# Waze Project Design Documentation

Alexander Lederman, Brandon Nguyen, Katie O'Brien, Liam Russell, Jessica Townsend

Department of Computer Graphics Technology, Purdue University

CGT 256: Principles of UX Design

Professor Nancy Rasche

Oct. 8, 2020

# Table of Contents

## Meet the Team

**Alex Lederman** is a Junior at Purdue University studying UX Design.

**Brandon Nguyen** is a Junior at Purdue University studying Web Programming and Design.

**Katie O'Brien** is a Junior at Purdue University studying Web Programming and Design and Data Visualization.

**Liam Russell** is a Junior at Purdue University studying Web Programming and Design.

**Jessica Townsend** is a Senior at Purdue University double majoring in Web Programming and Design and Virtual Product Integration.

## Introduction

Our team was tasked by Waze with finding a way to break into the college campus market. The objective was to understand the needs of drivers on the Purdue campus and use this knowledge to integrate a design feature into the current Waze app.

The root problem that our team attempted to solve was the parking availability on Purdue campus. Our team interviewed 4 Purdue students for background and insights. Our team also analyzed 15+ interviews produced by other teams to create an interview synthesis.

Using the interview data, our team created a persona and a scenario to define a design solution to the root problem.

Our team has created a prototype using Adobe XD and performed usability testing on representative users using Nielsen's 10 usability heuristics.

Our team received feedback on the developed scenario and considered the next steps.

## Project Steps

| Date | Event |
|---|---|
| August 28, 2020 | Decided to focus on campus drivers for P1 |
| August 31, 2020 | Completed interviews for P1 |
| September 1, 2020 | Completed P1 interview summary |
| September 8, 2020 | Completed P1 interview synthesis |
| September 11, 2020 | Completed team KWHL |
| September 15, 2020 | Completed P1 scenarios |
| September 18, 2020 | Completed P1 project video |
| September 20, 2020 | Reviewed and provided feedback for P1<br>Submitted P1 design document |
| September 21, 2020 | Completed P1 team evaluations<br>Completed P1 |
| October 11, 2020 | Updated P1 design document<br>Completed P2 team evaluations<br>Completed P2 |

# KWHL Chart

The purpose of this KWHL chart is to guide our team on how to complete the deliverables. Based on KWH columns, our team was able to understand the problem and used the L column to reveal our findings. This is the beginning of our Discover & Explore stage of UCD.

| K<br>What We Know | W<br>What We Want To Know | H<br>How We Will Learn It | L<br>What We Learned |
|---|---|---|---|
| • Wayfinding on campus is a struggle for many students (notably between classes)<br>• Car traffic on campus is centered on parking permit holders<br>• Waze already has the infrastructure to process real-time traffic data<br>• Waze allows users to report about incidents such as 'Road closed' or a car stopped on shoulder.<br>• Waze shows whether a road has heavy traffic or bumper-to-bumper traffic<br>• Waze can be used on mobile or desktop<br>• Waze is pretty popular (over 7 million ratings)<br>• There's a lot of services that help solve wayfinding problems such as Google Maps and Waze. | • Are students' class schedule data accessible?<br>• How many parking passes are issued every year?<br>• How many parking spots are available to students, who make up a majority of on-campus drivers?<br>• Where are the busiest areas on campus, and at what times?<br>• Can Waze keep track of parking capacities on campus?<br>• How many Purdue students know about Waze?<br>• Who are Waze's competitors? Have they implemented something that resolves the parking problem?<br>• Is Waze easy to use for drivers?<br>• Is Waze enjoyable to use for drivers?<br>• How much average time is spent on Waze by drivers? | • We will conduct interviews to see how traffic/parking accessibility affects students' daily commutes.<br>• We will ask other students where/when the most congested areas/times are on campus<br>• We will ask the University about how many parking passes are issued each year, & space availability<br>• We will interview and see how many students have used Waze, if they use other map apps, and how they like the app<br>• We will use the Waze app & research the company to gather insights<br>• We will search for any open API that Purdue provides (schedule data, parking data)<br>• We will investigate the current parking areas on campus | • There's a parking problem on campus<br>• Several areas on campus are most congested or hard to navigate<br>• Busiest times are morning (as people arrive) and afternoon (as people leave)<br>• Not many students use Waze, the ones who do like it but want to have more features.<br>• Some students don't use any apps to navigate campus, and the ones who do typically use Google or Apple maps.<br>• A lot of students park illegally, and their car isn't moved soon enough to make room for other students<br>• Students wish parking passes were cheaper and more accessible<br>• Student parking is far from main campus |

## Research

Our team interviewed four Purdue students whose primary method of transportation on campus is driving. During the interview, the students were asked the following questions:

1. How long does it typically take for you to find a parking spot on or near campus?
2. Have you ever gotten a parking ticket while you were in class?
3. How do you find information on on-campus parking regulations?
4. What are your personal tips for campus parking?
5. How would you make campus parking easier?
6. What is one thing you would change about campus parking?
7. What do you do if you get lost while driving on campus?
8. How would you describe the everyday traffic on campus?
9. How would you describe the everyday traffic on campus?
10. What areas on campus do you think are congested?
11. What areas do you think the campus should add roads?
12. What roads on campus do you think should be restructured?

## Insights

From the four interviews, our team gathered the following insights:

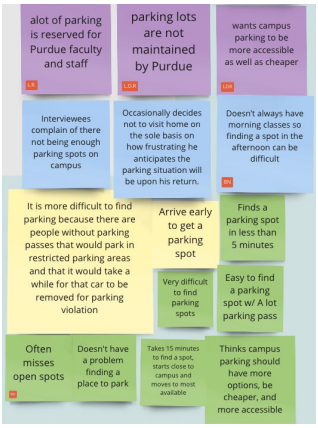
1. Wishes there were more features in the Waze app.
2. Uses apps other than Waze to navigate around campus.
3. Finds information on parking regulations from physical signs posted near spaces.
4. Has never received a parking ticket.
5. Wants campus parking to be more accessible and less expensive.
6. Believes there is a major traffic congestion problem on campus.
7. Says that parking near classes has always been a struggle without a parking pass.
8. Says that it is easier to navigate campus using an app rather than the posted signage.
9. Says that campus traffic is congested when people are getting to and leaving class.
10. Says that the two hour limit on metered parking makes it hard for students who don't have a parking pass.
11. Says that students without parking passes frequently use restricted parking spaces.
12. Thinks that West State St. and the Chauncey area are particularly congested.
13. Thinks that campus should add various roads and infrastructure to more congestive parts of the campus

# Affinity Diagramming

This exercise involved organizing the insights we received through surveys into groups and then determining similar comments. On the next page, our team has created an interview synthesis based on the affinity diagram.

## Traffic


## Lack of Parking Spaces


## Parking Passes


## Information


## Location

## Interview Synthesis

Using the interviews our team conducted, we synthesized the following problems our end-user faces:

1. Parking spaces are limited by other students who use them without a parking pass.
2. Parking spaces are hard to find in areas where most students take classes.
3. Parking spaces that could be used by students are reserved for faculty.
4. Parking spaces are too far away from the main academic campus.
5. Parking spaces and lots are not maintained by the university.
6. Metered parking spaces are incredibly hard to find on campus.
7. The waiting time for traffic lights on campus is too long.
8. There is a large congestion problem on campus.
9. Parking on campus is often inaccessible.
10. Parking on campus is expensive.

After the interview synthesis, our team debriefed to analyze our user's **root problem**. From this discussion our team agreed on the following need statement:

*Parking availability on campus is limited. Open parking spots are often too hard to find.*

## Persona

We created a persona to help us better understand our targeted users, which are college student drivers.


Photo by Warren Wong on Unsplash

"*Campus parking is difficult. I need a feature from Waze that would help make it easier to park on campus.*"

Jared, 24, out-of-state junior in mechanical engineering. He currently lives in an off-campus studio apartment, which is approximately a 20-minute drive from campus. Jared currently holds a C parking permit. Jared typically spends 30 minutes getting to class from his apartment. He is frustrated that he has to spend his valuable time every day looking for parking spaces on campus. Jared's average weekday is in the following order: attending all of his classes, studying at WALC, stopping by Au Bon Pain for some food, and then finally ending the day by going home to unwind. Jared needs a reliable parking space on campus. He has used the Waze app before. However, the app lacks a feature to keep track of the capacities of both the parking lots and the parking garages. He would normally drive to a parking space early to see if there are any available parking spots. However, he often finds himself driving back to his apartment and walking to class instead because of the lack of available parking spots. Therefore, Jared needs a feature that would find him available parking spots that would be near to his classes and that it should show parking spots. He should also not have to spend time navigating through this feature and that it should show an estimated wait time for an available parking spot.

# Ideation and Design Requirements

This is the beginning of our Ideate & Design stage of UCD. We mapped out what this new feature should contain based on the persona. The following is a list of design requirements and pain points.

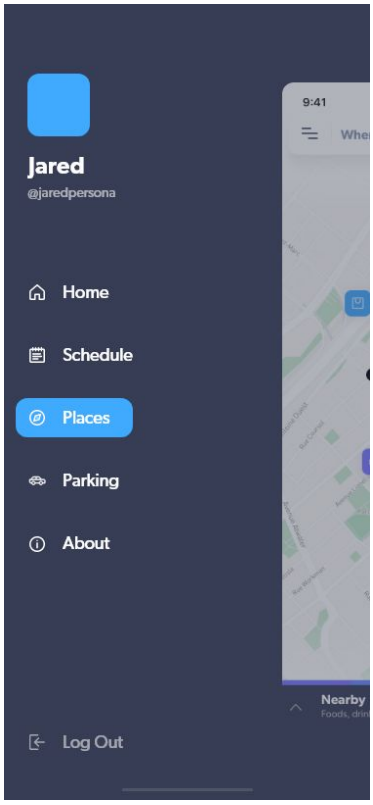
**Design Requirements**

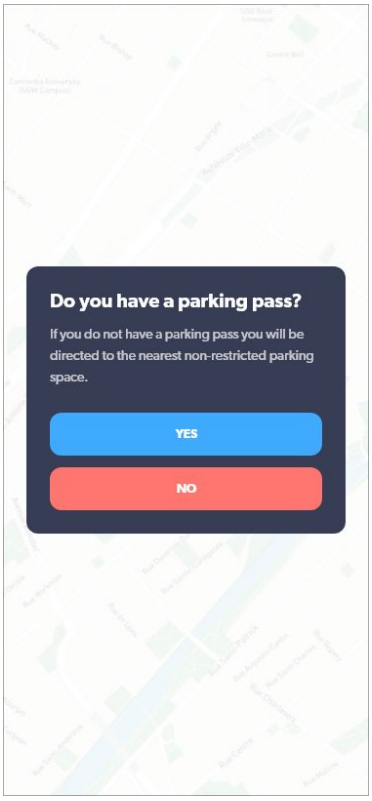
- Has to connect to Waze (mobile/desktop/wearable)
- Using information that's already available
- Still functions well if not everyone who drives to campus uses it
- Users can customize what kinds of places they can park (parking pass, street parking)
- Personalized based on where the user is driving from, what building they need to get to, and how far they have to walk from where they parked
- The user must be able to find the availability of open parking spaces remotely.
- The user must be able to understand the wait time for an available parking space.
- The user must be able to find availability without adding time to their commute. (through navigating the app, etc.)
- The app should be able to find parking availability for people without parking passes.

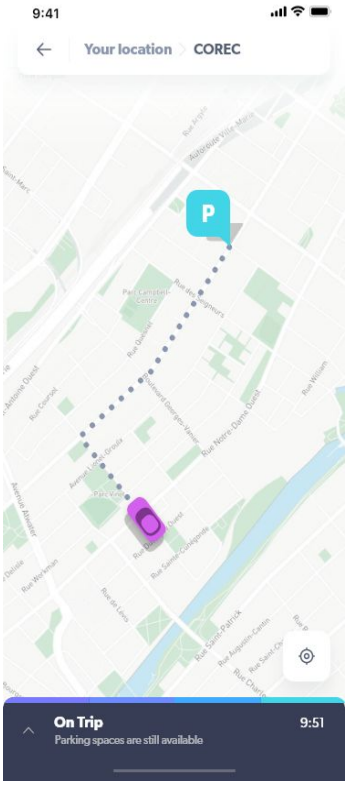
**Pain Points**

- The user struggles to find parking near their classes.
- The user is late to class because it takes a long time to find a parking spot.
- The user doesn't know where they can park with/without a parking pass.

# Sketches and Initial Mockups



## Tasks and Steps

This is the beginning of our Prototype & Test stage of UCD. We have listed out the following tasks, which are underlined, and their respective steps into completing that task. These steps are what a user would ideally perform. These rigid steps and the usability testing that we will perform on the users will help gather insights to improve the design and instructions.

<u>The user needs to drive their car to an available parking space near their classes:</u>

1. The user needs to enter the destination in the Waze app.
2. The user needs to specify if they have the appropriate parking pass in the app.
    a. If the user does not have a parking pass, it will redirect the user to the Purdue parking website to buy the appropriate parking pass before continuing to step 3.
3. The user needs to enter if this trip is planned for now, or the future. (Parking wait times)
    a. If the user selects planned, for now, the user will proceed to step 4.
    b. If the user selects for the future, the app will tell the user that it will remind them (sending a notification) that they have an upcoming trip. The user will not proceed to step 4 until they get the notification.
4. The user needs to take action based on feedback for parking availability in the Waze app. Some parking lots may have more open spaces than others.

<u>The user needs to find parking availability without spending additional time on their commute:</u>

1. The user opens the Waze app.
2. The user selects “create an account”.
3. The user enters their class schedule with locations and times for each class, and parking pass if applicable.
4. The user selects their notification preferences.
5. The user saves that information on the account.
6. Waze tracks the user’s location, and the user will receive a notification before they need to leave for class (based on notification preferences).

7. The user enters the Waze app, and clicks “start commute”

<u>The user needs to figure out how long it takes for parking availability to open up in a specific lot:</u>

1. The user opens the Waze app.
2. The user navigates to the Purdue campus on the map or searches for the location.
3. The user selects “show parking lots”.
4. The user selects the parking lot from the map.
5. The user sees an estimate on-screen about when a parking spot will open.

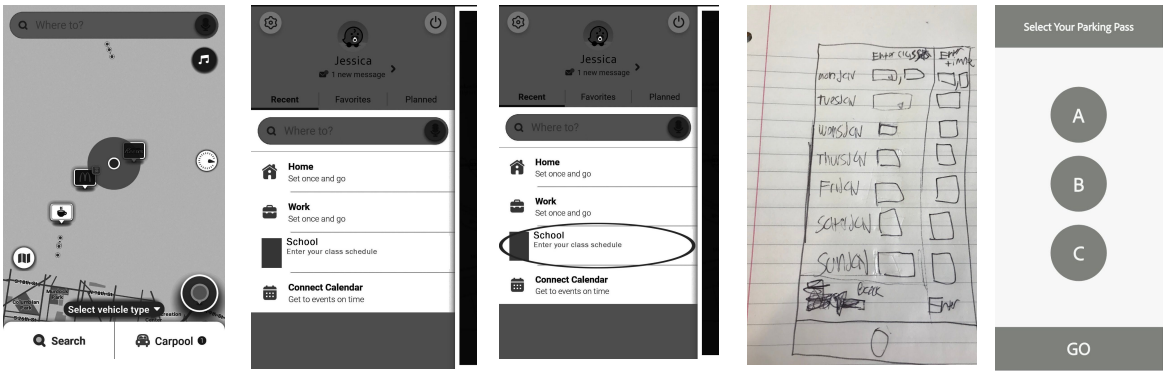
# Sprint 1

Prior to our first Sprint, we had already defined our problem as the parking availability on Purdue campus. We set aside time to conduct our sprint in class and we reviewed the analyzed results from Project 1. To begin our Project 2, we expanded on the sketches and the user tests.

In our first sprint, we established the tasks and steps for our solution. The first task involves the user opening the Waze app and finding a parking spot located near their classes on campus. The second task involves the user finding parking availability without spending additional time on their commute.

TASK 1: Parking Availability


TASK 2: **Schedule Analysis**

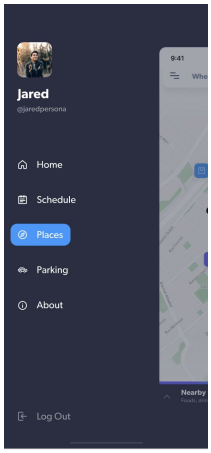


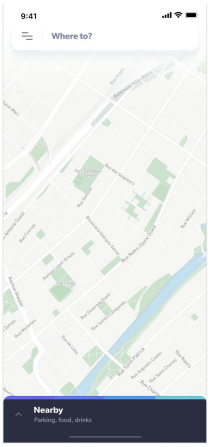
## Sprint 1 Feedback

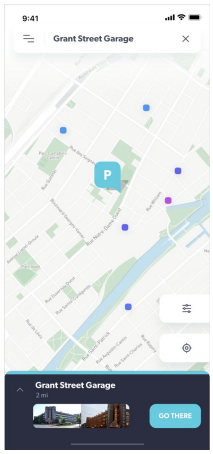
- I think this is a great idea, but I wish I was able to see how many parking spots are open in each individual lot.
- What about live updates? Or securing a parking spot?
- I like being able to save a location. That would help save time and I wouldn't need to memorize complete addresses.

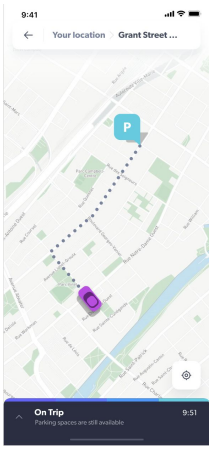
# Sprint 2

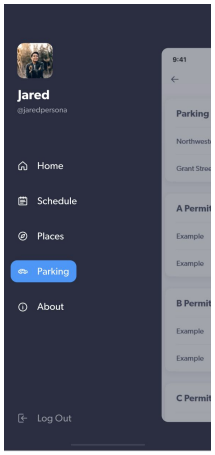
During our Sprint 2, we turned our physical mockups and drawings into digital versions. Based on the feedback from Sprint 1, we decided to add a page informing the user of parking availability in multiple parking lots at once as opposed to only displaying the selected lot's availability.

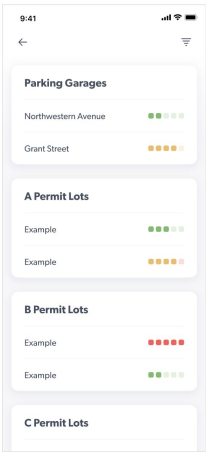


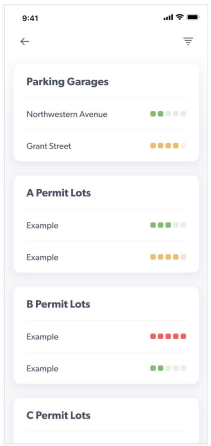



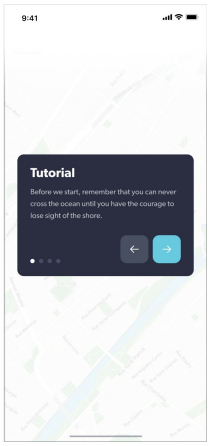



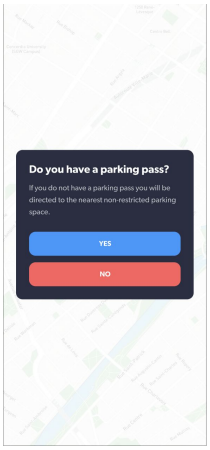



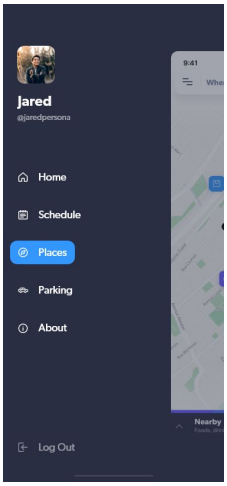



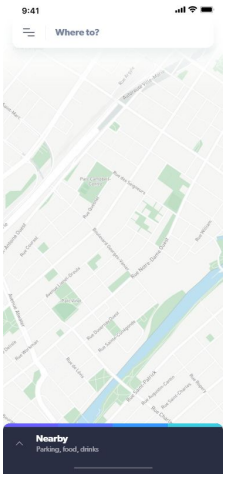
## Sprint 2 Feedback

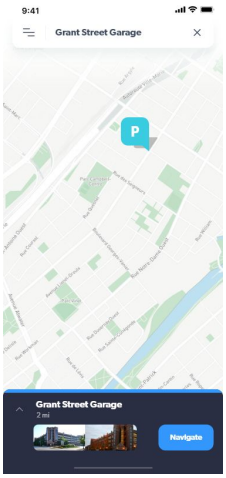
- I really like the function of being able to see and locate nearby locations.
- Being able to see individual availability for multiple lots at a time is a great function. This would be so helpful on campus.
- I like being prompted about a parking pass. This would be so helpful leaving the pass requirements to an app so I don’t have to maneuver public parking around campus.

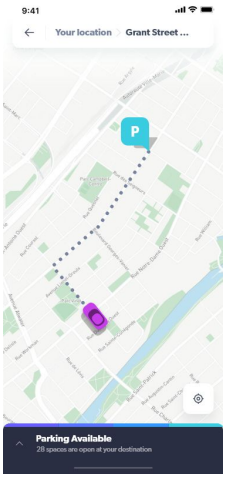
# Final Prototype

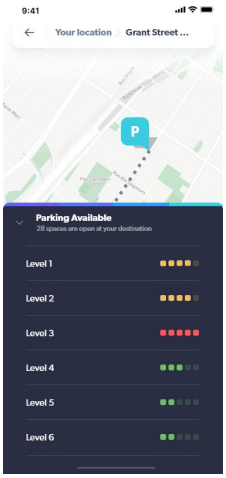
## Main Navigation



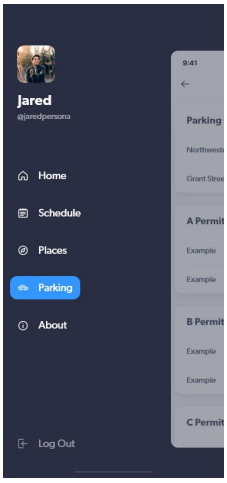



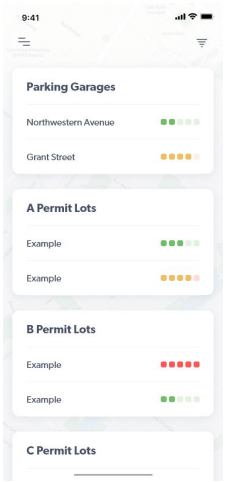



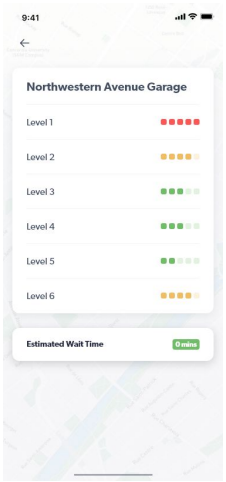



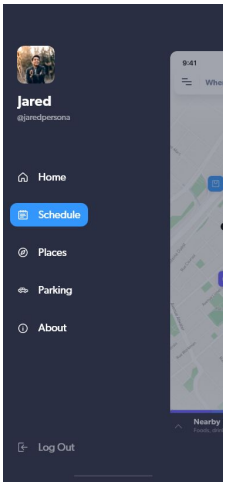

## Parking

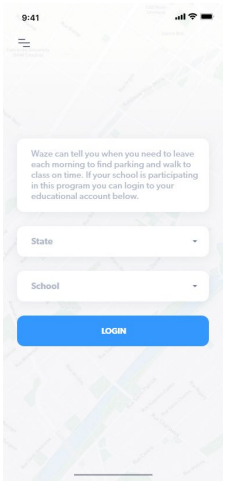



## Schedule



## Feedback and Next Steps, Part 1 (Project 1)

Our team has found that parking is a real problem on Purdue campus. Our team interviewed 2 representative users on the scenario using the following questions:

1. What do you think about our potential solution?
2. What do you think about these tasks and steps?

and received the following feedback:

1. “This makes it easier to find parking, although it does not increase the physical amount of spots.”
2. “I would have liked for the parking spot to be based on where my classes are.”
3. “This looks promising. It reminds me of what it looks like at airports.”
4. “I would definitely use an app if it lets you park and get to classes quickly.”

Based on this feedback and if our team had more time, our team would have done the following:

1. Create more high-fidelity prototypes
2. Perform usability testing
3. Perform heuristic evaluations
4. Reiterate on existing designs / solutions
5. Test  connection and camera for one parking lot
6. Refine the design solution
7. Collect more data (do more interviews, etc.)
8. Contact Waze for their thoughts on the design solution and data
9. Design for campus-wide use

## Feedback and Next Steps, Part 2 (Project 2)

Project 1 Feedback:

1. "The camera may infringe on student privacy on campus."
    a. We are not lawyers, and will have to consult with one to see if this would be an issue. However, an online search on Indiana recording laws indicated that Indiana is a one-party consent state. According to recordinglaw.com, this can be summarized as "You may not intercept wire or electronic conversations that you are not a part of without the consent of at least one party."
    b. According to dhlawindiana.com, "Video recordings have a different standard for legality than conversation recordings. Video recordings are legal in any place that is considered public. Examples of this would include concert venues, malls, parks, and roads, or any place that the general public is allowed. This standard allows video recordings to be legal even on property that it privately held as long as the general public is allowed, while excluding places where one reasonable has an expectation of privacy, like one's home."
    c. We may consider censoring people's faces using AI or angle the cameras in a way that would only focus on the cars. This is an important issue, but not one that the team could solve alone without professional consultation.
2. "The downside is that student drivers may speed to take the spot."
    a. The feature may encourage the student driver to speed to take the spot. However, the team believes that the feature would allow student drivers to plan out ahead instead of rushing to get a spot. The team will need to consult with a professional on traffic laws or university parking officials on how to provide a safer campus driving environment.
3. "The solution may increase the chance of getting an accident because users will have to use their phone while they are driving."
    a. People have used hand-free features within a navigation app such as using voice. The feature will consider using voice to navigate around the feature so that the driver can focus on the road with their eyes. The team will need to dissect apps such as Google Maps to see how it used the voice feature.
4. "The downside of providing available parking spots in realtime."

    a. It is difficult to provide real time data as problems such as lag or network issues can disrupt the user experience. We have considered if there are any downsides to providing parking spots in real time and we could only consider the problems of privacy. However, the feature will be secure as the data (user preferences, course schedules, etc.) can only be seen between the user and the Waze administrators.

5. “Have a reserve function or let users have 3-4 possible parking destinations using google navigation before they get in the car?”

    a. We are considering this reservation feature. At this time, our feature will save user preferences based on their parking destinations and course schedule.

Based on the project 1 feedback and usability testing feedback, we have considered the following next steps.

1. Implement a more visually appealing user interface using gestalt principles
2. Start doing wide scale testing on 100+ individuals from a range of demographics
3. Reiterate based on feedback
4. Implement a camera system to track cars in one specific parking lot
5. Collect more data (do more interviews, etc.)
6. Contact Waze for their thoughts on the design solution and data
7. Implement prototype with net code on waze.
8. Design for campus-wide use

# Team Contributions

| Tasks | Contributors |
|---|---|
| Interviews | Alex Lederman, Katie O'Brien, Jessica Townsend, Brandon Nguyen |
| Sketches | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| Mockups, Prototype | Alex Lederman |
| Final Prototype | Alex Lederman |
| Scenarios | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| Affinity Diagramming | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| KWHL Chart | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| Design Document | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| Presentation Slide Deck | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| Presentation Video | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| Updating Project 1 | Alex Lederman, Jessica Townsend, Liam, Russell, Brandon Nguyen |
| Sprint 1 | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| Sprint 2 | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |
| Usability Testing | Alex Lederman, Katie O'Brien, Jessica Townsend, Liam Russell, Brandon Nguyen |