

Master Project 2020

IETR Lab, SCEE Team, CentraleSupélec (Rennes campus)

Acceleration of GNU Radio Blocks Using General Purpose GPUs

Software Defined Radio (SDR) is a wireless communication system in which components of transmitters and receivers are mostly implemented in software. GNU Radio is an open source software package designed for SDR application development. It provides a graphical user interface framework to create an interactive environment for the user, and is well supported by SDR platforms such as USRP, HackRF, and BladeRF. GNU Radio uses a combination of Python and C++, where Python handles the high level interface and C++ is used to implement drivers and low level interfaces with hardware. In order to accelerate the baseband processing of the SDR, the main goal of this internship project is to identify opportunities for compute acceleration and move some processing blocks (FFT, FIR, frame detection...) from CPU to GPGPU accelerators. This can be achieved using the NVIDIA CUDA toolkit.

The objectives of this internship project are:

- To become familiar with GNU Radio and GNU Radio-companion (GRC)
- To create custom out-of-tree (OOT) modules in C/C++ and to make them available in GRC
- To become familiar with development for NVIDIA GPGPUs for compute acceleration (CUDA C/C++, PyCUDA and/or GPU-accelerated libraries)
- To accelerate the previous OOT modules in a GPU using CUDA
- To deploy the accelerated application in practical environments and evaluate the achieved speedup

Please send us:

- Your CV along with your academic records and marks
- A motivational text
- Any additional documents/links that you think can show your experience

Hosting laboratory : IETR (Institute of Electronics and Telecommunications of Rennes)
Hosting institution : CentraleSupélec
Research group : SCEE (Signals, Communications and Embedded Electronics)
Starting date : February/March 2020
Duration : 5 months
Salary : around 550€/month

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