UNIVERSITY OF CALGARY

CPSC 481 HUMAN-COMPUTER INTERACTION

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Project Iteration 1

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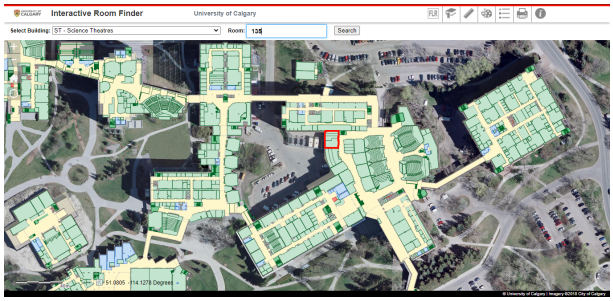
UofC Navigation

What is my problem

Navigating around the University of Calgary (UCalgary from now on) campus can be challenging at times. Especially if you are a first year student or are just visiting campus. There is already a way to find rooms at UCalgary through the UofC Room Finder

(https://ucmapspro.ucalgary.ca/RoomFinder/)

However, we find that the User Experience of the website is lacking and can leave the user confused in finding what they are looking for. The main issue that we have with the current solution to navigating around UCalgary is that a 2 dimensional map is used to navigate a 3 dimensional space. The following is a figure of what the current room finder website looks like when selecting a room:



Which floor you are supposed to be in, elevator to take, stair to go up/down, or underground hallways to take you from one building to the next are not easily shown to the user of the app and can leave the user unaware that those are options when going around campus. In fact, which route to take is up to the user themselves, with the current room finder only highlighting where that specific room is. There is not even an option to highlight where the person currently is leaving the user to orient themselves with their surroundings (**Could not check validity as the room finder app has been down since Oct 1st, but the last time I used it I was not aware of the option**). This can be frustrating and stressful as you are trying to decipher where you are and plot where you are supposed to go while you are trying to get to a class (which can be time sensitive).

Why is it important

As such, our idea is to improve the way a student, faculty member, or visitor is able to navigate around campus. We believe that improving this issue is important as it can make the job and experience of finding a room less like studying to become a cartographer (exaggerating) and more like what a human would use to get from point A to point B in the year 2020. What we mean by that is emulating modern navigation standards such as Google Maps and Apple Maps (that use voice commands and visual directions to get the user to their destination) in indoor/small scale settings such as a campus or building. Improving navigation in campus not only does it make it more accessible for students, it also improves the overall user experience of finding a class or room in an unfamiliar place. Furthermore, this solution can also be expanded to other problems, mainly, build better navigation systems in buildings, parks, museums, airports, etc.

How are we going to solve it

Our group is looking to solve this problem by developing a mobile application that by way of visual cues, voice directions, and camera/AR implementation shows the user the route to take to

get to the room they were looking for. We are planning for this app to be accessed anywhere around campus. However, for this timeline, a small scale part of campus can be achievable, such as a handful of rooms. The idea is to get the initial position of the user's mobile device. Discussion on how to get the position of the user will be discussed at the bottom of the document. The main methods we have considered are Wifi Access Points and BLE Beacons. Once we have received the location of the user, the user will then choose the room that they are looking for through a search bar in the app. Once the room is selected, the app will pick one of the pre-defined routes that is in the system that gets the user from their starting location to their final one. Alternatively, we can implement a shortest path algorithm that determines the the fastest path from one room to another. This method will need to have a map of the building/campus area implemented in software as well as the following considerations:

- If location finding was implemented with WAPs, we will have to calculate room positions relative to the WAPs before hand
- If BLEs are used, beacons can be placed in the rooms so that we know where the rooms are located

Finally, through the use of on screen visual commands, voice directions, or AR implementations **(will have to choose based on group's ability to learn technologies and the overall scope of the project)**, the app will direct the user through the chosen route to the destination that the user picked.

What type of system will it be

As mentioned previously, this idea revolves around developing a mobile application. The directions that the app can give can be done through:

- On screen prompts such as a straight arrow to go straight down a hall way and descriptions such as describing small landmarks that the person should pass when going through the route are displayed on the device.
- Voice commands where the mobile app can give directions through the speakers or headphones (similar to what Apple maps or Google maps voice assistants do), or
- AR directions that display a route that is projected onto the physical world by using the mobile phone's built in camera. Similar to what Gatwick Airport did with their mobile app: (https://www.vrfocus.com/2018/05/gatwick-airportsaugmented-reality-passenger-app-wins-awards/)

In terms of which programming suites and tools that we will be using, they are listed out below:

- For Wireframing and prototype building, we can use Webflow or InVision
- React Native Framework which can be programmed in JavaScript allows us to build cross platform applications. ViroReact works with React Native to build AR implementations in our mobile applications.
- Android Studio to develop the app which can be programmed in Java. Can use AR Core for the AR implementation.

Describing Positioning Methods (Extra Remarks)

(https://www.infsoft.com/solutions/application-fields/indoor-navigation)

- Using a Wifi positioning system to get the location of a user. A Wifi positioning system uses Wifi Access Points (WAP). These WAPs allow us to find the position of a user using the "Signal Strength" based technique. This signal strength is called "received signal strength indication" (RSSI). This technique measures the signal strength of the user's mobile device to each of the WAPs in that area in order to calculate the position of the user relative to the WAPs. There are other techniques that we could use to determine the position of a user, some of which are mentioned in this Wikipedia article: (https://en.wikipedia.org/wiki/Wi-Fi_positioning_system).
  - Apple has a program called "Apple Indoor Maps" that allows businesses to create detailed maps of their building. Allows to use Wifi access points and the documentation seems to show how to integrate the indoor map into the mobile app. (https://register.apple.com/indoor).
  - Android also has documentation on how to use Wifi access points to get the position of the user. (https://developer.android.com/guide/topics/connectivity/wifi-rtt)
  - Pros : Does not require additional hardware, utilizes existing infrastructure
  - Cons: Eats away at mobile user's battery life
- Use Bluetooth Low Energy Beacons (BLE). BLEs use Bluetooth to identify when users are near the device and then "performs actions" when they are near. (https://en.wikipedia.org/wiki/Bluetooth_low_energy_beacon). One of these actions can be to track a users mobile device when it is near. A possible implementation of our solution would be to place one beacon per room in the building, allowing each beacon to detect when the user and their mobile device arrives at the location. Some notes on BLEs:
  - Apple sells beacons called iBeacon (https://developer.apple.com/ibeacon/)
  - Google uses Eddystone (https://developers.google.com/beacons/eddystone)
  - Google provides documentation on how to get started with beacons. (https://developers.google.com/beacons/)
  - Pros: Bluetooth transmitters with accuracy of up to 1-3 meters., are energy efficient, is a cross platform solution (both iOS and Android use it)
  - Cons: Will have to buy BLE devices for this to work

WaitLess

What is my problem

The problem that we want to solve with this project idea is to fix the lengthy amount of time it takes to meet with academic advisors and to make the process of setting up these meetings simple for its users. We want to create a ”new and improved” application that is based on the QLess app that students use to meet with academic advisors. For some background, the QLess app is an application that students can use to join a ”virtual line” to make the process of meeting with an advisor much easier. Some of the problems with this current application is the complexity of the UX. When opening the application, you are immediately greeted with a seemingly infinite list of locations to join virtual lines. For new users, this can seem rather daunting. Another problem is the UI/UX that is used for joining these virtual lines. Every time you want to join a line, it will prompt you for the same inputs every time. These inputs range from your name, your faculty, your generic inquiry, etc. This becomes tedious especially if you are one of those students constantly seeking help from advisors. These problems can be fixed with a few simple ideas and steps which we will discuss below. Overall with the problems we have come across with the application, we feel we can solve this by designing our own new application that has the same premise, yet patches up the holes this current QLess app has. Many of these changes we want to make, like the ones mentioned, all help with the efficiency of meeting with academic advisors and making it simple for its students to use.

Why is it important

This idea is important because of the number of students that seek academic advising. We have all used this current application before, and all have similar opinions on the functionality of it. To create a clean and easy to follow application, it will make the process of students getting this help much easier. To meet with the academic advisors is not as easy as just waiting in line at a bank for a teller, so the app is needed in order to organize the students and ensure they meet with the right person.

How are we going to solve it

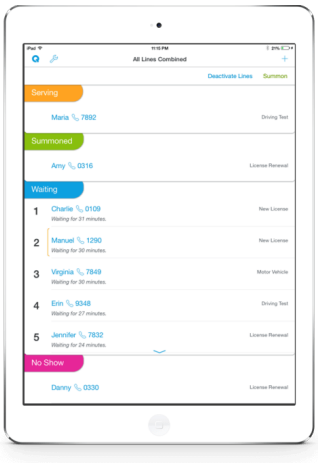
For the problems mentioned above, we are going to fix them to meet our standards as students. Firstly, the problem with the long list of locations, we can fix this by implementing local user data. When using the application for the first time, you can set your location in order to only show lines that would apply to you. Then if you needed to ever change this location because of changing schools or other reasons, there can be an option in the settings to do so. For the second problem, with the inputs it asks you every time, there can be more local user data implemented. For the information like your name and faculty, this will most likely never change, so this can be stored and remembered for each of your visits. We could also implement a confirmation message to ensure that none of this base information of your name and such has not changed. Then you will only need to give minimal information regarding your visit to speed up the process. These are only some of the only problems that are evident to us currently, and we are sure there will be other things we can add or implement to solve our problem

What type of system will it be

This project idea will be in the form of a mobile application. We would try our best to role it out as a mobile application, but if this is out of our scope for coding abilities, then we would create a web application. For practical use, this idea would be best as an application. This is because students would be using this in advising offices and would have their wait time and information submitted on their phones, so naturally an app makes the most sense. We could also take advantage of using the users location through their mobile application to help with finding the lines that associate with them. Again, this would only be possible if we have the abilities to deliver our idea through a mobile application.

Visualization

Below are some images taken from the QLess website that describe and showcase their application. We wanted to provide this so that you can get a basic understanding of how our application will flow and operate. We plan on developing a better prototype if this is the project we choose to go forward with.



Resources

Image 1: https://www.qless.com/L

Image 2: https://www.qless.com/features

D2L Mobile Application

What is my problem

Students don't have a simple means to keep track of their classes in regards to deadlines, tests and course material/work. While D2L exists as a web app, it doesn't meet many of these needs and students aren't on it 24/7 nor are they able to as inactive users are signed off automatically. Discussion posts, course updates and important news aren't visible or are drowned out in the notifications section and with assignments/projects varying in difficulty, structure and content; It is often difficult for students to balance and manage everything.

Why is it important

With online schooling slowly becoming the norm due to COVID-19, responsibilities in time management and courses have increased for students. As said previously, D2L exists and has capabilities to improve student experience with updates to the system, but it can be further improved on as a mobile application. If it's possible help students keep up with material and deadlines especially as we transition into online schooling it should be a priority to do so.

How are we going to solve it

With a D2L mobile application, notifications will be visible on a users phone as if it was a notification from any other app. This will help students keep track of courses and their updates/information. Important deadlines such as tests and assignments would be priority notifications and updated course info/material and discussion posts could be tagged as important by course instructors and TA's if they desire. Students would also have the ability to mute specific notifications, or add more for themselves if they require them. Class schedules could also be linked to user's D2L accounts to remind them of upcoming classes and tutorials or if they've been cancelled by instructors. These all would improve the student experience and assist them in course and time management.

How are we going to introduce it

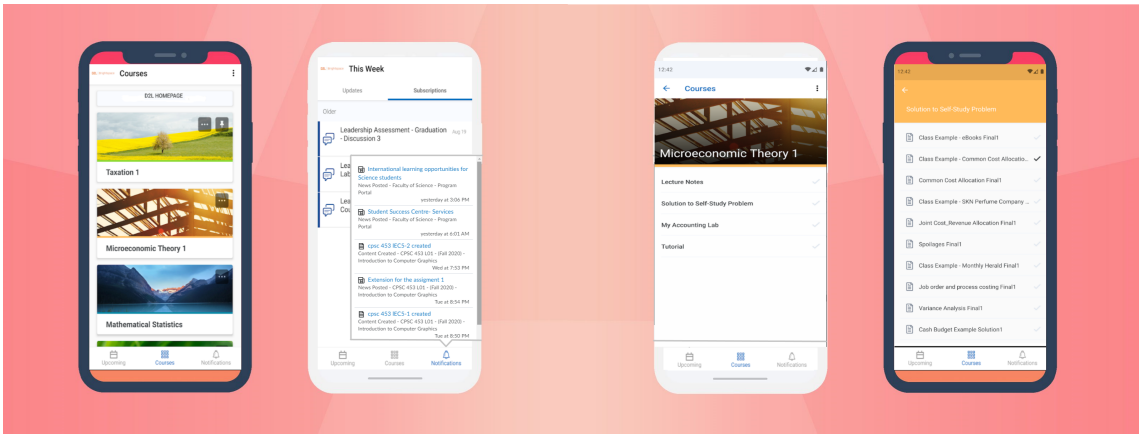
A slow introduction/trial would be best through the University Of Calgary or whichever post-secondary is interested in it. As it is slowly introduced, the feedback we get would assist immensely in it's development. As bugs are cleaned and the application is improved on, the user base would be increased through D2L web app or the University Of Calgary website.

What type of system will it be

The system would be implemented as a mobile application that students and course instructors can install through the app-store. Users would sign in with the information they currently use for the D2L web app. Course instructor's would be able to enter info or edit the course content through the web application or the mobile application. This however might require an update of the web app as well.

Visualization

Below are some images that were designed as a prototype for our application. They are small scale for now, and we will develop better versions if we go ahead with this project idea.



GitHub Repository, Portfolio, and Pages Links

Here is the link to our GitHub Repository: https://github.com/RMcCurdy/TeamS_Project

Here is the link to our GitHub Project Page: https://github.com/users/RMcCurdy/projects/1

Here is the link to our GitHub Pages Portfolio: https://rmccurdy.github.io/TeamS_Project/