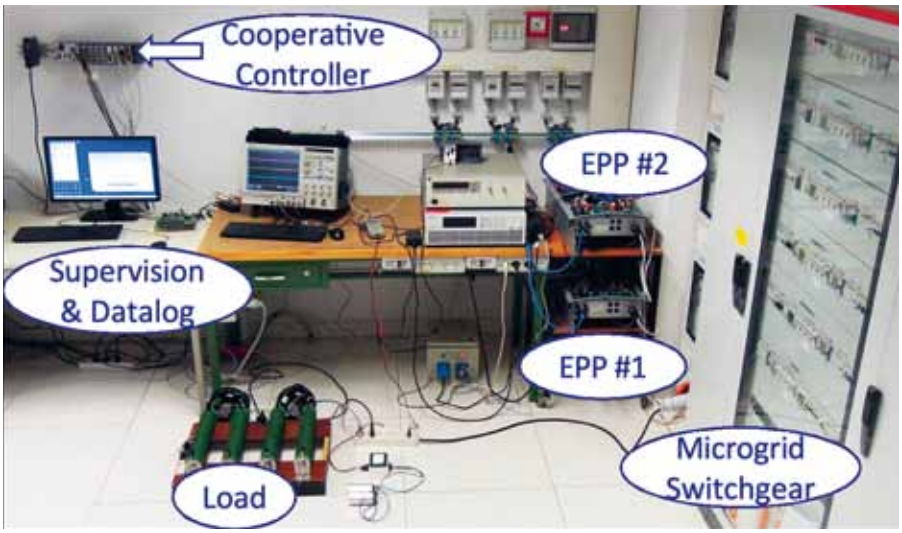
UNIVERSITÀ DEGLI STUDI DI PADOVA

UNIVERSITY OF PADOVA

Power Electronics Laboratory

The Power Electronics Laboratory (PEL) of the University of Padova performs state-of-art research in several areas of industrial and consumer power electronics. It has been active since the early 80's in development of topologies and control strategies for energy conversion. The research group includes three full professors, three associate professors and one assistant professor, plus several Ph.D. students and research fellows. Main current research areas are the following.



Power Device Technology

As new power devices appear, their performance characterization becomes a major research topic. PEL is particularly involved with reliability studies of new power semiconductors, i.e., SiC and GaN power devices as well as Si-based components.

Digital Control

Digital control of switching power supplies is a mainstream research topic at PEL, mainly targeting the study and development of fast, highly optimized and integration-oriented digital controllers for high-frequency DC/DC converters. Recent projects focus on digital control of automotive LED drivers with fast dimming capabilities, smart power management solutions for energy harvesting systems, and online efficiency optimization techniques for resonant topologies.

Renewable energy

Development of new converter topologies and control techniques for full exploitation of renewable energy sources is another key activity, with special focus on interface converters for photovoltaic generators, batteries and PEM fuel cells.

Solid State Lighting

Design of line-fed converters for lighting is a traditional research area for PEL. Recently, focus was on the development of novel converter solutions for LED lamps, in particular those based on high-frequency resonant converters.

Smart grids

PEL participates to a multi-disciplinary research team including experts in Power Systems, Control, Telecom, Economics, and Measurement. The group mission is to perform cutting-edge research on smart micro-grid technology, particularly on:

- Online and optimal policies for control of distributed micro-generation, real-time cooperative control of active elements, real-time power scheduling for distributed prosumers.
- Optimum control of distributed energy storage to meet grid requirements while maximizing the exploitation and lifetime of batteries.
- Real-time simulation and HIL testing real-time control algorithms in the smart micro-grid experimental facility.
- Communication paradigms for SG control and monitoring.