Universität Stuttgart
Institut für Elektrische Energiewandlung

Student theses

Start: 24/25

Master's Thesis (M.Sc.)
Bachelor's Thesis (B.Sc.)
Research Thesis
Student Thesis

Student Theses (M.Sc., B.Sc.) "Smart and efficient power electronics for emission-free mobility of the future"

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The newly founded research group "Smart Converters for Emission-Free Mobility of the Future" deals with highly efficient electrical energy converters for emission-free mobility of the future. Smart converters with intelligent operating concepts enable flexible and adaptable system integration of electrical sources, storage systems and consumers as well as the coupling of the electricity, heat and mobility sectors.

In order to accelerate sustainable mobility and the energy transition, the group is researching:

- **Highly efficient power electronics with new topologies and operating concepts,**
- **compact voltage converters for intelligent charging, storage and driving,**
- electrocaloric heat pumps for cooling and heating in mobile applications.

Student theses (MA/BA/FA/SA) are available. An associated future laboratory is being set up at the Institute for Electrical Energy Conversion (IEW), University of Stuttgart, as part of the Innovation Campus Mobility of the Future (ICM).

Topics and applications (selection)

- Power
  - Highly efficient voltage converters > 99% e.g. partial power conversion, soft-switching and multilevel converter topologies
  - Reconfigurable control technology
  - Optimization of efficiency and power density
  - 48V to > 1200V
  - Isolated and non-insulated voltage transformers
  - Wide-bandgap devices and ICs (GaN, SiC)
- Applications of electromobility:
  - DC-DC Battery-to-Battery Chargers
  - Bi-directional AC-DC chargers
  - Inductive energy transfer (e.g. charging)
  - Non-Insulated Electric Vehicle Charging
  - Traction converters
- More general topics of power electronics:
  - Simultaneous energy and data transmission
  - Characterization of GaN Transistors and ICs

Work content (selection)

- Circuit simulation (PLECS, Spice, ADS)
- Design and characterization of power electronics (transistors, gate drivers, sensors)
- Programming and commissioning (control technology, rapid prototyping)
- Measurement technology for electrical voltage transformers (efficiency with power meter, switching behavior with oscilloscope)
- The topic and duration of the thesis are determined individually
- Student (f/m/d), 3-6 months (BA, MA, SA, FA)

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Please send your application (incl. current transcript of records) or questions to:
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INNOVATIONSCAMPUS MOBILITÄT DER ZUKUNFT

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