



## UNIVERSITY OF BAYREUTH, DEPARTMENT OF MECHATRONICS



### Overview

The Department of Mechatronics at the University of Bayreuth has been founded in 2011 under the leadership of Prof. Dr.-Ing. Mark-M. Bakran. Approximately 1.150 of the more than 12.500 students in Bayreuth are enrolled in an engineering science field of study. The department teaches courses from electrical basics and mechatronics to power electronics and electrical machines in vehicles. From 2013 on, the Department of Mechatronics is located in a new building equipped with modern electrical laboratories for students as well as researchers.

### Research Topics

Mechatronics is a made-up word for the linkage of mechanical, electrical engineering and information technology. It has a bridging function over these three disciplines and deals with the functional

and constructional integration of these different aspects in applications. The research focuses on up to date topics from fields of propulsion technology and energy management with power electronics as the linking and also central element. Core areas are:

- New power electronic devices
- Energy conversion with high power density
- Development of new circuit techniques
- Integration of energy storages
- Safe power electronics
- High-Voltage Direct Current Transmission Equipment

### Equipment

The new laboratories offer a wide range of specialized measurement, supply and control tools for power electronics evaluations. Highlights of the technical equipment are:

- High-voltage IGBT test bench for benchmarking new power electronic devices
- Power sources for high-voltage and high-current experiments:
  - 6 kV / 20 A
  - 80 V / 1,5 kA
  - 10 kV / 1 A
  - 400 VDC/100 A/32 kW (bidirectional)
- Temperature and climate test chamber as well as thermal camera for device testing at thermal limits and reliability investigations
- High resolution 12-Bit oscilloscopes
- dSPACE and FPGA systems for rapid prototyping
- Partial Discharge Measuring System (20 kV)
- Zimmer LMG500 1 to 8 Channel Precision Power Analyzer

### Industry Cooperations

To link the scientific world with commercial products the Department of Mechatronics cooperates in several research projects with industry partners:

- Weight and lifetime optimized energy storage system with bidirectional charging unit
- Inverters with high power density
- Fast switching IGBTs in low-inductive systems
- Converter topologies for meshed DC-grids

