Information and Communication Technologies Institute

Carnegie Mellon | PORTUGAL

AN INTERNATIONAL PARTNERSHIP

Undergraduate Internship Program - CMU Portugal

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Final Report

From July 1st until September 18th, I had the unique opportunity to be an Intern in the Electrical and Computer Engineering Department at Carnegie Mellon University, under the Undergraduate Internship Program, sponsored by the CMU Portugal agreement.

Over these 10 weeks, I was a member of the CSSI group, in the All-Digital PLL project, under the supervision of Professor Jeyanandh Paramesh. The main goal of my work was to implement in hardware a previously tested Calibration Algorithm that would control the tuning of a frequency divider, and improve its power consumption. This was done using the Verilog HDL, and the sillicon synthesis was performed using Synopsys and Cadence tools. The implementation and testing was successful, and was even completed two weeks before the end of the internship. As such, I was given a set of additional tasks to occupy part of the time before my departure, which included the testing and synthesis of previously existing Verilog code for some other modules needed in the final project, which include a 5-bit Enconder and a Lookup Table, and the implementation, from Verilog to Layout level, of three Multiplexers. In the beginnig of my internship, as a starting task, I was also asked to design a Digital Filter, and to provide the HDL description for it in Verilog. Given this, I would say that the Internship goals were overmatched.

Aside from the obvious academic experience, this internship also improved my teamwork skills, as constant communication and feedback are required to make sure the work is being done properly and the schedule deadlines are being met. This was also an great opportunity to learn from my group collegues and, namely, I would personally like to thank Ahmed Hussein, the PhD Student responsible for the calibration algorithm that I implemented and for conducting the work, and Sriharsha Vasadi, a Masters Student who was tireless to guide and assist me in using the new tools I was required to use.

I also met many other Portuguese members of the CMU Portugal program, with whom I had the pleasant opportunity to have lunch several times, visit other cities, and share impressions about the work we were all doing.

Lastly, I want to thank *Fundação para a Ciência e Tecnologia* (Portuguese Foundation for Science and Technology) and CMU Portugal for this wonderful experience, and acknowledge the service they do for Portuguese Science in providing rich and contentful training experiences such as these. Also, I want to thank my Portuguese supervisor, Professor José Machado da Silva, for introducing me to these internships and promoting my application.

Pittsburgh, September 7th 2015,

José Pedro Castro Fonseca