Universitat Politècnica de Catalunya (UPC)

Electronic Engineering Department (DEE)

Terrassa Industrial Electronics Group (TIEG)

Members
10 PhD Lecturers  2 Staff Engineers  2 PhD Students
• Renewable, EV and Motion Control Lab.
  - 20 kVA Modular Multilevel Converter based on SiC
  - 4 x 3-kVA and 2 x 40kVA Three-Phase Inverters based on Si and SiC
  - 2 x 20-kVA Three-Level NPC Inverters (back-to-back connected)
  - 7.5-kVA and 70-kVA Matrix Converter
  - 2 x cRio National Instruments
  - Wind-photovoltaic Facility (800W+3kW)
  - Multiple Electrical Motors (20-kW PMSM)
  - Multiple Resistive and Inductive Loads
  - 2 x dSpace DS1103 and DS1006
  - 6 kVA Programmable Power Supply
  - Many oscilloscopes and other general instrumentation
Laboratory prototype (Three-Level NPC)
dSpace DS1103 application
Laboratory prototype. Wind-Photovoltaic Facility (800W+3kW)

- Global Solar Irradiation.
- Temperature Sensor
- Wind Speed Sensor
- Relative Humidity Sensor
- Barometric Pressure Sensor.
- Modbus Data Logger

BP 3170T - 170W
Photovoltaic application

Main Control System

PC with LabVIEW

Battery Charger

12 Volts Battery

Motor Controller

End Stops

Azimut Movement

Latitude Movement

2-Axis Solar Tracking Application

Sun Light Sensor

IMU 9DOF

GPS Module

Terrassa Industrial Electronics Group (TIEG) https://tieg.upc.edu
Facilities, Equipment and Research

- Laboratory prototype. Active Filter, Motors, VSI

**APLC Hardware Platform**

- 3-kVA Three-Phase Inverter
- 70-kVA Matrix Converter

**Initial currents**

**Balanced and filtered currents**

**4kW DC – PMSM 1-3 kW**

**PMSM 20 kW**

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https://tieg.upc.edu
Laboratory prototype. Three-Phase Modular Multilevel Converter (MMC)
Facilities, Equipment and Research

- **EMC Laboratory**
  - TEM Cell
  - RF Generators
  - ESPI Spectrum Analyzer
  - Line Impedance Stabilization Networks
  - RF Power Amplifier
  - Vector Network Analyzer
  - EMC Clamps
  - EMC Antennas
  - Oscilloscopes and Power Supplies
  - AC Power Supply (10kW - up to 5kHz)
  - National Pxi Controllers
Facilities, Equipment and Research

- Conducted EMI Suppression in Multi-Converter System
• Simulation Laboratory
  – COMSOL multiphysics
  – Agilent Advance Design System (ADS)
    • Momentum
    • EMDS
  – MATLAB
  – LabVIEW
  – ORCAD
  – Protel
  – ……
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