

Bi-Weekly Report

24 October 2014

Team Information

This document contains a summary of all that has been achieved over the last two weeks by team 19 on the CTSNet Robotics project as a part of the module Systems Engineering I of the University College London Computer Science course. Team 19 is formed of three students, Edward Collins (team leader), Kirthi Muralikrishnan (website and documentation lead) and Tom Page (research and programming lead).

Client Information

Team 19 has three clients:

- ~Dr Shabnam Parkar, a paediatric surgeon working for the NHS in London.
- ~Dr Joel Dunning, cardiothoracic surgeon at James Cook University Hospital.
- ~Dr Lourdes Agapito, computer graphics and vision expert at UCL and primary supervisor.

Summary of Progress

Over the last two weeks we have accomplished most of the goals that we set in the first bi-weekly report. We have established contact with our remaining two clients, Dr Agapito and Dr Parkar. We have met with Dr Agapito for an extended discussion on how we will go about completing our project, and have received advice from her about tools that we may be able to use.

We have also met with Dr Dean Mohamedally, after receiving an email from Dr Dunning that outlined his requirements for this project. In this meeting we decided that the goal we must primarily focus on is that of using the Kinect 2.0 as a larger-than-scale prototype of a depth sensing camera to tell when two objects have touched, for example a robotic surgical tool inside a body.

During our meeting with Dr Mohamedally, we were assured that the nature of this project is Research and Development into Kinect technology and its uses in a medical context. The goal is not to produce a fully working prototype - rather to provide the software that would allow a true scale prototype to work.

One of the main tasks over the last two weeks has been to continue the hacking of the Xbox Kinect 2.0s. On Friday 17 October we formed a small "production line", and in the two hours prepared all of the USB 3.0 cables and all of the Xbox Kinect cables to be soldered the following week. On Friday 24 October, due to a misplacement of our previously prepared Kinects, we only had three new ones to work with. We hacked these and by the end of the session had got all three working when plugged into a laptop.

Finally we have all been working on our individual coursework tasks, of which we have all completed the first.

Successes and Failures

Successes	Difficulties
At least three Kinect 2.0s now work with laptops.	The Kinects that we prepared on Friday 17 October have been misplaced so we could not complete the hacking of them on Friday 24 October.

We have met with Dr Agapito, given her details of the project specification and obtained information on how to proceed from her.
 We have arranged to travel to Middlesborough to meet Dr Dunning on Tuesday 28 October to watch him perform surgery and to meet with him face-to-face.

Summary of Team Meetings

Date	Topics Discussed	Time
14 October 2014	Meeting with Dr Mohamedally about goals for project.	~30 minutes
16 October 2014	Meeting with Dr Agapito - discussed project specifications.	~45 minutes
17 October 2014	Lab session - hacking Kinect	2 hours
24 October 2014	Lab session - hacking Kinect	3 hours

Progress Target

Over the next two weeks our aim is to:

- ~Travel to Middlesborough on Tuesday 28 October to meet Dr Dunning and watch him perform surgery to see first hand some of the issues facing today's surgeons.
- ~Finish the hacking of the Kinect 2.0s and begin to learn to program them.
- ~Complete our individual tasks.

Individual Description of Tasks

Ed Collins

My tasks over the last two weeks have revolved primarily around the hacking of the Kinects. Our skill at doing this is steadily increasing - with all of us now able to strip the wires and shielding, re-solder them to the USB and power cord and then re-apply the shielding. We have now managed to get three Kinects working.

In addition to this I have been working on the individual coursework tasks - completing task one, setting up a virtual machine through Thin Linc, and have almost completed task two, setting up a PHP and MySQL website using Microsoft Azure.

Tom Page

Over the last couple of weeks the task of rewiring the Kinects for use has been continued. This was the main task to be completed. In addition to this I have done some further reading about image processing and computer graphics, particularly about Kinects. I have gathered some resources to be able to complete some future reading and use as references in the remainder of this project.

We also met up with Dr Agapito who showed us some of the technology she had worked on with the Kinect 1.0s including the use of the Kinect fusion software which may be helpful in our project as it renders 3d models of the images captured in high definition. This can then be used in order to perform calculations about the depth of the image such that the endoscopic robot will know how close to tissue the tool is in order to prevent injury.

Kirthi Muralikrishnan

This week we met with Dr Agapio who gave us some ideas about how to go about completing our project; but due to an emergency I could not attend this meeting. I spoke to my team members to learn what was discussed at the meeting. We as a team decided that we would learn more about how to program the Kinect and read about computer graphics and vision. We continued to configure our Kinects over these weeks as well.