RECRUITMENT OF ASSOCIATE PROFESSORS
2021 SESSION

Grenoble INP, Engineering Institute of the Univ. Grenoble Alpes, labeled Initiative of Excellence, is a public institution offering engineering courses with solid basic scientific content, a high technological specialization in connection with strong societal challenges related to digital, industrial, environmental and energy transitions, and a major internationalization of its courses. Grenoble INP employs more than 1,200 people (associate and full professors, lecturers, administrative and technical staff) and has 5,500 students in its 6 engineering schools (Ense3, Ensimag, Esisar, GI, Pagora, Phelma) and the Prépa des INP. From 2020, Polytech Grenoble and Grenoble IAE join Grenoble INP and considerably expand its training offer. Grenoble INP is recognized in national rankings as one of the leaders in engineering with international visibility. It is member of international engineering networks as well as the European university UNITE!

Grenoble INP is a mother institution of more than 30 research laboratories, some of them international, and platforms where state-of-the-art research is carried out to develop knowledge, promote it to our industrial partners and transfer it to students. Grenoble INP is thus at the heart of the technological challenges of the future: Energy and materials; Digital sciences; Micro nanotechnology; Future industry and eco-efficient production in which international rankings recognize it as a leading player.

POSITION DESCRIPTION

Short profile:
« Hardware architecture and hardware/software integration: acceleration and energy efficiency »

Job number : 27 MCF 0402
Field of expertise : 27

Recruitemnt date : 01/09/21
Location : Grenoble

Keywords : Hardware architecture, hardware acceleration of artificial intelligence, hardware software/interface

TEACHING

School : Grenoble INP - Ensimag
School web site : http://ensimag.grenoble-inp.fr/
Contact persons : jean-louis.roch@grenoble-inp.fr, christophe.rippert@grenoble-inp.fr

Ensimag is one of the best French engineering school in the digital and information technology domain. It offers very high-level conceptual and technological classes in the fields of computer science and applied mathematics. It prepares people for digital engineering jobs in many sectors, it core sectors such as information systems, banking, embedded systems, networks, but also the industry as a whole, for digitalization, design and decision-making tools.

Teaching profile :
Ensimag, a reference school of higher education for digital and information technology, wants to consolidate its teaching in the field of computer system design in the broadest sense. The courses
focus on the implementation chain to train engineers in the design of secure systems: from modeling to implementation with evaluation and testing (programming, system, architecture, algorithmic, discrete mathematics, service architectures and distributed applications ...) of all elements of the processing chains from software and hardware components validated, proven or certified.

The person recruited must have a solid knowledge of computer science and software development. He or she will have to be involved in the teaching of the Ensimag core curriculum (1st year and about 50% of the courses in the 2nd year): algorithmics and programming, harware architecture and low level software, software projects (in particular the software project in C and the digital design project in the 1st year), operating systems, etc.. This common core is the foundation of our engineering students, recognized by our industrial and research partners, which allows them to specialize but also to remain generalist and adaptable. The person might be led to participate in the development of courses in the themes of hardware artificial intelligence, particularly in relation to edge computing, in computing in the broad sense, and to take on pedagogical responsibilities of a various nature.

In collaboration with the pedagogical teams concerned, he/she will have to be involved in setting up project-based teaching and training using digital technology.

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**RECHERCHE**

**Research lab : TIMA (UMR 5159 Grenoble-INP, UGA et CNRS)**

**System Level Synthesis team**

**Website :** [http://www.tima.fr/](http://www.tima.fr/)

**Contacts :** giorgio.dl-natale@grenoble-inp.fr, olivier.muller@grenoble-inp.fr

TIMA (Unité Mixte de Recherche N°5159) is a public research laboratory under the supervision of Grenoble INP (Institut Polytechnique de Grenoble), CNRS (Centre National de la Recherche Scientifique), and UGA (Université Grenoble Alpes). The research topics of the TIMA Laboratory cover specification, design, verification, testing, CAD tools and design support methods for embedded systems, from basic analog and digital components to multiprocessor systems-on-chip and their basic operating system. TIMA is a cosmopolitan team, with researchers and trainees from all over the world. A large part of the research is carried out in the context of collaborative projects, with industrial and academic partners, funded by regional, national and European contracts.

**Research profile:**

The deployment of IT systems anywhere, anytime intensifies the need for more efficient architectures in all areas: hardware complexity, time performance, energy efficiency, software execution efficiency. Continuing the current trend requires gains of one or two orders of magnitude in these areas, and the design of new architectures is a major lever for achieving these gains. Hardware architectures dedicated to an application or a class of applications aim on the one hand to accelerate specific processing and on the other hand to make them more efficient in terms of time and energy (“digital frugality”). The design of innovative hardware architectures requires the mastery of simulation and/or verification environments, and/or hardware synthesis tools. The integration of these architectures in multiprocessor systems with a complex memory hierarchy requires a good knowledge of current embedded system architectures, design tools, and software layers down to the operating system.

In this context, the recruited candidate will be led to develop his/her research activity in one of the two following directions:

- design and implementation methods of specialized architectures, aimed more particularly at artificial intelligence applications: dedicated neural network architectures, e.g. highly quantified, inference and learning adapted to hardware constraints, parameter access methods, compression, multiplications and convolution methods, etc,
- design of general-purpose architectures: processor micro-architecture, organization and optimization of the cache and translation buffer hierarchy, networks on a chip, digital systems integration, ...

The team validates its proposals for architectures on FPGA boards. A mastery of FPGA development methods and tools would be appreciated.

**Restricted regime area (ZRR):**

- YES
- NO

(French governmental protection of scientific and technological research program)
Online application must be done on the website Galaxie from 2021, 10 am (GMT+1) to 2021, 16 pm (GMT+1). Postal applications won't be accepted.

The interview will include simulation/situational exercises. The interview will be held in French; a part of it could be held in English. Further information will be provided with the letter of convocation.