B.Sc. Computing Stage 1 2016/17
Activity Led Learning Project
Semester 2 – Navigation System

Group Details

Group Name:
Harambe did nothing wrong

Group Members:

James Lee 6950219
Zack Caley 7177901
Ed Billington 6950518
Toby Ward 6864101
George Allmark 7212958
Ayyub Lindroos

Submission Notes:

Do not edit this Section

- Your submission must be uploaded to Moodle **by 23:55 on Friday 31st March 2017.**
- The submission point will appear in the ECU177 – Computing Moodle Page.

- Place this report in a directory **alongside all the code needed to run your navigation system**. Compress it to a zip folder and upload the zip to Moodle.
- If we need to run code in Codio to host the website ensure all the necessary instructions are provided in this report.

- Your game will be tested using a tablet of the same make and model as given to you at the start of the year. So ensure it looks good on this.

- **You submit only one report and one folder of code per group**.
- All team members should agree on the final submission.

- Each report section has a maximum word count. **Any words over the maximum will not be marked**.
-
- You need not write up to the limit.

User Documentation

Running the website on localhost is as easy as running the CherryPyWebsite.py file. You will need to open your web browser of choice and enter “127.0.0.1:8080” into the search bar. This will navigate you to the home page of our website.

When accessing the hosted version of our website you will need to navigate to “https://ego-toronto.codio.io:9501” This will take you directly to the home page of our website. The CherryPyWebsite.py script on our group’s codio box has to be slightly edited so that you can access the website online.

In the event of the website not being hosted, you should unzip the files into a codio box. Using pip, install the modules “CherryPy” and “dominate”. You need to be running Python 3.5.2 or newer. In the configuration setup, change the variable “server.socket_host” to the value 0.0.0.0 and the variable “server.socket_port” to 9501. To access the website, you should then type in https://<box-name>.codio.io:9501, where <box-name> is the name of the codio box you are currently using (e.g. ego-toronto)

Campus navigation - Once you are on the CampusMap page of the website you will simply need to enter your start point and destination into the html form in the sidebar. The website will then show you the route to the destination with steps along the way.

Indoor navigation - Once you are on the EEC Building navigation page all you need to do is enter the start location and your destination. A new webpage will be generated with the fastest route to the destination. This will be shown in a room by room basis. In the final product this page may be formatted differently giving specific direction giving a description of the route you should take. This page is a proof of concept and it would be very easy to expand this system. The look of the page is something that can also be very easily changed.

Administration - To access the admin page, the username is “admin” and the password “adminpassword”. In the future this would be expanded so that an administrator could add, edit or remove rooms and locations

Usability Tests

Our usability tests consisted of 3 stages; we first created a prototype of our design on paper which allowed us to make quick changes when we discovered usability problems (see Appendix C). We then obtained 5 volunteers and asked them to perform 2 tasks - to find information about a given building and to obtain a route from one building to another. We then noted:

- How long it took to complete the given task
- How many clicks were required (where a click is classed as clicking on an element such as a button or an item in a selection box)
- The reactions of the participants.

These results were compared to our expected metrics to see if our hypotheses on the effectiveness, efficiency and enjoyability of our designs were true, and thus created the best possible design we could have made. This test also showed us where we could make improvements to our final design; for instance, it was noted that most users expected a response when selecting a response from a table (e.g. it being highlighted or submitted to the system), and so we made sure that in our final design that a response was generated whenever a user performed an action

Our second test consisted of using an alpha prototype of our product and testing some of the completed features we had. As before, we gave 5 volunteers 2 tasks to do, one of which we had conducted in the previous test (finding information about a building) to confirm our previous findings of it being a successful design. Again, we used the same metrics as before and found that users had actually performed better this time with the task we gave previously, and so we elected to make no further changes to the design at this time. The other task (logging into the administration portal and logging out) showed us a technical issue with the website when logging out but otherwise performed successfully and within our expected clicks and time frame (even when an incorrect password was entered)

Whilst we were only required to do two tests, we elected to do a further test on our beta product for the following reasons:

- Due to time restrictions we had to change some of our designs - as a result we wanted to make sure that these new designs didn't affect the usability of our product too much
- Whilst we had tried to use a representative sample for our previous tests, we were informed that our sample size was not large enough to be statistically significant, which could potentially invalidate our previous results
- We wanted to see if our design worked on other tablets and on desktops

- We also wanted to gather evidence of our work by filming some of our participants, which we had not done previously (please see Appendix B for these videos).

This test was done with a much wider array of tasks; we again included tasks that were performed in the alpha test (finding information about a building; logging in as an administrator and then logging out) as well as asking users to:

- Find a route from the user's currently location to a separate building
- Find a route from the main entrance of the EEC building to the first floor stairs in the EEC building

The results of our test were significant:

- Compared to our previous design for the campus navigation system, users found that whilst the amount of clicks required had reduced, the amount of time taken had increased.
    - One reason was that some users (~58%, using 12 results) clicked on the Campus Navigation button first even though the campus navigation was presented as the home page
    - Another was that some users (~31%, using 13 results (includes one incompletion)) could not find the inputs for inputting in locations as this wasn't presented to them on the first screen (rather it was in the menu toolbar)
- The larger sample size showed the importance of statistical significance as times for some of the previous tasks were notably longer (e.g. administration tasks)
- The tests pointed out some technical flaws within our code, such as some results not displaying correctly
- When considering the medium that was used, we found a possible link to smaller tablets being poorer for usability due to not being able to them showing the whole page correctly. This would be investigated further with more testing

The results of the test have given us a series of tasks for us to complete as a group if we were to continue with the project in the future in order to create a fully fledged and usable product. Overall the testing has been useful and has helped us to shape our product and avoid some of the pitfalls of designing a complex application such as a navigation system aimed at a specific user base.

For our full set of quantitative results from our usability testing please refer to Appendix A.

Project Management

Project management - During this project assignment we never officially nominated a “project leader” instead we decided that each member of the group would focus on the part of the project that suited their skillset. This turned out to be very effective. This was because we had broken the project into smaller and more manageable problems for each group member.

Work division - As a group we decided that the best way to divide the work between us would be for each person to focus on the area in which matched their skillset.

How we managed code - Throughout the project we used Git and GitHub to manage our code. We chose to use GitHub because it allows the whole team to collaborate together and to share our code and fixes almost instantly, while having a central place to have all our code located.

Disputes and Joint Decisions - As in any project, there were small disputes which were quickly resolved by compromising and talking it out during the A.L.L sessions. There was one significant dispute during the project. Zack had an excellent idea of adding markers for every building on the ‘campusMap.html’ page. The idea was great but the communication and implementation of the idea was poorly executed. Ed was not happy about what had happened due to Zack not telling him what he was going to do and how, which ended up in an argument in the group chat that we were using. It was late at night so we slept on it, talked it out and Ed then implemented the idea using a more ideal programming practise (Iteration amongst other things). This dispute was over quickly and both sides felt happy because Zack’s idea was implemented and Ed was happy because it was done in an efficient way.

Work Allocation (max 300 words / 1/2 page)

James - During the project James handled the indoor navigation of the EEC building. He did this by writing Dijkstra's algorithm in Python 3 and using CherryPy to host it on the website, and to get the relevant inputs. James also helped with writing the CherryPy Website script and helped Toby with hosting the website on Codio.

Ed - During the project, Ed created the webpage for navigating around coventry to help users find their way between either two pre-selected buildings or from the user's GPS location and a selected building. This was at first attempted with google maps API directly but found using an external API (Gmaps.js) made what he wanted to accomplish much easier, but still needed to be tweaked to the website's needs.

Zack - During the project Zack handled the css for the webpages, alongside the HTML code and implementing sensible forms to work with the other members' code, whilst also taking into account how a user would interact with the page on a tablet for fluid browsing.

Toby - During the project Toby handled the security algorithms for the administration page (via usage of a key derivation function), Toby hosted the website on Codio using the CherryPyWebsite script. Toby also handled the majority of the usability testing.

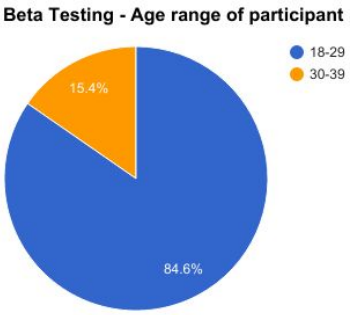
George - George assisted in the creation of an outdoor navigation database. Which is a database of latitudes and longitudes and their corresponding buildings. Unfortunately this database was never used as it was incorrect and wasn't fit for purpose so a decision was made to use an javascript object (created by Ed).

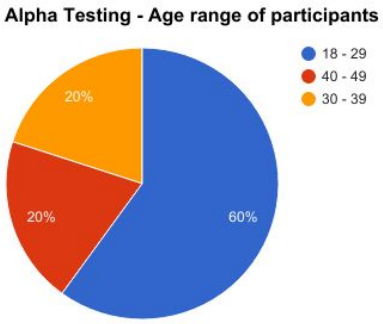
Ayuub - Committed the first draft of the website, As seen on GitHub, but his design was taken no further and replaced with Zack's website.

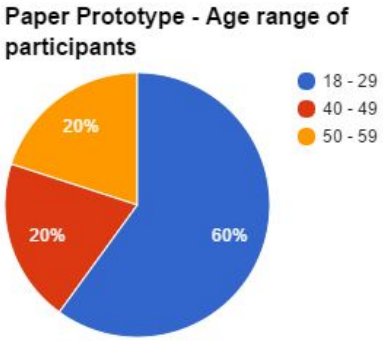
Appendices

Appendix A: Usability testing results

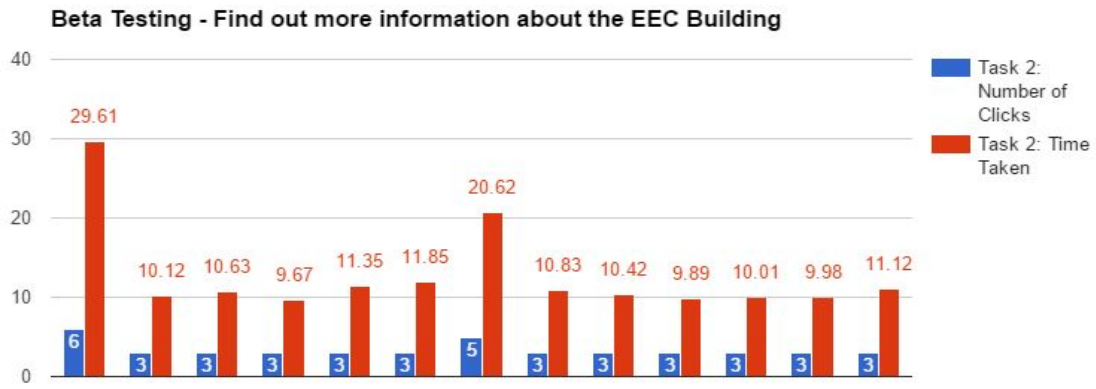
Participant Demographics:

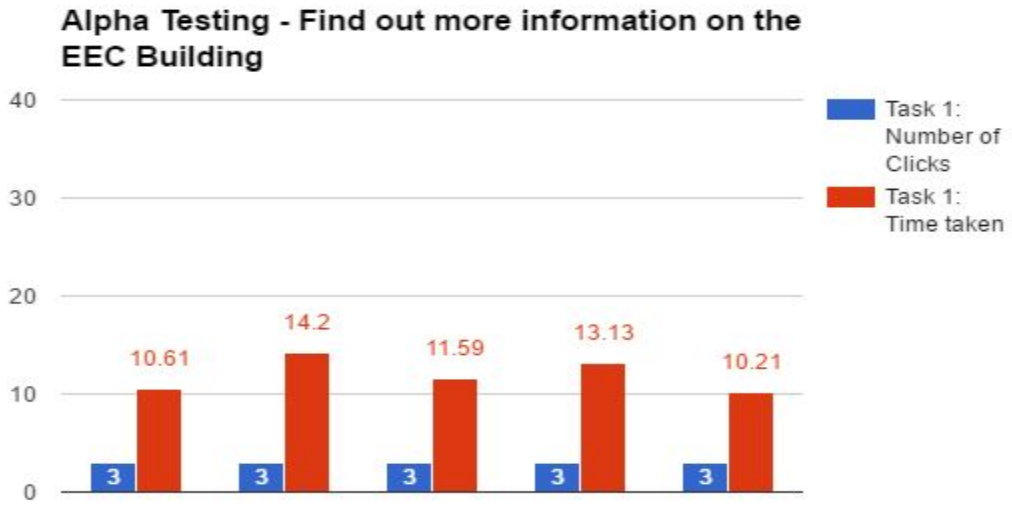


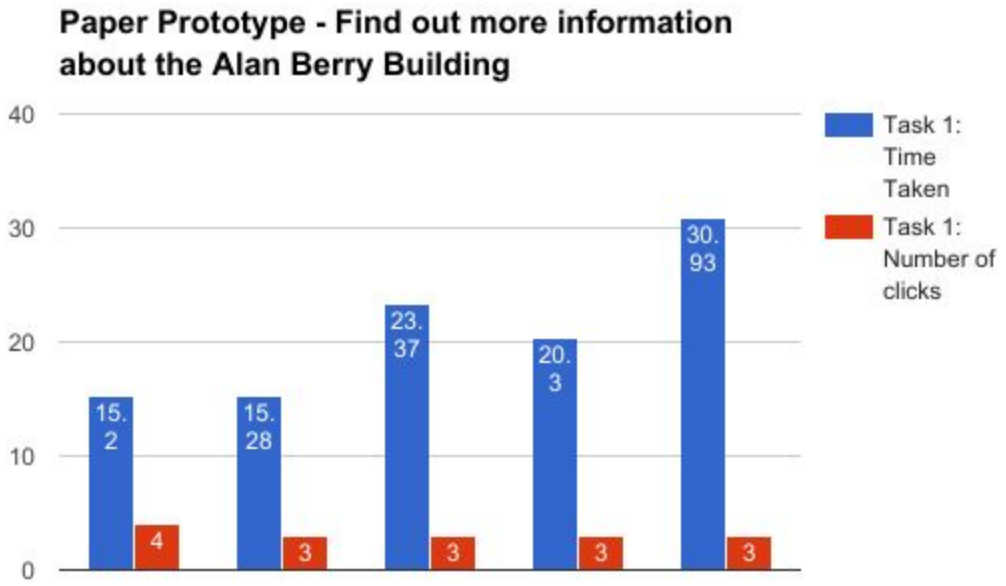




Find out more information about the EEC Building

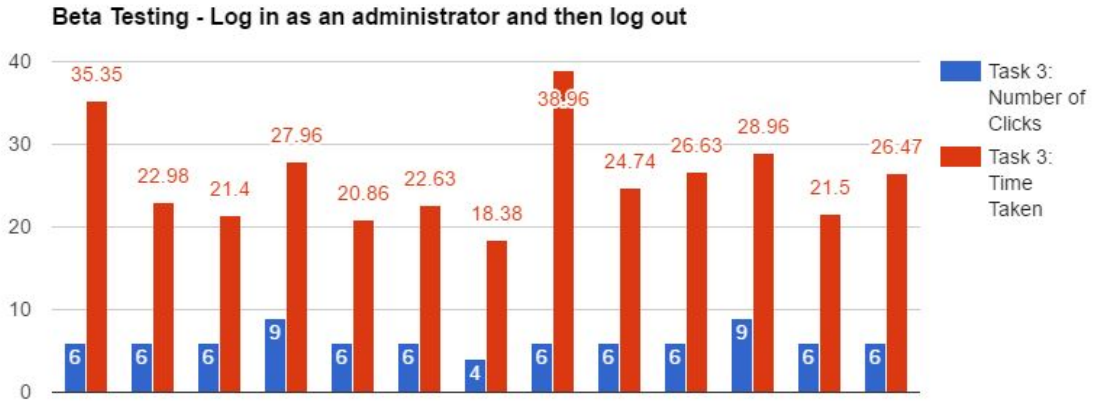


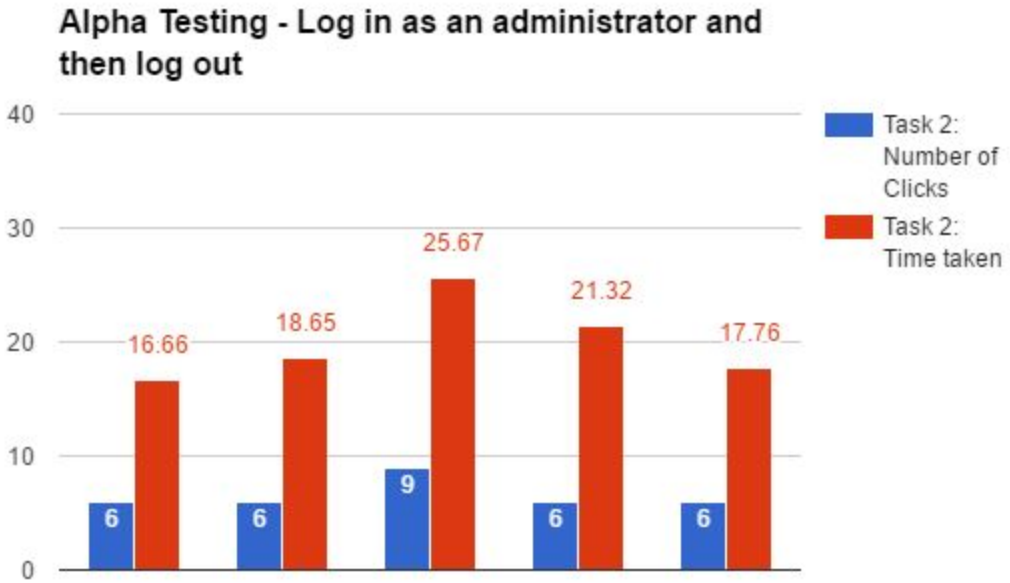




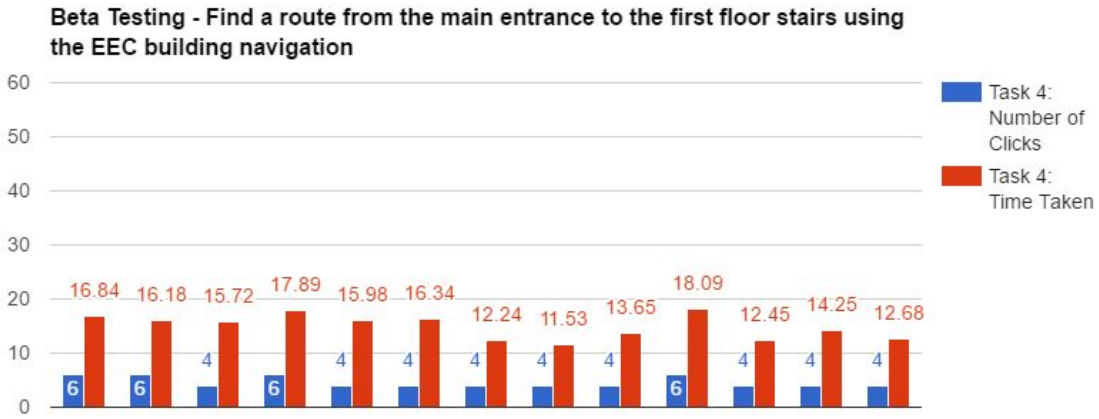
Note: Whilst the building name was different for the paper prototype the process for obtaining the information was exactly the same and so a similar amount of clicks and time taken should be expected

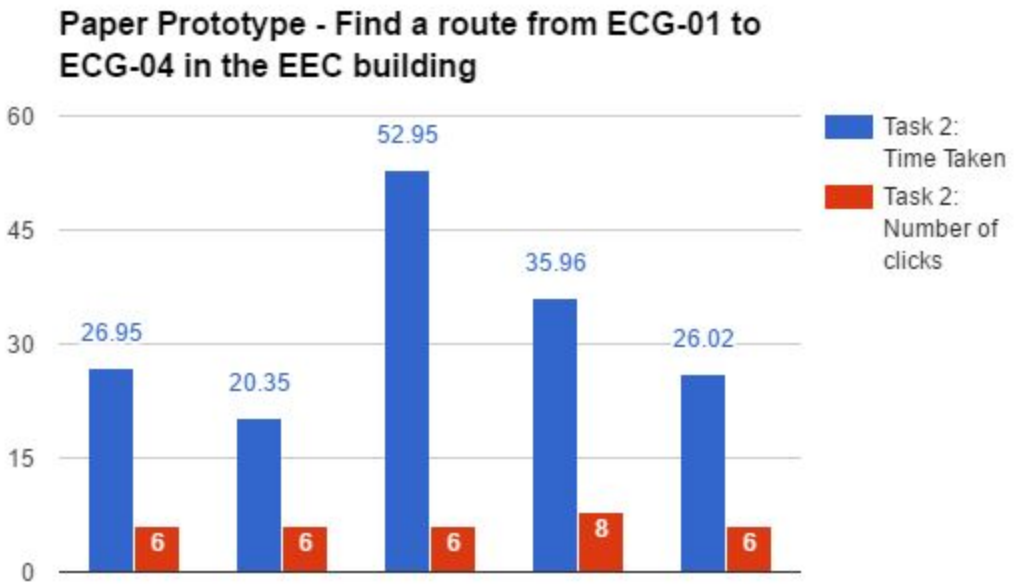
Log in as an administrator and then log back out





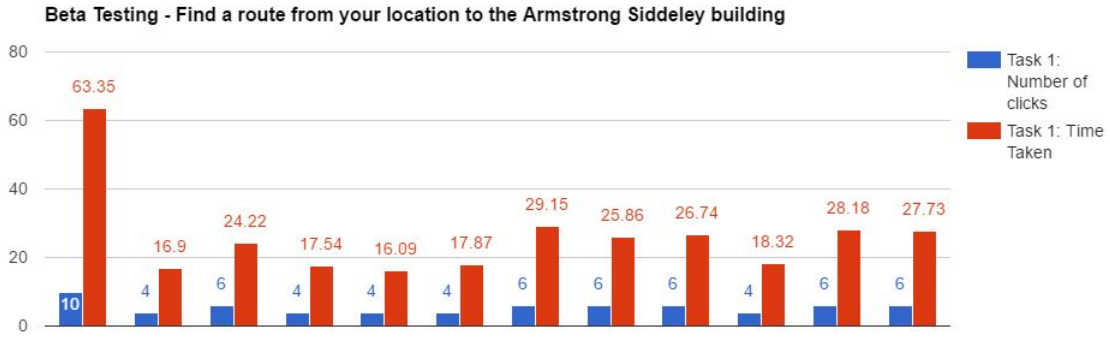
Find a route from the main entrance of the EEC Building to the first floor stairs of the EEC Building





Note: Whilst the room numbers are different for the paper prototype, the process required and therefore the amount of clicks and time taken should be the same as with the beta test

Find a route from your location to the Armstrong Siddeley Building



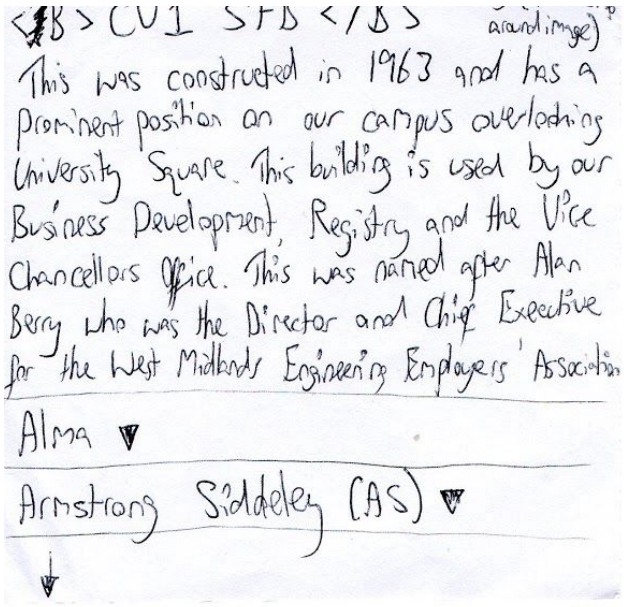
Appendix B: Usability testing video links

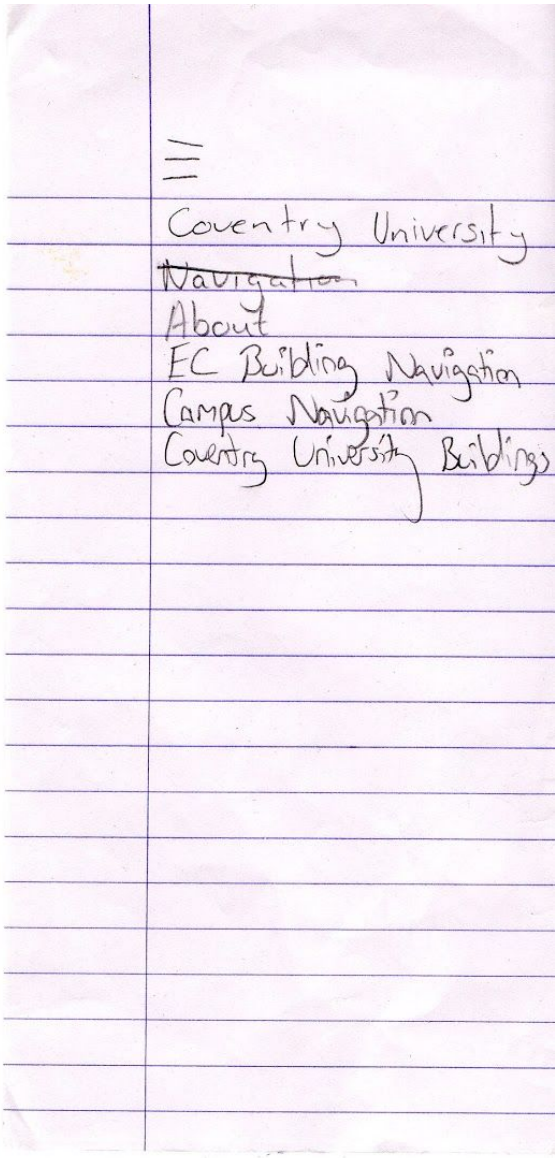
https://youtu.be/QJ-FLIRcTjo

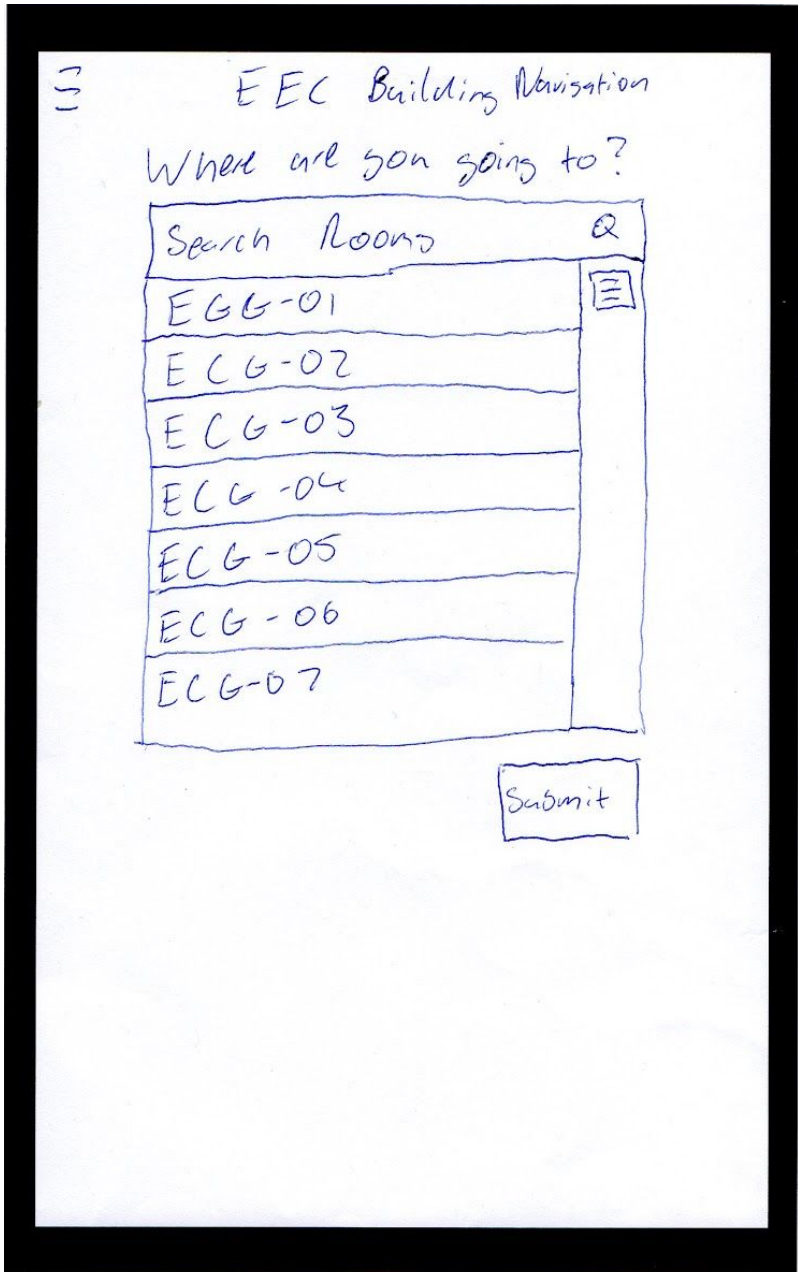
https://youtu.be/QxmHDDrpfMY

https://youtu.be/xLCoN97Tp-A

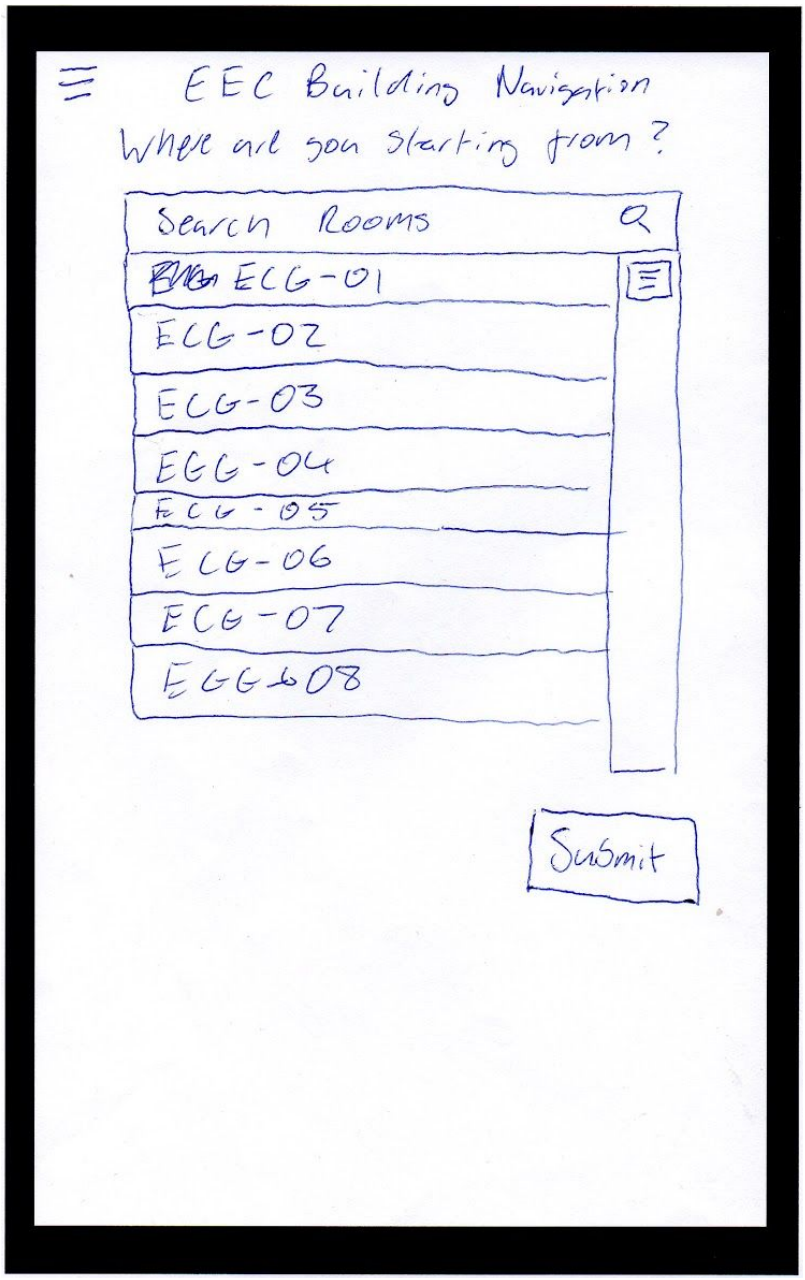
Appendix C: Paper Prototype Images

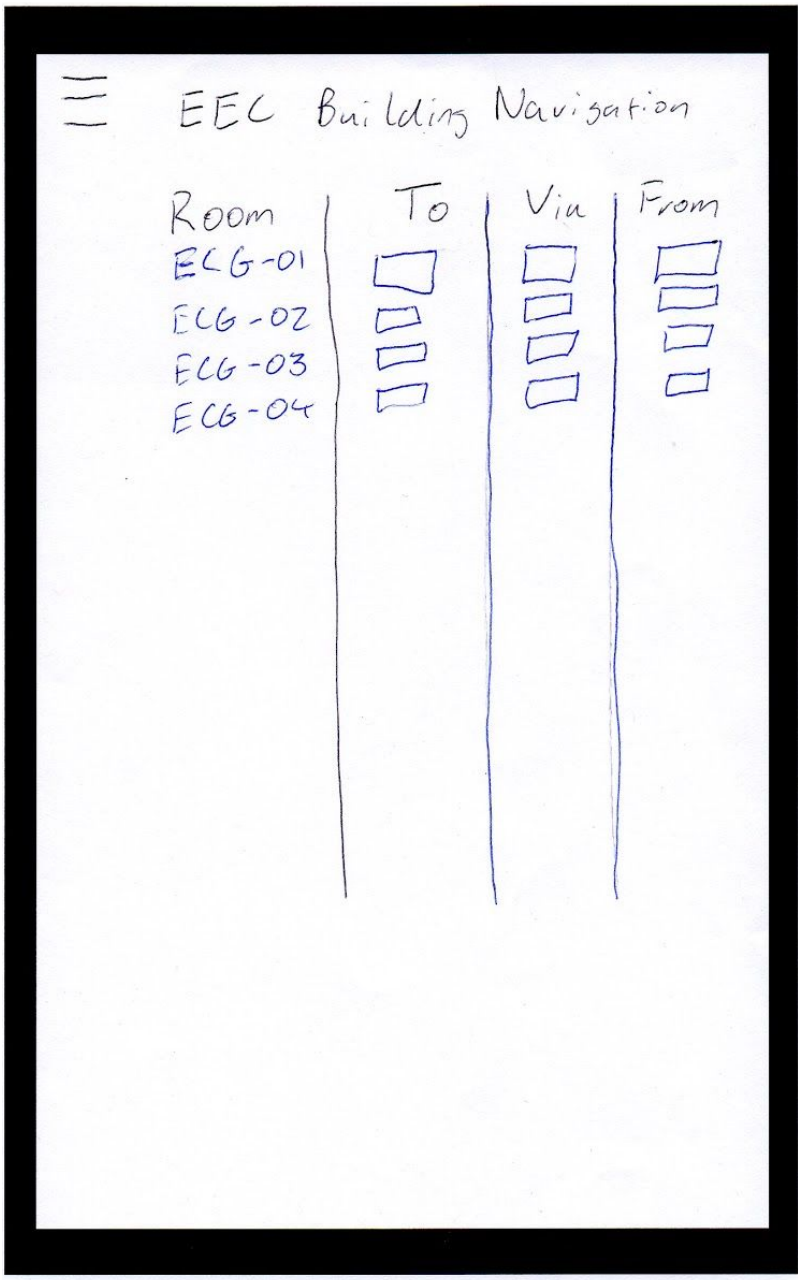





EEC Building Navigation
Where are you going to?
Search Rooms
EGG-01
ECG-02
ECG-03
ECG-04
ECG-05
ECG-06
ECG-07
Submit


Campus Navigation
Goosle
Maps
Route
Current Instruction
Previous
Next

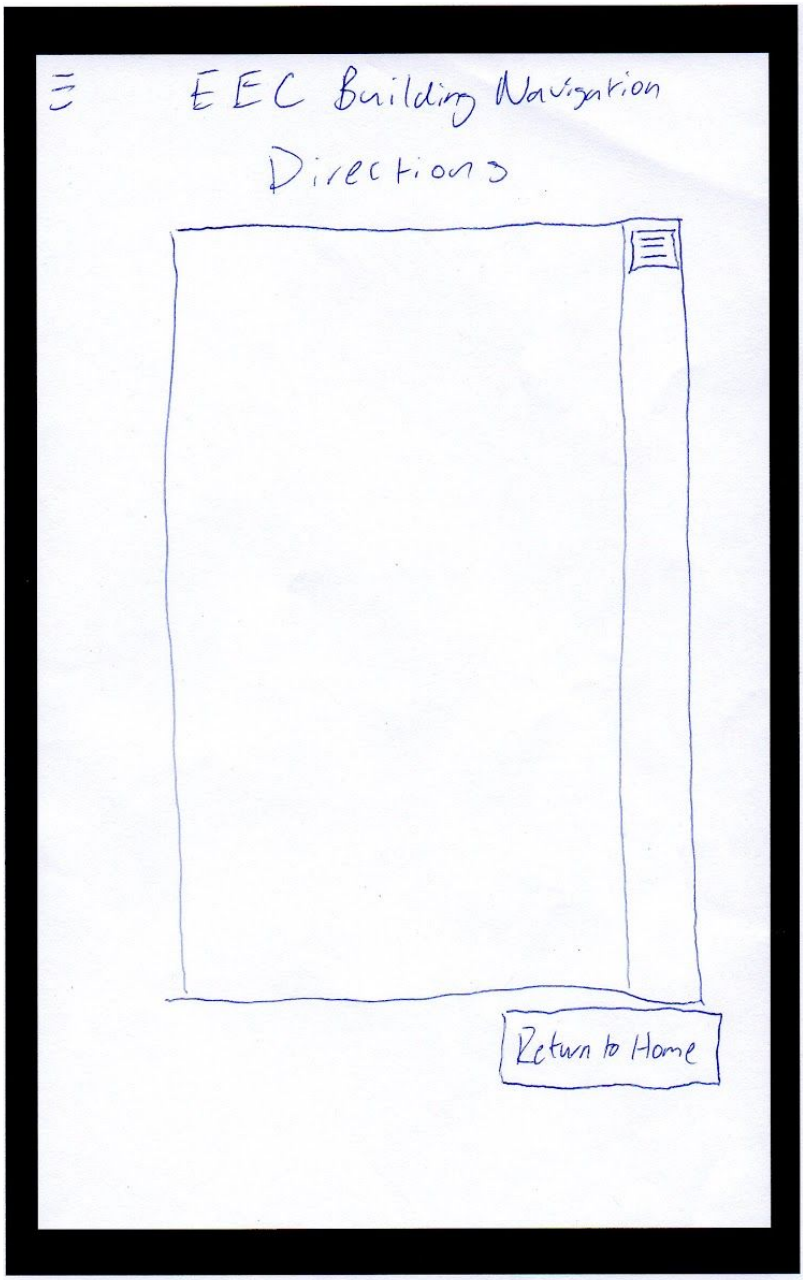

EEC Building Navigation
Where are you starting from?
Search Rooms
ECG-01
ECG-02
ECG-03
EGG-04
ECG-05
ECG-06
ECG-07
EGG-08
Submit



Not In Use;

- Starter Prototype.


Goog le maps API
Maps


EEC Building Navigation
Directions
Return to Home