Recent Research and Education Activities in Electronics
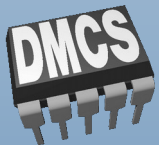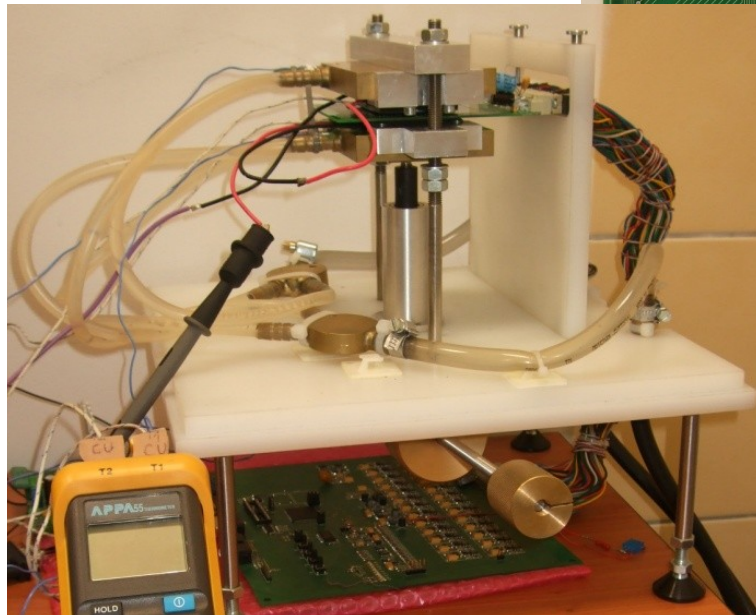
2011–2016
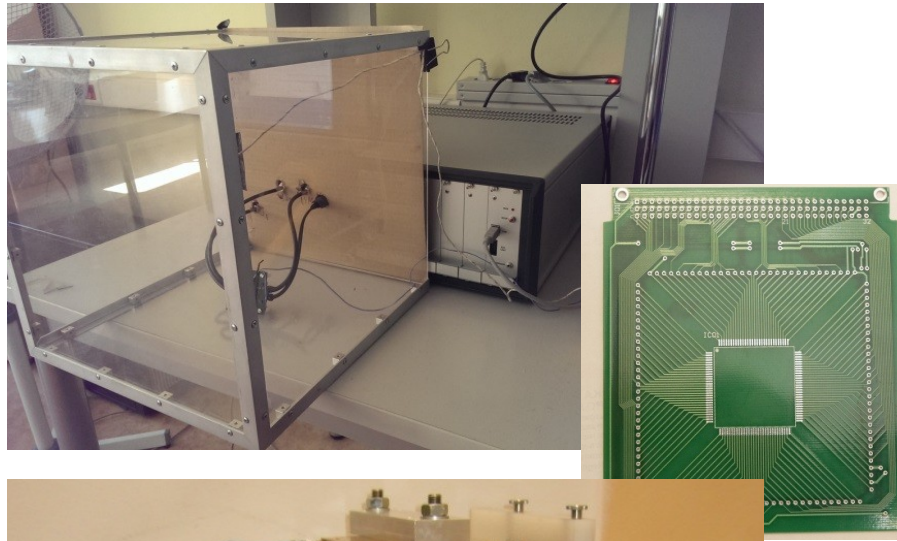
Presented by
Łukasz Starzak
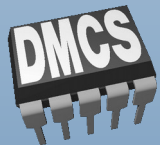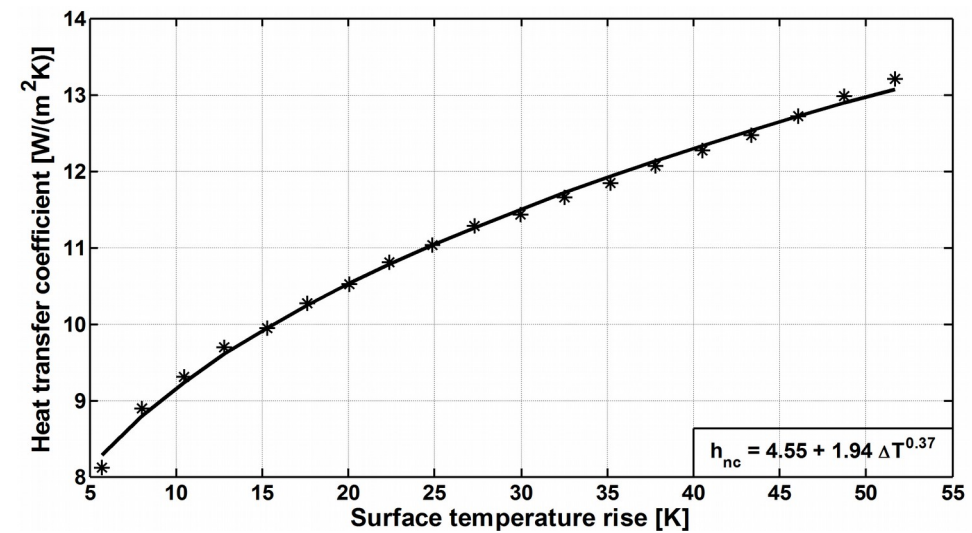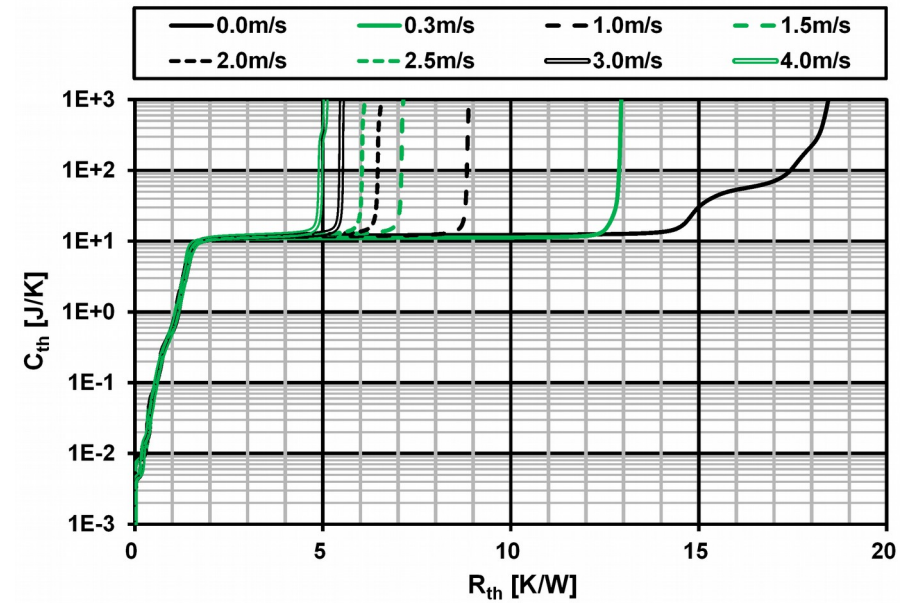
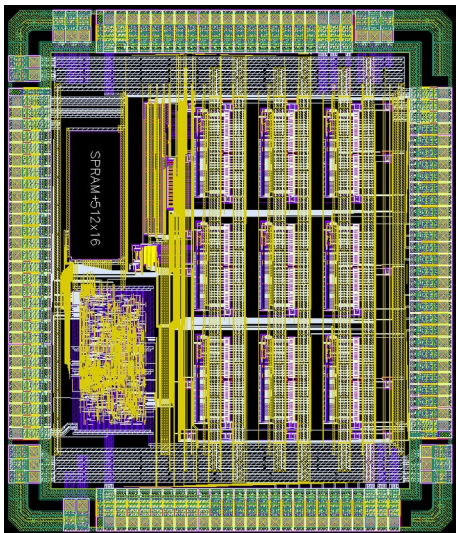# Thermal Testing and Modelling
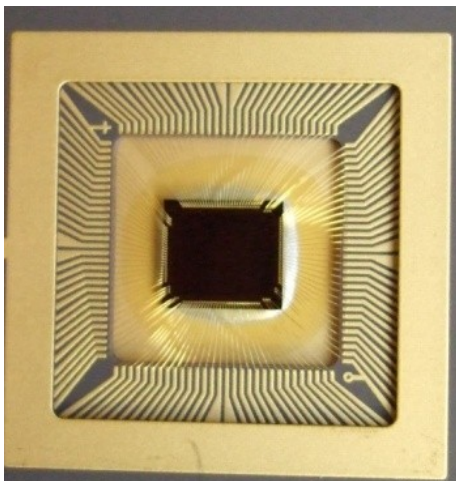
Measuring Equipment

Heat Transfer Coefficient

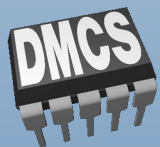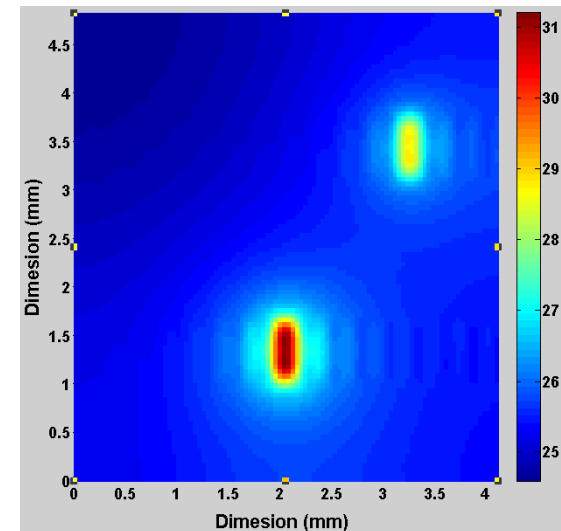# Thermal Imaging and Simulation
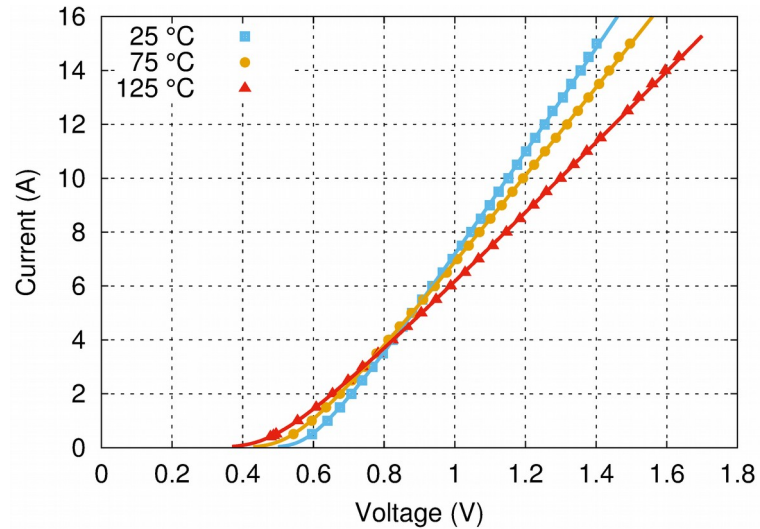
Dedicated IC Designed

Measurements
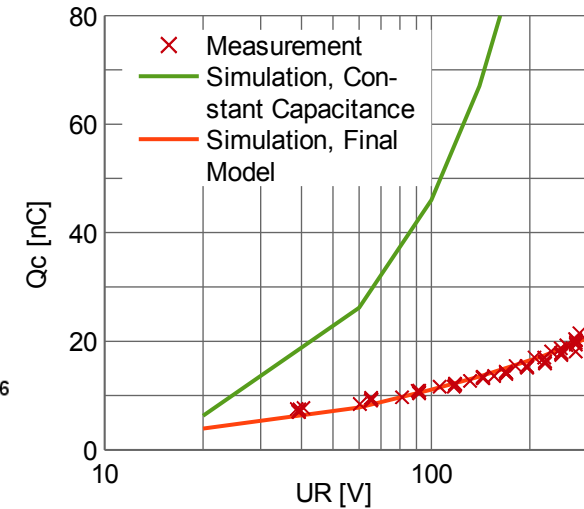

… and Manufactured
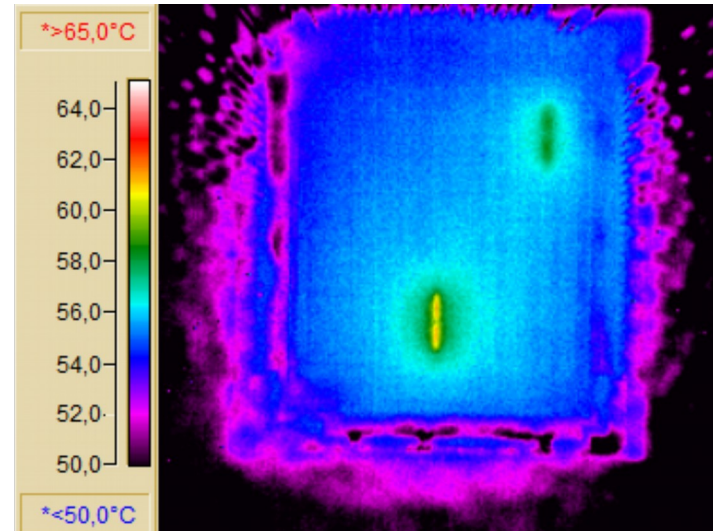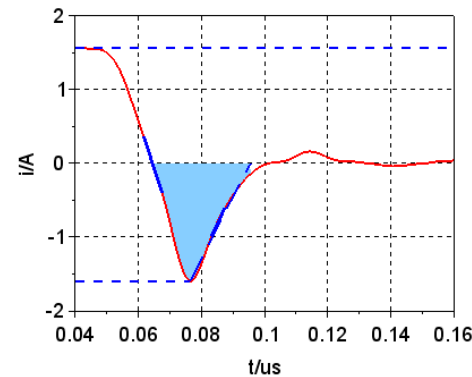
Simulation using Green's Functions

Silicon Carbide Power Semiconductor Device Modelling

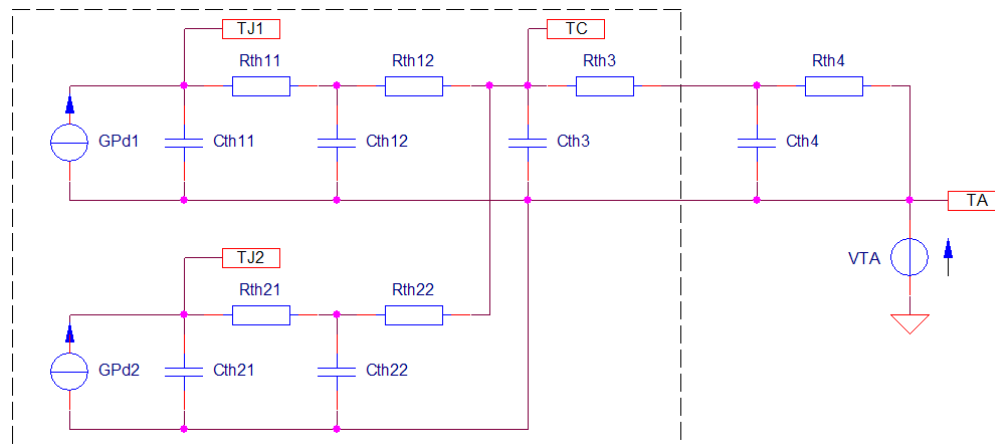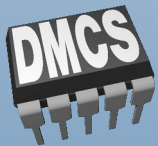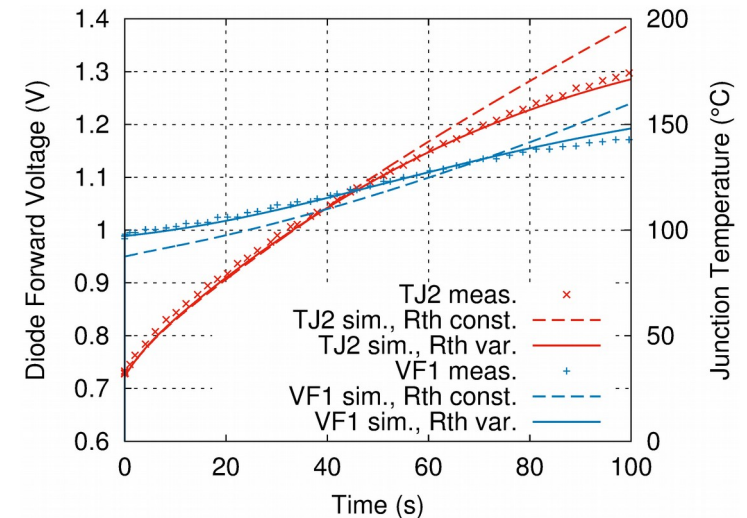## Static Characteristics

Switching Characteristics

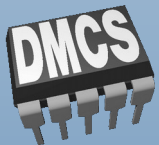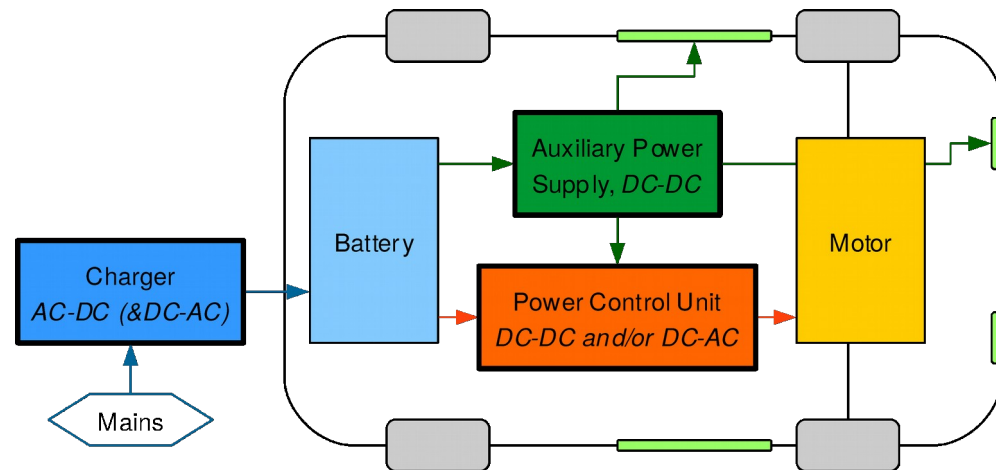## Electro-Thermal Coupling

Variable Thermal Resistance

Application in the ADEPT Project

- **Partners**
  - Eindhoven, Oxford, Milan, Jaguar Land Rover …
- **Goal**
  - Development platform for electric propulsion systems
- **Our contribution**
 - Power loss prediction in power semiconductor devices

Photovoltaics

- Focus: design and operation of PV systems under rapid variations of solar irradiance
  - study on solar irradiance
  - thermal modelling of PV modules
  - short-term energy buffering in PV systems
  - smart PV applications in buildings
  - dynamic efficiency of PV inverters
  - charge-discharge cycles of batteries
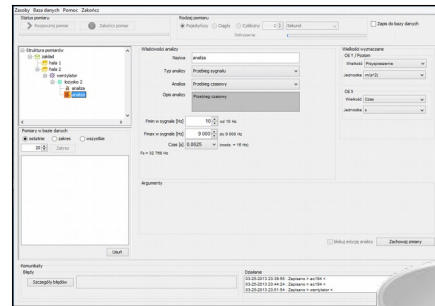 - PV economics under low feed-in tariffs
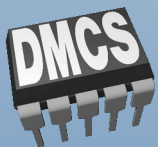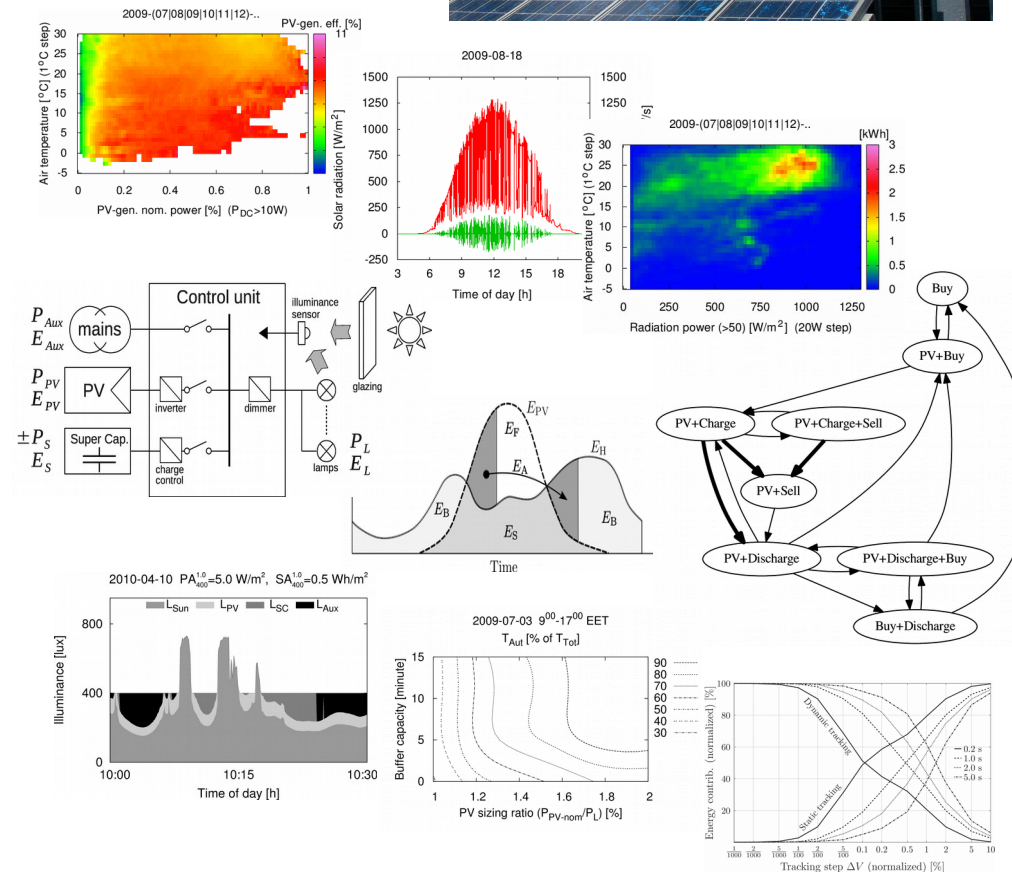
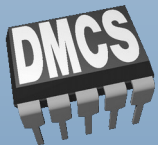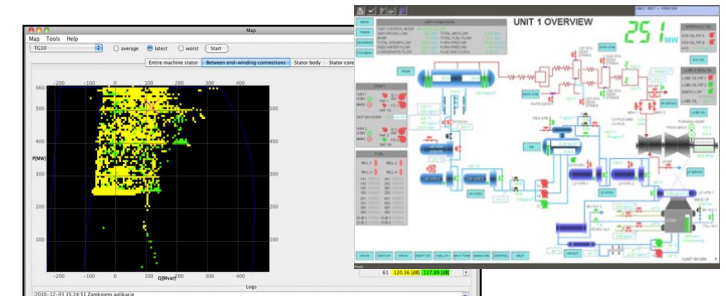# Vibration-Based Machine Condition Monitoring Tools

Signal processing and analysis software for mobile devices

Data acquisition and signal processing hardware

Database applications for signal storage and data dependency analysis
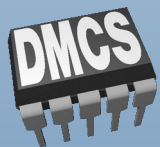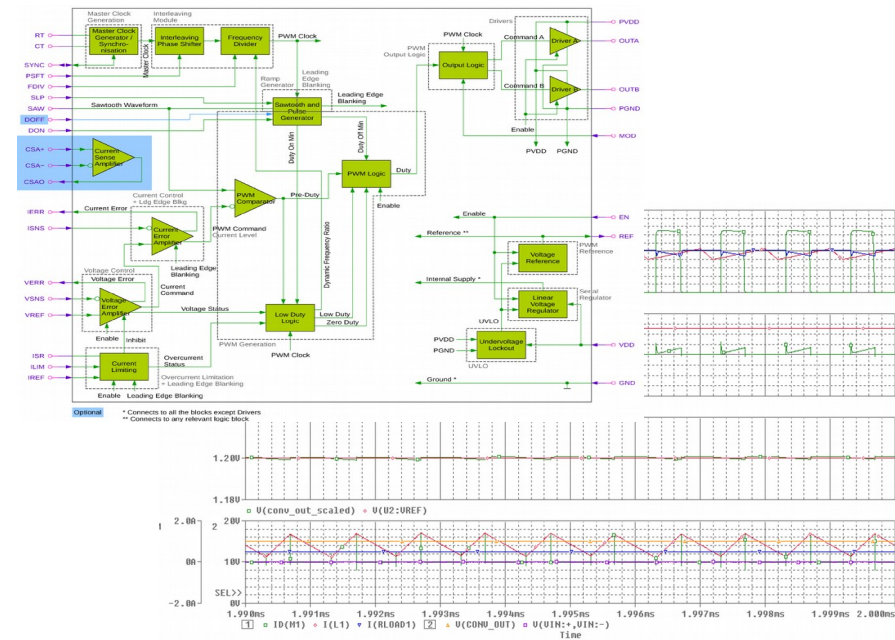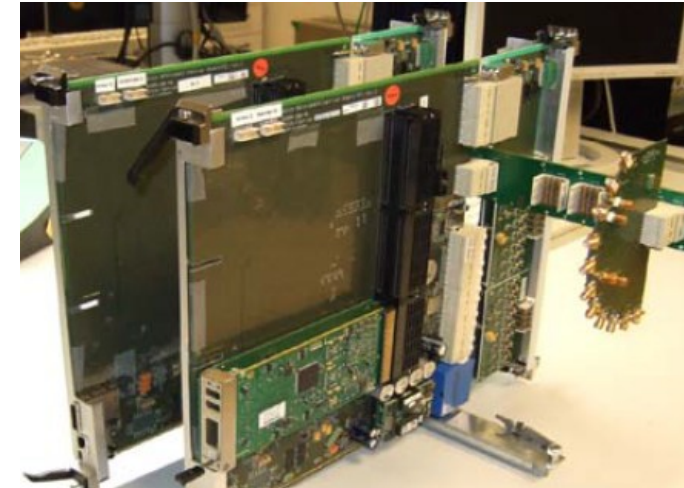
Analytical expert software for turbogenerator fault diagnosis

Collaboration

- **Accelerator Control**
  - Piezoelectric actuator supply and control for beam (resonant cavity) tuning
  - Design and deployment

- **Microelectronics**
  - MISAC: a versatile DC/DC converter controller for space-grade applications
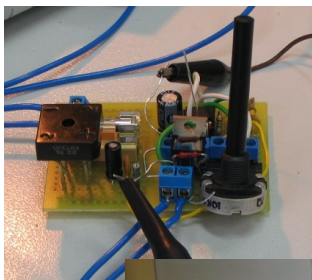 - Architecture design and functional validation

Education

Power Devices
and Converters
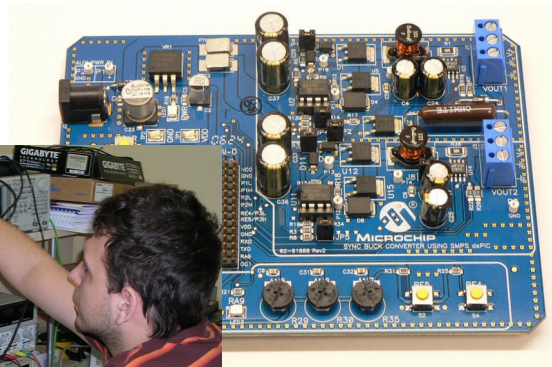
Microcontrollers
Actuators
PLCs & SCADA

Student
Designs:
from Dimmer
to UPS