Bi-Weekly Report 3

Date: *16/11/2015*

Project: *ARUK-VRSim*

Project Title: *Video and sensor display on the Google Cardboard*

Team Members:

Garrett May (Team Leader)

Hekla Helgadóttir

Overview

The Google Cardboard application has made progress, moving away from a blank screen app to a more recognisable split screen stereo one.

We have also created a MoSCoW chart, made a components order request, and then spoken to individuals from MSF and learnt of a different emphasis on requirements from their point of view.

Meetings

Date: *13/11/2015*

Attendees: *Garrett May*

Hekla Helgadóttir

Carla Hyenne

Patty Kostkova

Rosamund Southgate

Idriss Ait-Bouziad

In this meeting, we met with representatives from MSF (Rosamund and Idriss), along with Patty Kostkova, our client for the MSF side of the project. For MSF the focus was mainly on being able to send video as quickly as possible to the user. The example they gave was a situation in South Sudan, where the team would have to estimate how many people were located in a single camp and the size of the area occupied by people. This would have to be re-estimated frequently due to constant population change in camps. An ideal solution to a situation similar to the one in South Sudan, would be to have a drone capture videos and images of the camp. Being able to estimate the population in a more accurate way by using heat cameras would also be helpful, Idriss suggested the possibility of taking overlapping pictures with a heat camera, render the images to create one large image of the area and then calculate the population.

For MSF vido footage, data from infrared sensors or heat cameras and photos have more importance than sensors gathering data at the drone height, such as gas sensors and temperature sensors.

Completed Tasks and Project Projection

Before our meeting with MSF the team gathered requirements discussed at earlier meetings, and created a MoSCoW chart:

Function	Must/Should/Could/Would
Access a sensor reading from Arduino	M
Send the sensor readings to laptop	M
Send the sensor readings to phone	M
Display the sensor readings on phone	M
Access multiple sensor readings from Arduino	S
Display graphs	S
Live stream sensor readings	S
2D Main menu	S
Display data highlights	S
3D Main menu	C
Sending video footage	C
Video and graph integration	C
Store data on laptop	C
GPS	C
Height sensor	C
Analysing video	W
Heat Camera	W
Quality Camera	W

The team created the chart based on the previous meeting with Mr. Usama Inam from Google, where we agreed the main focus should be to capture some kind of data and display it in an interesting way on the Google Cardboard. As our team has more experience with sensors than camera, we prioritised the sensors over video for this part of the project, and aimed to add video analysing in the second term.

We have ordered hardware to meet the above requirements to build the system that will be placed on the drone. The ordered components were a gas sensor, light sensor, heat sensor, an arduino, a telemetry and telemetry receiver and a battery.

We have created a mock-up of the main menu to display different graphs and information on the cardboard, and have made a paper prototype on how the user should engage with the app.

After meeting with MSF the requirements have changed slightly and we want to put more emphasis on capturing video and images from the drone. As we have already ordered the

components we will continue focusing on the sensors, but will adjust the requirements for the second half of the module.

The project is going well and we estimate that we are on the right track, although we might need to increase the workload over the next couple of weeks to meet the deadline.

Problems to be resolved

Our major problem is that we need to be able to create a solution to our project that satisfies Google's requirements of using the Google Cardboard in an inventive way, and MSF's requirements of relaying video information and analysed video data.

First off, we have not found a way to stream live video that retains high quality. This is due to the fact that so much data would have to be sent quickly over long distances, requiring a significant amount of time to do. If we need to send video across from the drone to the cardboard as quickly as possible, it must be of a lower quality.

Also, analysing video to gain information is very difficult. A program such as OpenCV is useful for detecting a person's face, but less useful for calculating the number of people visible in an image. From an aerial perspective, humans are difficult to identify.

Finally, being able to use the Google Cardboard in an interesting manner is a challenge, given our requirements from MSF. Simply displaying a video onto the screen could easily be done on a smart phone or laptop. Thus this does not make use of the Cardboard's full potential. We need to devise a way to incorporated video into our idea in such a way that it still would take advantage of the Cardboard's abilities.

Workload - Past Two Weeks

Garrett:

I have been working on building the base for our Google Cardboard application. First off, I have managed to split the stereo rendering in the Cardboard into a separate class. In the future, this will be critical for allowing cleaner code. Currently, the app is not rendering anything, except the android views needed for each eye. This means that the application no longer displays the blank white screen previously.

I also managed to create the notorious 'Hello World' program. This worked by using the cardboard activity's default displaying of text, producing 3D words in the centre of the screen, before fading away. Although not useful for the text that will be used in our graphs, it may be helpful for notifications.

To improve the code, I attempted at creating a Matrix class; however, this was not entirely necessary, and I will need to rethink how the program works.

As of now, the current work has been uploaded to GitHub in the android branch.

Hekla:

I have continued the research on which drone parts to order. As we have not yet seen a reason to build our own drone, a simple arduino board linked to the sensors and to the telemetry should be sufficient. By leaving the flight controller out we reduce cost of the hardware and simplify the whole system.

I have placed an order for a gas sensor, light sensor, heat sensor, an arduino, a telemetry and telemetry receiver and a battery. We will need to connect the system, and I have read articles and forums on how to connect the arduino to the telemetry and to the sensors.

I have also looked into ways of displaying data in a 360 view, but believe this will not be of use to the user. We will therefore include 3D data but limit it to an extended field of view.

Both:

We updated the paper prototype of the application.

Workload - Next Two Weeks

We had first created a plan on what we intend to create for the upcoming proof of concept.

On the Google Cardboard side, we need to create a series of boxes, concave to the user, which will be displayed in the Cardboard as a main menu. On these boxes we must display video and graphs, most likely by transforming them into textures and then applying them to the boxes. The graphs should be able to plot data, and this data, along with the video data, should be sent from the server. For the prototype, generating data will be sufficient. This will also allow us to test this subsection of the project, ensuring reliability.

As creating the Cardboard application is quite a large task, and with limited time for creating a proof of concept, the required work necessary to create the basics of the app have been divided.

Garrett:

I will be working on the shaders and rendering, in order to create the boxes needed for the main menu.

I will also need to film an area for a video. As we have had more information from MSF on what they would want, it is likely that a street view video is not required; rather, an aerial view will probably be more preferred.

Hekla:

I will be working on getting the menu items, or the boxes to light up when gazed at, and to display the image or video selected full screen when selected.

I will also be working on connecting the hardware and start investigating how to interpret sensor data.