Undergraduate Internships Program Report - Fall 2016

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This short report summarizes my activities and experiences during my visit to Carnegie Mellon University (CMU), from September to December 2016. I was hosted by Professors Daniel Siewiorek and Asim Smailagic and sponsored by Professor Alexandre Bernardino.

During my stay at CMU, I was able to work on spoken dialog systems (SDS) in the scope of the Augmented Human Assistance (AHA) project, designing a dialog state space and its rules and integrating it in the Virtual Coach (VC) and its interface. Dialog is a fundamental skill for a service robot and user interfaces (UIs) when dealing with elderly and disabled people given the fact that their lower visual acuity may hinder interaction with a UI.

Since I've had no prior design experience of SDS's, I made an initial review of their components and architectures. Since my visit had a short-term nature, Automatic Speech Recognition (ASR) and Speech Synthesis (SS) solutions should be straightforward to integrate while performing state-of-the-art results. For this reason, I made use of a cloud-based solution provided by Nuance to handle both ASR and Speech Synthesis, although a locally based solution (CMU Sphinx, MaryTTS) should be used in the future. For Natural Language Understanding (NLU) a keyword spotting approach was employed. Regarding dialog management (DM), I made use of the OpenDial toolkit to deploy the designed dialog using the probabilistic rules approach. During the integration of OpenDial in the project, several modules were developed and submitted as a contribution to the toolkit. The final dialog system can guide a person through the VC UI, complying with sudden intention changes and making some suggestions when the person is unable to decide what to do. During exercise, the system gives progression feedback and proposes breaks based on user score, emotion and reported well-being. It will also stop the exercise if the person states that he/she is feeling pain, or upon request. Future work includes the design of social dialog during exercise breaks and for situations where the assistive robot approaches people, presents itself and offers them its services.

The weekly meetings with Professor Asim and Professor Dan provided invaluable insights about possible problems and the way to go. Furthermore, they invited me to attend other projects' weekly meetings allowing me to know some of CMU's cutting edge projects, their progress, and the involved people. I also had the opportunity to meet with Professor Jodi Forlizzi and Jill Lehman who shared their Human-Robot Interaction/SDS experience and also led me to meet some Robotics/Human-Computer Interaction Ph.D. students with similar interests, making some good friends.

CMU's resources are simply amazing. There are regular talks and seminars which are free to attend and to watch online at any time. I also had the opportunity to attend some classes which were extremely interesting. As for leisure time, some of CMU's offerings include free cinema, gym, pool, and even a jacuzzi (yes, a jacuzzi).

Although calm, the city of Pittsburgh features lots of events and interesting places to visit (like sports events, museums, exhibitions, historical landmarks). There, you can feel emerged in the American culture. Some of the city views can be breathtaking, and the architecture really catches the eye.

I would like to thank CMU-Portugal, Professors Alex, Asim and Dan for the opportunity to participate in this unique and highly rewarding experience and for all their support.