

# Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website [www-csc.utt.fr](http://www-csc.utt.fr))

Supervisor's name : Prévotet Given names : Jean-Christophe

Status (prof., assistant prof., ...) : associate prof (HDR)

Laboratory : IETR Website address : <https://www.ietr.fr>

Institution : INSA de Rennes Website address : <http://www.insa-rennes.fr>

Scientific competence of the supervisor:

The supervisor is mainly involved in embedded reconfigurable systems in the field of IoT. His current research interests deal with device adaptation, machine learning and embedded systems security. He is also very interested in communicating devices and the hardware implementation of such devices.

Two major publications in the field proposed for the PhD :

1. ARM-FPGA-based platform for reconfigurable wireless communication systems using partial reconfiguration, MROUE, JC Prévotet, F. Nouvel, Y. Monhanna, EURASIP Journal on Embedded Systems, 2017
2. APPLYING PARTIAL RECONFIGURATION TECHNIQUE ON ARMFPGA SYSTEMS IN CONTEXT OF VERTICAL HANDOVER IN WIRELESS HETEROGENEOUS NETWORKS, MA Rihani, F Nouvel, JC Prévotet,

Website address of the personal page : <https://jprevote.perso.insa-rennes.fr/>

Supervisor's email : [jean-christophe.prevotet@insa-rennes.fr](mailto:jean-christophe.prevotet@insa-rennes.fr)

Description of the research work proposed for a PhD Topic # (see list) : I-7

Title : Hardware Implementation of Machine Learning Techniques for IoT devices

Subject :

Due to the this multiplicity of standards, the various characteristics of wireless channels (pathloss, fading, shadowing ...), the frequency allocations, and the mobility features of wireless devices, the operating environment is becoming more and more complex to comprehend. In our work we are considering smart systems that must have the ability to reconfigure themselves to adapt to channel conditions and to the environment in general. Our proposed system is built on several steps. In this thesis, we strive to identify the most promising solutions in terms of performance and low complexity in the context of IoT devices adaptivity.

We will consider the following steps:

- Perform a state of the art study on Machine Learning for platform adaptation
- Identify the relevant parameters that we can consider to perform learning
- Propose the corresponding Machine Learning Architecture that takes into account the design constraints (limited amount of resources, low latency, low-power)
- Accelerate this architecture in an FPGA reconfigurable platform

Keywords :

machine learning, IoT, hardware implementation, FPGA

Expected collaborations :

National and international collaborations are targeted and should get started with the next months.

Background required from the applicant :

A good knowledge in machine learning, computer science is required. Furthermore, the candidate should also be familiar with Hardware Description Languages and reconfigurable devices.

Existence of a PDF file detailing the proposal ("yes" or "no") : yes

(see guidelines on the website [www-csc.utt.fr](http://www-csc.utt.fr))