

UCL Peach Group 39: Reality

Bi-weekly Report

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1 Overview of the last 2 weeks

In the last 2 weeks we have focused on researching the technologies that we're going to use, setting up the development toolchain and gathering requirements from our client. We've had a chance to meet our client, Dr. Navin Ramachandran, and our TA, Mirek Janatka, to discuss the scope of the project, existing (legacy) source code and issues our solution is meant to solve. Below you can find a brief summary of the information we have acquired and the tasks we have completed.

2 Summary of meetings held

2.1 Thursday October 6th, 2016

During this meeting we discussed how much experience every team member has with programming and shared useful resources that can be used to get up to speed with various technologies and techniques we're going to use, such as unit testing, continuous integration, git, etc. We also decided on the tools we're going to use for team communication and planning, which are Ryver, Slack (for development integrations), Trello (for Kanban boards, MoSCoW analysis and TODOs), Google Drive and Dropbox. Additionally, we allocated the roles within the team as follows:

Timur Kuzhagaliyev Team leader, chief editor, responsible for leading the production of all documentation, project website and the team video, as well as research regarding potential solutions and techniques the team can use.

Fraser Savage Deputy team leader, technical lead, responsible for assisting the team leader where necessary and overseeing Proof of Concept (PoC) design work and production. Will also be involved in research of potentials solutions and technologies.

Laura Foody Client liaison, chief researcher, responsible for keeping in touch with our client as well as updating them on any new developments in the project as well as leading all research activity within the team.

In addition to the roles mentioned above, every team member will be involved in the development of PoC itself and production of documentation at every stage of the project.

2.2 Friday October 7th, 2016

We had a chance to briefly meet our client and get a short brief on what UCL Peach project is about, but sadly we did not have enough time to gather any requirements. Instead, we focused on analysis of the source code produced by the previous team of developers and choice of programming languages. Since our target platform is Microsoft HoloLens and the legacy code was based on Unity and C#, we ended up choosing them as our primary development tools.

2.3 Tuesday October 11th, 2016

This was our first formal meeting with the client during which we learnt about the architecture and specifications of the continuous integration system currently used by our client, the purpose of UCL Peach project and what work has been done so far regarding the Reality project.

Our client outlined two use cases for the HoloLens to target development at during the project. The first of these use cases is the application of the HoloLens within theatre — enabling the inspection of 3D DICOM images prior to and/or during surgery using hand gestures. It was also noted that in this use case one could also use the HoloLens to view real-time patient data (such as heart rate and other vitals) in 3D space, reducing the need to check the equipment away from the patient.

The second of these use cases is the use of the HoloLens as a way to visualise patient data in unique ways and then explore them in a virtual space. We were informed that the assistive surgery use case was to take priority over this application.

Additionally, we obtained access to documentation produced by our predecessors which contains a lot of useful information about the aims of the project, namely user stories and requirements for the previous iteration of the Reality project. There are still a lot of aspects of the project we want to clarify so we will soon schedule another meeting where we'll focus on the MoSCoW analysis.

3 Tasks completed

- Setup means of team communication (as well as communication with the client) through Slack, Ryver and emails.
- Setup cloud storage for the team using both Google Drive and Dropbox.
- All team members have acquired MRC certificates for the 'Good Research Practice' and 'Research Data and Confidentiality' courses.
- Allocated team roles as mentioned above.
- Had the first meeting with the client and begun gathering requirements.
- Begun setting up the toolchain for development.

So far the project has been progressing as expected.

4 Problems encountered

- Only have limited access to HoloLens for 2 hours on our lab sessions every Friday.
- Currently need to use 2 messaging platforms for communication (Slack for team communication and Ryver to communicate with the client) which is inefficient.
- Moving everything from Slack to Ryver presents an issue in the form of integrations, as Slack has better support for Trello and GitLab chat-bot integrations and Ryver appears to lack support for some of the desired functionality.

5 Plan for the next 2 weeks

- Setup HoloLens development environment on devices of each team member (involves Unity: HoloLens Technical Preview and HoloLens emulator)
- Transfer all work done from Slack to Ryver, keeping the structure/integrations where possible.
- Analyse legacy source code further and decide which parts we can reuse.

- Establish a continuous integration pipeline.
- Schedule a meeting with the client to further discuss requirements, including MoSCoW analysis

6 Individual reports

6.1 Timur Kuzhagaliyev

In the last 2 weeks, my main responsibilities as the team leader were to arrange our first meeting with the client, setup tools for team communication and planning, cloud storage for all team members to use and allocate the roles within the team. Once this was out of the way, I focused on setting up my local development environment for HoloLens development and began looking at the official documentation, studying the APIs relevant to our particular project. Our TA, Mirek, was very helpful by answering all of my questions and providing a lot of insight into the AR industry and applications of AR in surgery.

I also looked into the documentation produced by the previous developers working on the Reality project and begun writing up a list of points I want to clarify on our next meeting with the client and researching how we could tackle some of the issues discussed in said documentation.

6.2 Fraser Savage

The week commencing the 3rd of October was the initial week of the project, during which I met with my team-mates prior to the first client meeting in order to establish communication with them. After team communication and planning tools were set up by the team leader, the group liaised with each other to set up similar development environments.

Following the set-up of our environments I begun to familiarise myself with the development tools which are key to HoloLens development — namely the customised version of Unity and Visual Studio. Alongside this I spoke to Mirek about computer vision and got pointers to some suggested background reading resources for the project relating to computer vision, which I have begun to read through.

6.3 Laura Foody

This week I have been starting to have a look at possible languages and platforms that we may use to build the project. I have had a look at unity and have started a code academy program for git so that when it comes to starting to write programs I already have a base knowledge of the languages. We have had really good liaison with our TA these past two weeks and we have been making good use of his knowledge of augmented reality and also the links already existing between computer science and medicine. For example we went to his postgraduate lab and had a look at the Da Vinci surgical system and talked about different types of existing AR, and the pros and cons of each of those.