



PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 37th cycle

Research Area n. 1 - Computer Science and Engineering

**THEMATIC Research Field: DESIGN OF EFFICIENT HARDWARE CORES AND
ACCELERATORS FOR HPC**

Monthly net income of PhDscholarship (max 36 months)

€ 1350.0

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

To sustain the transition towards Exascale computing the use of FPGA-based accelerator cards targeting HPC workloads, such as the Xilinx Alveo solutions, is becoming a de-facto standard solution. Power/ performance/ predictability trade-offs must be addressed at all levels of the system, from application to system software and hardware platform. Customization of hardware accelerators are critical to adapt the system to the QoS requirements of the applications while staying within the power/energy envelope. Thus, complex heterogeneous and configurable architectures will be employed, requiring a methodology to design and to prototype hardware on FPGAs. For more information: <https://textarossa.eu/>

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

Design methodologies to realize custom hardware, prototyped on FPGAs. Development of models for power estimation and energy management at hardware level. Use of design flow based on SystemVerilog to design cores and hardware accelerators.

Educational objectives

The student will acquire strong skills in hardware design (Verilog/SystemVerilog/VHDL) and system software development (typically C/C++), as well a depth knowledge of modern architectures supporting the entire computing continuum, from edge devices to HPC systems.



Job opportunities	Recent graduates in this field have been hired by major semiconductor and technology companies. Post-Doc research opportunities are also available. Cooperation with academic startups at Polimi could be also valuable job opportunities.
Composition of the research group	0 Full Professors 6 Associated Professors 2 Assistant Professors 3 PhD Students
Name of the research directors	William Fornaciari, Davide Zoni

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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	564.01 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: ENEA - IT; BSC - ES; CERICT - IT; CINECA - IT; INRIA - FR; ATOS -FR; E4 -IT; Fraunhofer Institute -DE; CINI (Univ. Studi Torino, Uni Pisa, Polimi) - IT; INFN - IT; CNR - IT; PSNC - PL; INQuattro - IT 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 per year 2nd year: euros per student (1534) 3rd year: euros per student (1534) TEACHING ASSISTANSHIP: (availability of funding in recognition of supporting teaching



activities by the PhD student)

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:

1st year: individual use

2nd year: individual use

3rd year: individual use

DESK AVAILABILITY:

1st year: individual use

2nd year: individual use

3rd year: individual use