

## POLITO-INFINEON internship activation

“Design of measurement and control circuits for power electronics”

### Objective

INFINEON develops in Italy the Gate Drivers used in industrial applications where a microcontroller must drive one or more power switches. The devices designed in Pavia realize the analog/digital interface to control inductive or capacitive loads and measure the relevant nodes allowing system diagnostics and protection. Integration of digital blocks with previous technology used to be difficult, but the availability of a new process removes constraints and allows digital support and/or replacement of analog functions. The aim of the internship is to demonstrate the effectiveness of a digital solution integrated with high voltage analog to improve performance, reduce costs and increase reliability. The student will be able to demonstrate the achievements by comparing the implemented solution with a traditional full analog solution.

### Acquired skills

- Operating principle of a gate driver (interface between the controller and the power transistor)
- Electronic systems modeling techniques
- Key parameters of industrial applications (e.g. robustness)
- Methods for integrated circuit architecture analysis
- Design techniques, physical implementation and verification of a digital block

### Timing

- Months 1-2: SystemC description in of a DC-AC conversion system
- Months 3-4: design and verification of one or more digital blocks
- Months 5-6: implementation in INFINEON proprietary technology

### Novelty compared to the state of the art

- New INFINEON process allowing the integration of digital blocks and high voltage analog devices in the same device
- New application function that collects information on the status of the system and predicts maintenance for unattended applications (e.g. wind generator)
- New methodology with mixed approach for functions such as dead-time and slew-rate control