CMU | Portugal Faculty Exchange — Final Report

Rui Prior

Assistant Professor, Faculdade de Ciências da Universidade do Porto
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This report summarizes my work and experience during the four month period spent at the CMU, hosted by Prof. Hyong Kim.

I was involved in the graduate course *18-757 Network Management and Control*. Even though, due to my arrival late in the semester, it was not possible to do the qualification for teaching CMU/ECE courses in the future, which was one of my intents, it was still a very enriching experience. A noteworthy aspect was the research-oriented character of the course. The discussion of recent research papers (given in advance to the students, and which they were supposed to have read) was frequent in the classes, and some included lectures by more senior PhD students on their own research work. The course projects were used to explore research ideas, and by the end of the semester students presented their work and delivered reports of publishable quality, some of which evolved into actual research papers. This enrollment of students in research contrasts to the more spoon-feeding attitude still frequently found in Portuguese universities.

By invitation of Prof. Charles Neuman, I attended the presentation of the projects of his *Mechatronic Design* course, where several interdisciplinary teams of students have shown their realizations of two projects (connect-four playing machine and can crusher). It was a good example of the complex (and highly appealing for the industry) work that can be performed by students.

With respect to research, after an initial period familiarizing with the topics currently being researched within the group, I started a collaborative work with Prof. Kim and Prof. Ricardo Morla (from FEUP) on the use of machine-learning techniques in network management, a field that is entirely new for me but holds much promise. More specifically, our work concerns the automatic detection of abnormal BGP events (caused by Internet worms, blackouts, etc.) from the UPDATE messages exchanged with the peers. The work is still ongoing, and will give rise to a joint publication.

I also participated in Prof. Kim's weekly research group meetings. Every week, three PhD students would give a presentation each, followed by discussion. Whenever they had new work of their own, they would present it (especially as dry runs before going to conferences), but more frequently they presented papers they had read and found interesting, analyzing their merits and weaknesses, as well as their relevance for the research done within the group. In these meetings, I gave two talks, one on a recently published paper of mine *(Systematic Network Coding for Packet Loss Concealment in Broadcast Distribution)* and the other one on the use of network coding with TCP.

During my visit, I also had the opportunity to attend many interesting seminars on diverse topics, mostly technical (on security, next-generation network design, electronic

elections, etc.), but also non-technical (talk by Rodrigo Costa, CEO of ZON Multimedia).

Overall, my feeling about the experience is very positive, and I believe it will allow me to improve my work both in terms of research and education.