



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 39th cycle

Research Area n. 2 - Electronics

THEMATIC Research Field: HIGH-FREQUENCY MULTI-LEVEL DC-DC CONVERTERS

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

DC-DC converters are widely used in any electronic system to provide a range of supply voltages starting from a single energy source. Efficiency and cost, as well as static and dynamic performance, are key parameters of those devices in both consumer and high-end applications. The research aims at developing novel integrated DC-DC converter architectures with high efficiency and high power density. The main application area includes integrated power management circuits (PMICs) for portable devices. To achieve the research objectives, both innovative control schemes and advanced conversion topologies will be explored. Efforts will be mainly focused on the development of integrated high-frequency 3-level converters with time-based control.

Methods and techniques that will be developed and used to carry out the research

The research activity will be carried out using system theory and dedicated tools for system analysis (SIMPLIS, MATLAB). The performance of the devised system will be assessed in a test-chip demonstrator. Transistor level design of each circuit block will be performed in Cadence-Virtuoso, and properly characterized over PVT variations and post-layout parasitic extraction. A thorough experimental characterization of the fabricated silicon prototypes will be performed using dedicated evaluation boards.



Educational objectives	The PhD student will be involved in different areas such as system analysis and verification, analog microelectronic design, heterogeneous integration, laboratory measurements.
Job opportunities	1. Power electronics design expert in the R&D areas of major semiconductor companies. 2. Academic career.
Composition of the research group	2 Full Professors 1 Associated Professors 1 Assistant Professors 2 PhD Students
Name of the research directors	Prof. Massimo Ghioni, Prof. Salvatore Levantino

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Additional support - Financial aid per PhD student per year (gross amount)	
Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
Amount monthly	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p>The research is supported by STMicroelectronics in the frame of the Joint Research Center collaboration with Politecnico di Milano.</p> <p>EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student.</p> <p>TEACHING ASSISTANTSHIP: availability of funding in recognition of supporting teaching activities by the PhD student.</p>



There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

COMPUTER AVAILABILITY: individual use.

DESK AVAILABILITY: individual use.