Technische Universiteit Eindhoven University of Technology

electromechanics power electronics epe

## EINDHOVEN UNIVERSITY OF TECHNOLOGY (TU/e)

The Electromechanics and Power Electronics (EPE) group conducts research in the area of electromechanical and power electronic systems, and aims at driving innovation and opening new application fields in close collaboration with both Dutch and international industry.

Main research areas in power electronics:

- Ultra-compact/low-weight/efficient power converters
- Application of new semiconductor devices (e.g. GaN and SiC)
- Intelligent battery management solutions
- Advanced methods and tools to enhance the analysis and design of multi-level, multi-port converters
- Multi-objective optimization of converter systems, linking multiple performance indices such as efficiency, weight, costs, reliability and EMC
- Hardware-in-the-loop technology for algorithm and component testing
- Dedicated high-precision low-noise power amplifiers
- Wireless energy transfer

High-precision, high-bandwidth amplifier based on ultra-level topology

Disruptive conceptual innovations are combined with a detailed, system-oriented, and multi-objective design/optimization approach. Comprehensive experimental verification of the theoretical concepts is provided through the development of near-industrial hardware demonstrators, which provide the basis for the initiation of future, cutting edge products.

20 kW, 3-phase, bidirectional, isolated AC-DC converter based on SiC MOSFETs

Typical application areas:

- Automotive industries
- Renewable energy industries
- Rail transportation
- Aerospace and more-electric aircraft
- Medical systems
- High precision and lithography applications, robotics, industrial systems, etc.

Besides power electronic systems, other key expertise areas of the EPE group are electromechanical and mechatronic systems, in which the EPE group obtained a strong, world-leading reputation in multi-physics modelling, analysis, design methodologies, and multi-objective optimization.

Electromagnetic vibration isolator

The group is collaborating in many national and international projects and research activities. It is actively involved in various Horizon 2020 and FP7 projects and has a broad international network that includes a large number of leading companies, research institutes, and universities.
Currently, the EPE group consists of 4 Assistant Professors, 9 Fellows from industry, 26 PhD students, 2 post-docs, 5 PDEng students, and is continuously expanding.
State-of-the-art, highly equipped laboratories (> 600 $m^2$) for production, testing and characterization are available, as well as a large variety of simulation software, DSpace hardware and software, measurement equipment, thermal chambers, and high and low power loads.

EPE laboratory