an important role in providing new tools, new procedures and new methodologies, which are necessary for the development of advanced sustainable automotive applications. The fourth network-wide school event aims to provide knowledge and competences on how to develop flexible high-standard testing facilities based on advanced instrumentation and cutting-edge testing procedures and technologies. In parallel with the school event a School on Sustainable mobility will be organized for maximum 30 PhD students and young researchers coming from all over the world.

The training event will be organized online, using TEAMS platform. For registration please send a message to anca.nicu@ethm.utcluj.ro with your contact data (name and surname, title, affiliation, position, email address).

AGENDA OF THE TRAINING EVENT

8th of December 2020

TESTING AND INSTRUMENTATION FOR AUTOMOTIVE APPLICATIONS

9.15 CET OPENING

9.30 – 11.45 CET: MBST FOR ELECTRIC VEHICLES

Description: In the frame of the OBELICS project, Siemens targeted a 40% reduction of e-drive optimization development effort, considering the Kyburz SimRod as vehicle under test. To reach this objective, consistent testing has been performed on the whole V-cycle thanks to advanced identification and modelling techniques on the one hand, and combination of different scalable simulation models with physical tests via MiL, XiL and HuiL configurations and on-road data acquisition on the other hand.

Speaker: **Yves A. B. MOLLET** received the master in industrial engineering from the Haute Ecole Léonard de Vinci (ECAM), in 2010 and the Ph.D. in engineering sciences and technology at the Université Libre de Bruxelles (ULB), in 2017 (both in Brussels, Belgium). He is now a researcher at the ULB and at Siemens Industry Software (Leuven, Belgium). His main research topics concern identification, modelling, testing, control, fault detection and NVH aspects of electrical machines and drives.

11.45 – 12.15 CET: DIGITAL TWIN FOR EFFICIENT VALIDATION OF SUBJECTIVE VEHICLE PERFORMANCES

Description: The high-fidelity model (Digital Twin) of a vehicle is integrated in a motion-based driving simulator to study ride and handling (R&H) subjective experience. A combination of simulation and testing activities has been performed to provide the required level of physical simulator fidelity. A subjective study is planned to compare vehicle modifications on both the real vehicle and the simulated model. The results of the study will provide the foundation for an human-centered vehicle design cycle.

Speaker: **Marco Grottoli** obtained a MSc in Mechanical Engineering with focus on Mechatronics and Robotics from Politecnico di Milano in 2014. He is currently enrolled in a PhD program in Biomechanical Engineering at Delft University of Technology, the Netherlands, and works as a Research Engineer in Siemens Digital Industries Software, Belgium. He worked on different research projects funded by the European commission and the Flemish government. Currently he investigates the usability of driving simulators for comfort and perceived safety evaluation of autonomous vehicles.

12.15 – 13.15 CET: Lunch break

13.15 – 14.00 CET: FROM SIMULATION TO REALITY: THE XIL JOURNEY...

Description: Writing embedded software is hard. Testing it is harder. As more and more software finds its way into our cars, planes, and lives, we need to shift the way we do development. Join us on a journey that takes you from designing new product to simulating it, then to Hardware-in-the-Loop testing. We'll show you how to discover defects early, we improve your algorithms to match reality, and push your devices to the limit to make sure they'll be safe and reliable.

Speakers:

Marcelo Izaguirre is a software engineer with over 10 years of experience in the Real-Time Test world and a keen interest in Hardware-in-the-Loop solutions for the Automotive and Aerospace industries.

Horia Hedesiu is Professor with the Electrical Machines and Drives Department at TUCN, having a broader industrial experience besides the academic one. He's also Managing Director with NI in Romania since 2005.

14.15 – 15.00 CET: AERO THERMAL TEST BENCH DESCRIPTION

Description: Engine Thermal Tests + Security Tests (Test Instruments , Test description, Data processing); Cabine Thermal Tests (Test Instruments , Test description, Data processing); Battery Thermal Tests (Test Instruments , Test description, Data processing).

Speakers:

Ciuhandu Alexandru received the bachelor degree in road vehicles at Mechanical Faculty, University of Pitesti, Romania in 2004. He is with RTR since 5 years as test validation specialist.

Voicu Iulian received the bachelor degree in Thermal systems at Mechanical Faculty, Politehnica University Bucharest in 2008. He is with RTR since 9 years as test validation specialist in Testing Department/Vehicle Testing.

15.15 – 16.00 CET: EMC SIMULATION FOR POWER-ELECTRONICS

Description: The Simulation of EMC is used to identify the source of electromagnetic disturbances. With simulation it is possible to optimize power-electronics not only to reach the customer targets, it is also possible to improve the signal quality for motor measurements during operation mode.

The presentation will show you the basics of EMC, the simulation approach and the comparison of simulation with measurements.

Speaker: **Michael Richter** obtained a Diploma (Dipl. Ing. (FH)) in Electrical Engineering with focus on Communications Technology from University of Applied Sciences Würzburg-Schweinfurt in 2015. He is working on high frequency and EMC topics at Brose Fahrzeugteile SE & Co. Kommanditgesellschaft, Würzburg as a specialist for EMC. Currently he is developing new simulation methods for more efficient and more reliable EMC related electronics development.

9th of December 2020

SCHOOL ON SUSTAINABLE MOBILITY AND AUTOMOTIVE INDUSTRY

9.30 – 10.15 CET: SUSTAINABLE URBAN MOBILITY AS A CRITICAL ELEMENT FOR PLANNING, DESIGNING AND MANAGING CITIES BASED ON THE PRINCIPLES OF SUSTAINABLE DEVELOPMENT.

Description. The long development of thinking on sustainable development that starts from the first movements that promoted development based on an ecological economy up to the current sustainable goals was not a path without obstacles. In this process the cities play a fundamental role. More and more attention must be paid to the issues of urbanization, territorial governance on a global scale and the transformations triggered by digital innovation. Urban mobility becomes sustainable only if it is capable of harmonizing and contributing to the transformations of the contemporary city, but not as a provider of technological solutions, but as a structuring element of strategic planning for urban development: An integrated strategic planning, participatory and capable of intercepting the emergencies of the present-day urban life.

Speaker: **Pietro Elisei**, town and regional planner, senior researcher and policymaker. He collaborated, as consultant, with ministries, cities and towns all over Europe, holding important positions in international organizations dedicated to urban planning (PLANUM, ISOCARP).

International expert in urban regeneration policies, integrated planning for small-medium sized cities and topics related to smart cities and strategic planning. A collaborator with EU universities and research centers, he works with international institutions (European Commission: URBACT and UIA Secretariats, UN-Habitat, UNECE) for important urban and territorial planning research/planning tasks. Dr. Elisei also routinely holds keynote speeches in international conferences and publishes a number of scientific articles on topics related to urban planning. Founder and Director of URBASOFIA (www.urbasofia.eu).

10.30 – 11.15 CET: PRODUCT LIFECYCLE MANAGEMENT BENEFITS, CHALLENGES AND OPPORTUNITIES

Description: Socio-eco-economic sustainable products involve a multi-lifecycle perspective of design and management. This moves the focus from product to product-service system (or product servitization), which in the automotive industry is named sustainable mobility. Deployment of sustainable mobility into vehicle design and development is a lifetime and lifecycle multi-dimensional optimization problem, in a win-win scenario of all stakeholders. Under these circumstances, it is important to understand how sustainability has to be embedded along the lifetime of a product in automotive industry and which are the benefits, challenges and opportunities of product life-cycle management considering both circularity and servitization as key drivers.

Speaker: **Stelian Brad** obtained a MSc in Energy Management at the UNESCO International Technological University Paris, a PhD in Robotics at the Technical University of Cluj-Napoca in co-tutelage with Stuttgart University, and a PhD in Economics at the Academy of Economic Studies Bucharest, with a focus on economy of innovation. He is currently professor at the Technical University of Cluj-Napoca, acting also as program director of the Robotics specialization. He runs courses on robot programming, artificial intelligence, and OOP for robotics, as well as engineering and management of innovation. His current research focus is on social intelligent robotics, disruptive innovation systems, and interdisciplinary design.

11.30 – 12.15 CET: PRODUCT DEVELOPMENT PROCESS (PDP) IN THE SCOPE OF PRODUCT LIFE CYCLE (PLC)

Description: Short description: What are the challenges for an automotive Product Development Process (PDP) in a Product life cycle (PLC). What and who are the drivers in the definition of the

process specifications. Are there obstacles in regards e-mobility and new OEM in the market? Where are the challenges and how BROSE solution will look like?

Speaker: **Volker Nägele** received the diploma (Dipl.-Eng.) in electrical engineering for sensor, laser and optic technology from the University of Applied Sciences Furtwangen (HFU), in 2004. He is now Director Project management and leading the global Project management office (PMO) in the business division drives and is taking care of all aspects of project management for internal and external projects, portfolio management as well as the needed management reporting.

12.15 – 13.00 CET: LCA FOR ENVIROMENTAL IMPACT ANALYSIS

Description: Using the Life Cycle Analysis (LCA) can assess an environmental impact (EIA) of an activity and/or activity that produce products or services especially of automotive industry. Life cycle assessment is a cradle-to-grave or cradle-to-cradle analysis technique to assess environmental impacts associated with all the stages of a product's life, which is from raw material extraction through materials processing, manufacture, distribution, and use.

Speaker: **Ovidiu Nemes** (UTCN) obtained a PhD in composite structures analysis and modelling at National Institute of Applied Sciences, Toulouse. Currently he is professor at the Technical University of Cluj-Napoca in the field of Environmental Engineering (Eco-Design of Products and Waste Treatment and Valorization) and the director of the Department for Research, Development and Innovation Management.

13.00 CET: DISCUSSIONS AND CLOSING