Computer Science Tripos Part II Progress Report

Gesture-controlled Robotics using the Vicon Motion Capture System

C. J. Hung, cjh84@cam.ac.uk

30 January 2009

Project Supervisors: Cecily Morrison, Laurel Riek

Director of Studies: Simone Teufel

Preliminary work

All preliminary work for my project have been entirely satisfactory. The hardware was ordered during Michaelmas term, and two OLPC XO laptops and two iRobot Creates were received at the beginning of Lent term. I recorded approximately 700 KB of Vicon data for use in training and evaluation, representing thirty examples of five gestures.

Successes

I have obtained the libraries needed to drive the laptops and robots, along with a Java client for the Vicon system. Using these APIs I have written the virtual robot simulator and a virtual Vicon system which emits data from the pre-recorded logs. I have also created a simple multiplayer game which uses the iRobot Create API, which will be used for initial testing and as a backup if integration of the XO laptop webcam fails.

Changes to original plan

On the advice of my supervisor, I am using pre-existing libraries for Hidden Markov Models and Artificial Neural Networks, modifying these for my specific purposes. The justification behind this is that as long as I fully comprehend the algorithms, it is more time-efficient to use these as tools towards my final goal. To this end, I have obtained Python implementations for both statistical models, which will be acknowledged as part of my final dissertation.

Timetables and Scheduling

Currently I am training the models with the recorded gestures. This means that I am approximately a week or so behind my coding timetable. I am also a little behind in my write-up, in that I have an introduction but no preparation, and the implementation section is incomplete due to the current work on the implementation.

Upcoming work

The forthcoming two weeks will be primarily integration with the physical hardware. This is likely to be the most hazardous section, as I am dependant on external libraries. However, even if this proves infeasible, my success criterion do not depend on having actual hardware. My focus for the upcoming weeks will therefore be training the models and switching from the virtual robots and Vicon system to the live systems.