Commute Assist

Stefan Kapetanovic	- Team Manager
Alec Adair	- Lead Tester and Head of QA
Warren Schweigert	- Head of Communications and PR
Rusty Griggs	- Lead Designer

Problem and Solution Overview:

The main problem we are tackling is that many campus commuters do not know how to most efficiently commute to campus and get to class, and the information to make a commute more efficient is available but difficult to coordinate. Based on our contextual inquiries and peer reviews we have determined that a mobile application with a voice user interface, map component, route calculations for automobile, public, university transportation, a parking reservations and payment system, and a minimal scheduling system for users would stop unneeded driving and cut transportation time. By using a voice user interface users will be able to stay informed of relevant commuting information while driving as well as be guided along the most efficient real time route to campus without having to interact visually with their phone. The maps portion of the app will help users visualize their route to campus as well as inform them of parking, construction, as well as bus and shuttle locations. The route calculations will inform users of their entire commute as well as time needed. The parking and reservation and payment system will help cut down on time needed for drivers to park.

Contextual Inquiry Target, Stakeholders, and Participants:

SUBJECT #1 - Engineering Student

We observed an engineering student driving to the MEB hereafter to be known as S1. We chose S1 because we wanted a perspective of someone that commutes to the engineering buildings with a “U” permit.

From S1 we learned that students looking for parking do not want to drive to further parking lots due to the risk of wasting even more time driving and walking. We asked S1 if he ever considered parking illegally. He responded that if he really needed to find a spot quickly, he too would park there even if it resulted in getting a ticket. S1 did say they would consider other parking lots and when asked why responded with a feeling of frustration but did not actually choose to explore other lots.

After noticing S1 not going down rows other cars were coming out of we asked about it, S1 responded that it was likely that those were cars that hadn’t found a spot so that searching there would be futile. He responded similarly, when we asked why he avoided following behind other cars. Eventually S1 parked in a farther pay lot after 20 minutes of searching since S1’s class was beginning in 10 minutes.

SUBJECT #2 - Business Student

We observed a business student driving to campus hereafter to be known as S2.. We chose S2 because we wanted a different “U” permit perspective of someone that commuted to a different part of campus (not the engineering buildings).

We learned about the driving tendencies and observed/asked questions about why the driver: wasn't going into the parking garage, why they didn't follow cars, why they chose to wait or proceed across parking aisles, what they would do to improve parking on campus, and to inquire if they plan for difficulties finding parking ahead of time. One of our main goals was to know if whether or not S2 would use a technology that would help finding the best possible route of commuting to class and park, and how they would envision it (app, web service, voice commands, etc.). If S2 were to have known about the parking situation coming onto campus and the amount of full lots, S2 would have been more willing to find an alternate route to campus through trax, bus, or carpooling. S2 constantly mentioned that different lots on different days are subject to being closed because of the construction activity near and around the SFEBB. We asked S2 if they would use a farther parking spot with absolute knowledge that it would be open, and S2 answered with an enthusiastic yes. According to S2, a ten minute walk is acceptable when the weather is reasonable.

SUBJECT #3 - UTA Commuter - Engineering Major

S3 is a student at The University of Utah who is a sophomore in Computer Engineering. S3 commutes to school daily usually using the TRAX and bus systems and does not own a vehicle. S3's commuting schedule varies throughout the week. We chose S3 because we wanted a public transportation perspective of someone that commuted to campus but used UTA and/or the shuttle. At the time of the inquiry S3 was commuting to the WEB building on campus from his origin at 1300 East and 1300 South in Salt Lake City. The contextual inquiry was with S3 on the bus and the TRAX system on his commute to The University of Utah. The contextual inquiry started at 4:15 PM on a Monday with a goal to be in class by 5:30 PM with some time to spare. The route was to take the 220 bus from their origin to the Stadium TRAX line up to the Hospital TRAX stop and walk down to the WEB.

The bus was 3 minutes late which left S3 boarding at 4:31. On the bus Alec asked S3 if he had looked up the time for the TRAX train to the hospital and he replied no. Alec then asked him if he knew of any faster ways of getting to the WEB other than TRAX and S3 did not know of any. Alec then suggested that maybe getting off at a shuttle stop would be quicker than waiting for TRAX and informed him of the University of Utah's Shuttle tracking app. Alec showed him the app on his phone, and it was hard for S3 to find a linking efficient shuttle to connect with and decided to continue with the original plan of taking the TRAX. S3 arrived at the TRAX station at approximately 4:42 and barely missed the train and had to wait for the following train.

While waiting for the train S3 discussed the potential possibilities of an application that could potentially link together The University of Utah's commuter shuttle services with UTA's TRAX and bus information to help most efficiently get to class without a car. S3 examined The U of U's existing shuttle app to try and find a quicker way with a shuttle to get to the WEB, but was unable to determine the best shuttle to take by simply looking at where the shuttles were currently located. After waiting for the next train S3 boarded, got off at the hospital station, and walked down to the WEB barely making it on time even though he had planned to be early.

Additional interview:

We interviewed Melissa Johnson, the Director of commuter services at the University of Utah. Commuter Services provides services in one way or another for over 26,000 parking stalls on campus, at the hospital, and at research park, but students at the U have access to maybe 6,500 stalls.

To track the parking situation, they simply drive through the lots and count the empty spaces. However, starting next year, the University of Utah will start using a product called Blyncsy, which will track people using their phones anonymously in real time. It can determine whether you're driving, biking, or walking based on your speed. They want to increase the amount of data available on the trends of students commuting to campus so they can make necessary and productive changes.

Ms. Johnson acknowledged that she knew when and where lots would be busiest. Tuesdays and Wednesdays around 10:00 a.m. is the busiest time to park on campus. Before 9:00 a.m. and after 2:00, there is a lot of parking availability. She also mentioned that of the student accessible parking on campus, that lot 40 (the lot at Guardsman Way) often goes underused. Additionally it is possible to purchase a higher parking pass for a half day or full day.

The university has considered many different options to improve parking on campus. For example, a carpooling app, an e-bike share program, better shuttle programs, and even disallowing freshmen from driving to school. These opened our minds to additional possibilities that we hadn't considered before and should help us develop a solution.

Contextual Inquiry Results and Themes:

Common Themes

One common theme we noted was a lack of parking spaces for students between 10:00 a.m. and 2:00 p.m. Another theme we observed is that information to expedite commuting can be found online, but using the information to make quick commuting decisions is difficult. It is worth noting that commuter services and UTA both make efforts to provide the information without widespread success. Some information such as the availability and cost of temporary parking passes or the constant availability of parking stalls in lot 40 (Guardsman lot) may aid more students.

Despite all the ways students have of getting commuting information, we observed that it is difficult for them to quickly make quick decisions based on the data while commuting. For instance there is a way to look at where shuttles on campus are, and there is a way to look at train times, but figuring out how to best use both is difficult and time consuming. The time it takes to check this information may lead to a missed bus or train. Likewise few students are fully aware of the ever changing public transit schedules and construction efforts that affect their commute.

There is a communication gap between students and Commuter services and UTA. We hope to design a way to better facilitate communication between students and different departments of Transportation (e.g. UTA and Commuter Services). Our goal is to keep students

informed of the parking and commuting situation both around and on campus so that they can both better plan and respond to congested parking and other commuting factors quickly.

As we performed our contextual inquiries and reviewed them we found it would be useful for users to interact with our application using a voice user interface (VUI) while driving. This would allow users to obtain information without being visually distracted while driving. Users will be able to receive information about their commute in real time without having to take their eyes off of the road. We also learned that potential users would not want to constantly be having to put information into the application so we designed a feature that allows for prior tendencies/setting preferences the user would only have to set once. The VUI would have a verbal command to awake and start calculating a commute a user's current commuting situation. This would adjust when the user needed to get to campus early, and will contain a feature for special one time cases. In our contextual inquiries we observed students buying parking passes multiple times and determined being able to reserve a parking stall or buy a daily permit pass would have to be a feature in our design. We also came to the conclusion that students would take an alternative route to campus than they normally would if they were confident they would be saving time. From this we decided that we would need route scheduling and mapping for users to easily determine these alternative commutes and direct the user route options based off their commuting needs. This would enable users to determine an extremely flexible alternative way to getting on campus while still knowing with ease and confidence how long it will take. Our review greatly affected the original design thoughts our group had and allowed our design to be more flexible in terms of a user's constantly changing schedule and commuting factors.

Task Analysis Questions:

Who is going to use the design?

The primary users are expected to be students commuting to campus. However, there may also be usage by faculty and staff. The individuals that will be most affected by this are individuals that drive to campus.

What tasks do they now perform?

Students currently choose between a number of commuting options in order to get to class. Students who drive to class navigate traffic on the way to class, and then search for parking stalls; This can take a significant amount of time. Students who take either the bus or train must navigate multiple ever changing schedules in order to get to campus. In either option there is a significant level of risk of not making it to class on time, or being forced to leave home earlier than is strictly necessary to get to campus.

What tasks are desired?

- Find the best route for a given user
- Determine departure and arrival times
- Reserve a parking stall
- Become informed of and adapt to current commuting conditions

- Avoid cellular distractions while remaining informed of commute
- Purchase parking as needed

How are the tasks learned?

In the design we choose the tasks are simple to do and it should be easy for the user to transfer their experience from using other applications. With the Voice User Interface it is also possible to request tutorials.

Where are the tasks performed?

Currently the tasks are performed both in the commute heading to campus, as well as in navigating the parking issues on campus. We plan to calculate the tasks ahead of time to reduce the stress on commuters.

What is the relationship between the person and data?

There are multiple independent sources of information which compete for students attention. There is a tendency for these sources to contain very specific information, such as only showing bus schedules or only showing train schedules. Oftentimes between all of these sources it is hard for students to aggregate the information into a complete picture, and information is often lost between the cracks.

What other tools does the person have?

Many students have cars or take the trains or buses. They also have access to tools such as Google Maps, bus and train tracking applications, as well as the information that commuter services provides.

How do people communicate with each other?

There is currently a gap between the information provided by commuter services and the students who commute to campus. Also students who drive to campus rarely have the option to communicate with others trying to find parking.

How often are the tasks performed?

Each task is performed one or more times per day per student, depending on whether and when they have classes. In aggregate this task is being performed thousands of times a day.

What are the time constraints on the tasks?

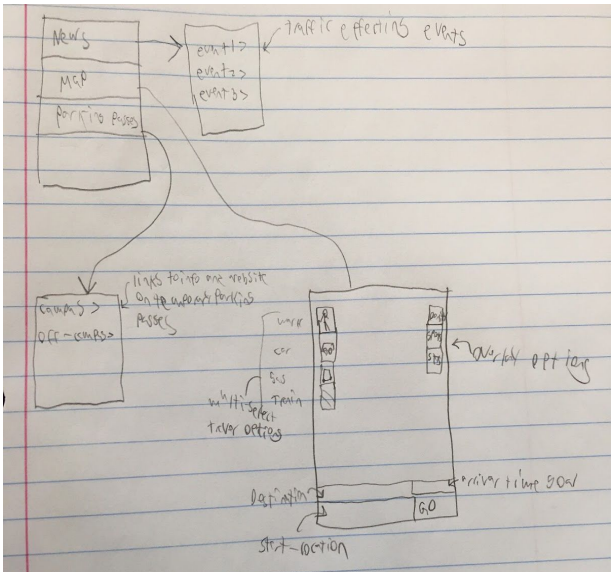
The time constraints are incredibly dynamic. The time constraints depend on when the student can head to campus, how long it takes to get to campus, how long it takes to find a parking spot, the time of their classes, and how long it takes them to get from the parking lot and too class. Many of these constraints are in flux on a day to day basis. However some of these time constraints are cyclic on a weekly basis and as such can be planned around.

What happens when things go wrong?

There are many possible outcomes that can occur when things go wrong. The first is that students can find themselves totally unable to go to class and will just head back home. The second outcome is that it will take the student a while to find a parking location and that they will run late to class. A third possibility is that the student will end up parking illegally, which could result in a fine. When things go wrong the student is usually late to class which then reflects poorly on the student.

Proposed Designs

Design 1:



The first page is a navigation pane which allows the users to chooses between news, map, and parking permit info. This allows for the user to easily navigate between modes. This design provides three other modes. The news mode provides information on construction and events that affect commute. The Map mode provides a map. Finally the parking passes window provides information on parking passes as well as allowing you to select what you have.

Task 1 - Find the best route for a given user

The map mode can take in input as to how to get to campus, such as walking, driving, bus, or train. This can be done by hitting the multi-select icons on the left hand side of the map mode.

Task 2 - Determine departure and arrival times

The map mode allows the user to enter when they want to arrive, so that they know when to leave in order to get to their destination at that time. This can be accomplished simply by inputting a time into the box just above the go button in the lower right corner.

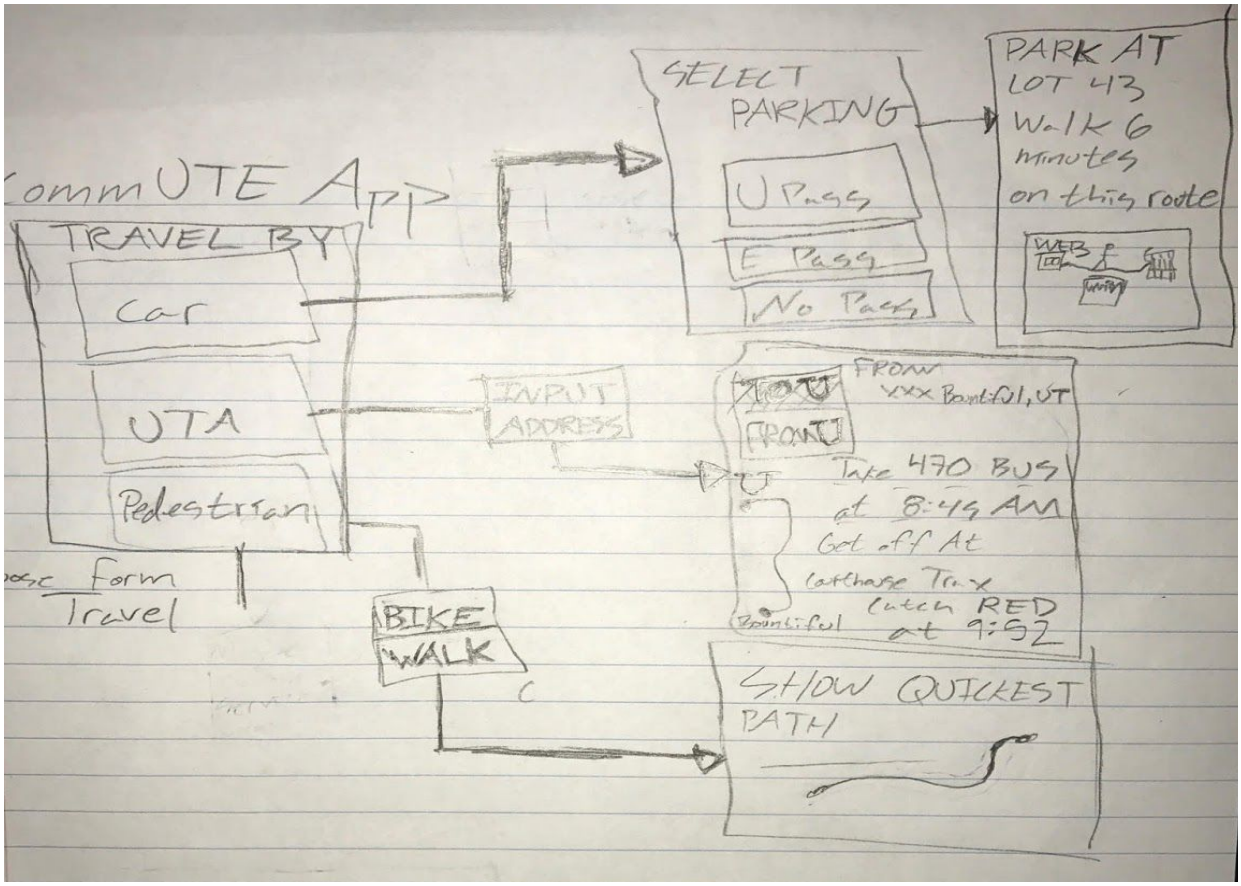
Task 4 - Become informed of and adapt to current commuting conditions

The news section informs user about campus events that may affect their commute. The user may browse through this list to get an overview or click on it to be redirected to a detailed news page. Meanwhile the map mode uses that information to route you around issues.

Task 6 - Purchase parking passes as needed

The parking passes mode allows for the user to browse a list of parking pass options. Each option is accompanied by a bit of description text, and when tapped on takes the user to the appropriate place to purchase the tickets(for example clicking on temporary A parking takes you to the relevant commuter services page to purchase it).

Design 2:



Task 1 and 2 - Find best route for user and determine departure and arrival times

Design 2 shows 3 different UIs for the three different commuting types displayed. For all three UIs the goal is to convey the best route for the respective mode of transportation as well as to inform the user of the time they will arrive and should depart.

Task 3 and 6 - Reserve a parking stall and purchase parking passes as needed

These tasks are supported by the car option in the initial screen which leads to choosing the preferred type of parking followed by the ability to reserve a spot. When the car option is chosen, the user is presented with an option for their parking pass. Using the commuter

services BLYNKSY system they will be piloting next year the app could be updated with real time parking information about every lot.

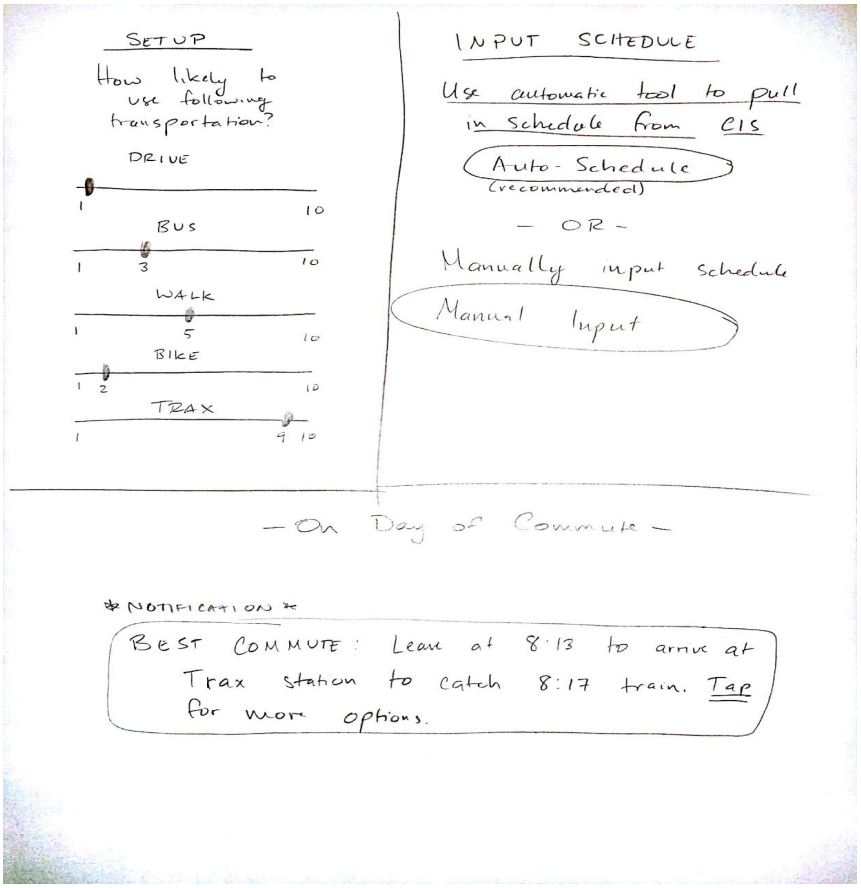
Task 4 - Become informed of and adapt to current commuting conditions

This task would be supported by the maps shown in the design, although there is no information conveyed to user about dynamic commuting info, this would have to be designed in.

On each final screen in the hierarchy a route of travel could be displayed as well as times for departures and arrivals and commute times. This would inform the user of travel times as well as the most efficient route of travel.

When this design was made we had not thought of the VUI yet. This design could easily incorporate the VUI while a commuter is driving. The application will also assist the user in finding the best place to park by determining which lots have more cars currently and by analyzing past history to see how quickly it is likely to fill up while also correlating route times and adding all drive, walk, public transit, etc preferences to the overall travel.Task 6: The news mode informs you as to what things on campus (such as construction or events) affect your commute. It is a live update and with enables notifications the commuter can have exact information before they begin their travel as well as during in case of breaking news. At the same time the map mode takes this info into consideration while planning your commute to be as effective and efficient as possible.

Design 3:



The initial setup would make the future use of the app much more effective. By entering the likelihood of using certain forms of transportation, the app can generate a more

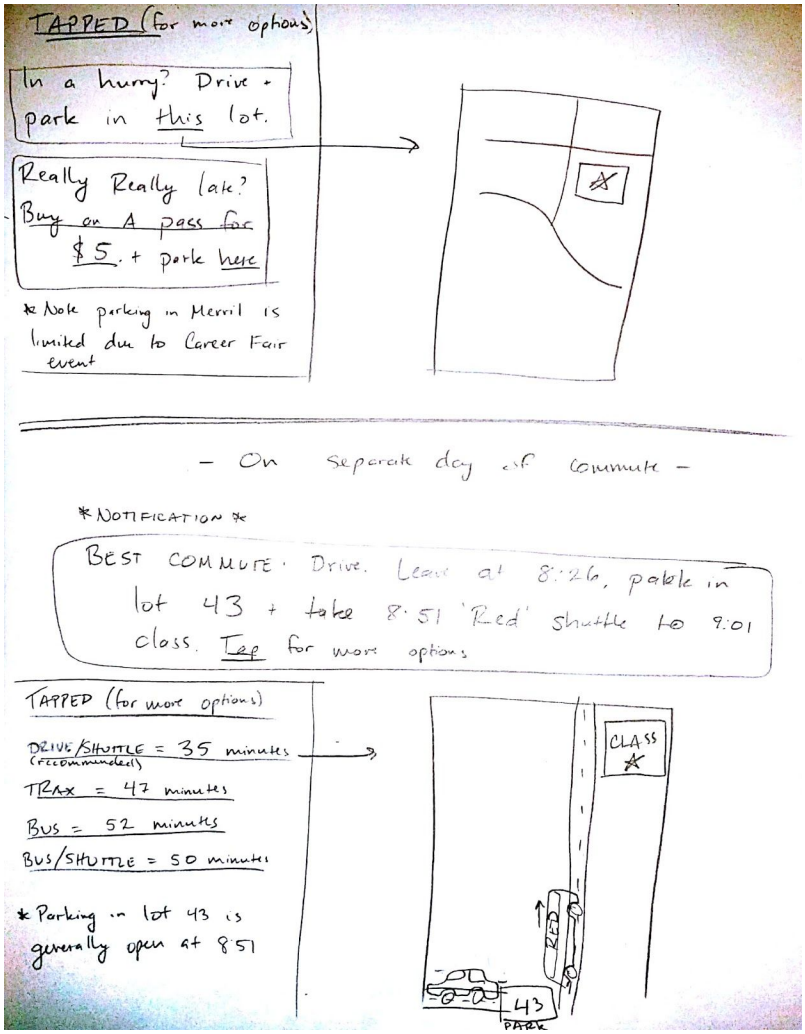
customized experience for the user. By inputting the class schedule, using an

auto-populate from CIS tool, the application will know when and where the user's classes are.

Notifications will let the user know which is the best route to take that day depending on circumstances that may be

difficult to anticipate such as events on campus.

The user may tap on the notification for directions and other options that may be faster, but more expensive (i.e. buying a day ‘A’ pass), or may allow for more homework time (i.e. trax). All these preferences can be set in the initial setup shown above.



Task 1 - Find the best route for the user

The app makes a decision as to which route is the best for each given day.

Task 2 - Determine departure and arrival times

The user does not need to worry about determining departure and arrival times since the user will be notified when to leave and when he or she will arrive.

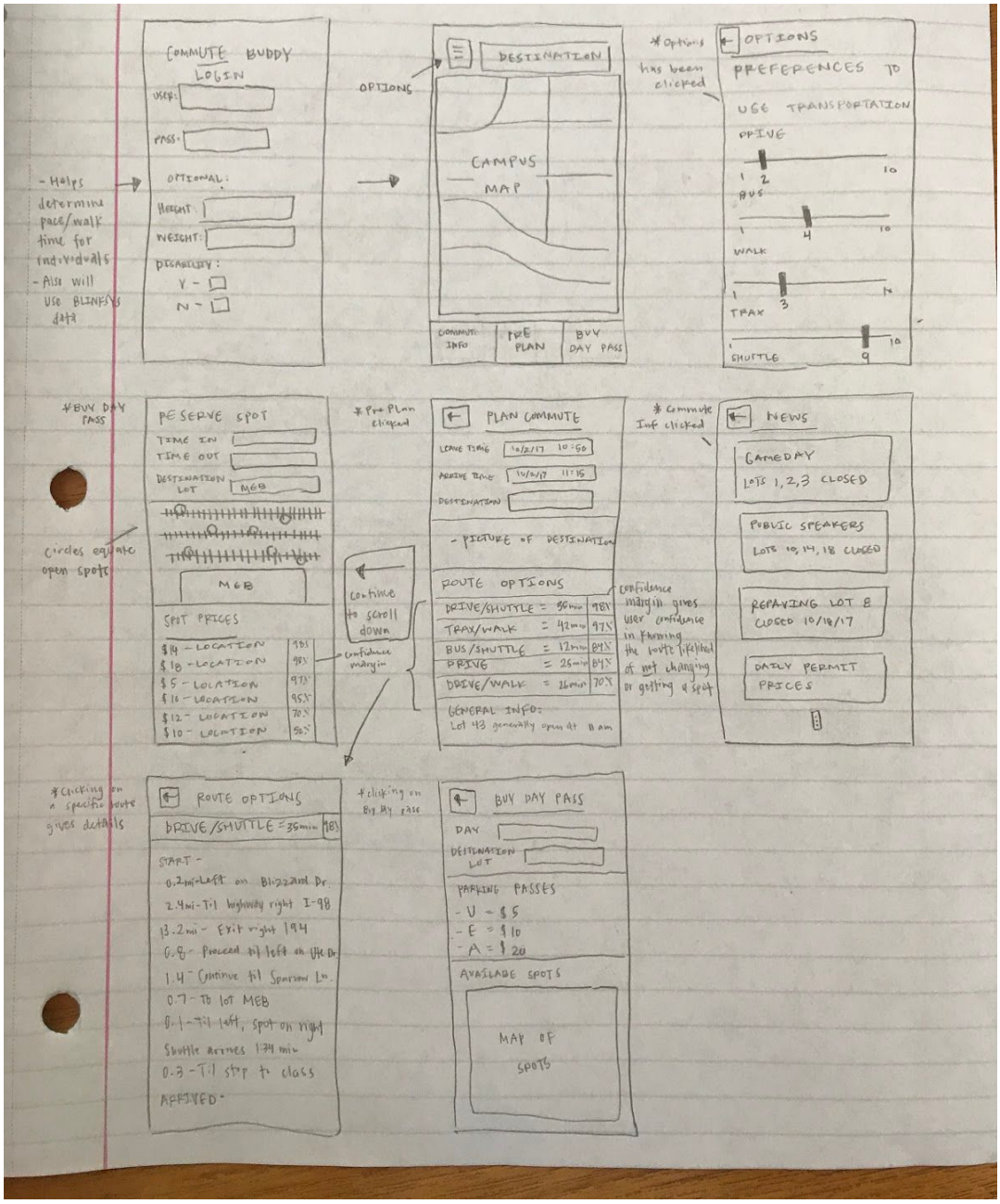
Task 4 - Become informed of and adapt to current commuting conditions

The application will inform the user of current conditions and will adapt automatically for the user.

Task 6 - Purchase parking passes as needed

If the user is running late, a parking pass may be purchased through the application’s interface.

Final Design:



Task 1 - Find the best route for a given user

By inputting the Student's ID and travel preferences the system will generate travel paths for the student. Additionally the student can tell it to find routes on demand.

Task 2 - Determine departure and arrival times

The integration with the class schedule and the ability to add other scheduled events allows for the device to get you to where you are going on time, and lets you know when you have to leave to get there.

Task 3 - Reserve a parking stall

You can browse through a list of reservable spots and their prices that are relevant to your destination. You can reserve it by clicking on it and then selecting purchase.

Task 4 - Become informed of and adapt to current commuting conditions

By either navigating to the news panel or asking through the VUI(Voice User Interface), you can find traffic related news relevant to your commute experience.

Task 5 - Avoid cellular distractions while remaining informed of commute

The integrated VUI allows you to do things without looking at the screen. This drastically reduces distractions while driving.

Task 6 - Purchase parking passes as needed

Temporary parking passes can be purchased by scrolling through the Temporary Parking Passes page. Additionally they can be purchased through the VUI.

Design Comments:

- Key words “Hey Buddy” will activate the application’s audible services, the audible service will be called Buddy from this point on.
- Real time notifications are a critical aspect to the mobile app. Both on screen notifications and notifications through the vocal system. Buddy will notify/speak to you as your route route progresses.
- A login will help customize the application specifically to the user and their campus so as they use it more more locations are saved, more preferences are learned (whether the user likes to drive, take transit, walk, etc.) allowing it to evolve.

Written Scenarios - “1x2”:

Storyboard for Task 1

1. Determine different route methods including walk, drive, public transportation (bus and trax), and university shuttle to get to your campus destination when you want and how you want

James puts in his preferences for driving and taking public transportation at the beginning of the semester. Everyday he gets a notification from Commuter Assist that directs him to campus. He follows the directions precisely to drive to school. He ends up arriving efficiently to campus and shortly before he gets to the parking lot that Commuter Assist is directing him to, the app reserves a parking spot for him. Right before he pulls into the spot, the tire spikes lower and allow him to park in his reserved space. He then goes and picks up an E-bike that the app has reserved for him and rides it to class. He has never had such a smooth or fast commute.

Storyboard for Task 2

2. Determine confidence margins and ease for the commuters parking on campus with a pay for a day parking permit option giving you an exact spot.

Taylor wakes up and asks Commute Assist to find routes to the MEB. Commute assist vocally responds and provide a list of routes. Taylor chooses the fastest one. Taylor drives to a parking lot, and then takes the shuttle from there. Taylor gets to the MEB in an easy and timely fashion.