SimPark

Team

Kathryn Chan
Sepehr Hakami
Adilene Pulgarin
Umang Sehgal

Problem and Solution Overview

Locating a place to park is meant to be a task that requires little to no extra effort. However, many drivers find that they need to plan ahead because it has become very time consuming finding a spot that fits their needs. Whether it is finding a place to park at work, school, or at a big event, there are many factors to consider when it comes to finding the right spot. Not only this, but another problem that arises is being able to locate the parked car afterwards. In addition to drivers, parking managers also have trouble attracting drivers and keeping an efficient system in managing cars coming in and out of their lots. With SimPark, we hope to be able to ease the burden of this task for both groups. By designing a mobile application with an integrated car device, we give the drivers an alternative way to find parking according to their standards by being able to filter through suggested parking locations. For parking managers, the integrated car device and application make for an efficient way to manage the cars as well as help expedite the process of checking cars in and out of their locations.

Design Research Goals, Stakeholders, and Participants

During our research stage, we wanted to get an idea of what problems drivers dealt with the most when it came to finding parking. Since following drivers around is a privacy issue and can cause the driver to change their usual strategy, we gathered information by interviewing drivers. During the interviews, we asked them to explain what their general approach was and how they go about searching elsewhere when they are unable to locate a spot. We also asked the interviewees about their worst parking experience in order to gather information on what factors created this situation and, as a follow up, what they did to resolve the situation. With all of this information, our next focus would be identifying how we would be able to assist drivers in avoiding some of the most common problems we found among the interviewees.

Stakeholders & Participants

The stakeholders during this phase were drivers at the University of Washington. UW is a big campus and there are various parking options, but as a student driver, there are a lot of factors to consider when choosing a spot. Their strategy varies depending on whether the driver pays for a quarterly parking pass, if they choose street parking, or if they search the campus lots. Nevertheless, we felt that an application such as SimPark would be the most beneficial for student drivers in terms of saving time and money. Finding parking any day of the week is challenging and can become even more challenging when we consider factors like location, safety, and price.

Our first interviewee was Tom, a student who commutes to campus daily. During his interview, we found that his parking situation depends on whether he requires long term parking. When he does, he purchases a parking pass and his options are limited to the E-18 parking lot. This location is far from his classes, but he is guaranteed a spot. When he does not purchase a pass, Tom parks on campus lots with the help of his friends to get a lower rate. With a lower rate and relatively close distance, Tom prefers this parking location. However, when his friends are unavailable, he sometimes chooses street parking because it costs less for the amount of time he requires.

Dan, our second interviewee, commutes to campus five days a week and finds that he spends more time parking than he does commuting. Dan chooses to park in a residential area near the South end where he is free to park. Although it saves him money, he spends about 25 minutes to walk to work from his parking location. He believes that the tradeoff between price and distance is worth it although it is a lengthy walk. A new concern expressed in this interview was that of safety. Cars around that area have been vandalized before which concerns him whenever he parks there.

Our last interviewee, Amy, commutes from Bellevue to campus daily. Unlike the others, she chooses to prioritize her time instead of the rate for parking. She has a location that she frequents where she is usually guaranteed a spot because it is in west campus. In general, she allows herself no more than 15 minutes to find a spot before giving up on finding a cheaper alternative. She mentioned that she has the option to get free parking and then commute via bus, but she believes this would take more time than necessary.

Design Research Results and Themes

Of the three people we interviewed, the most common factor they considered was price. This was more evident during our conversations with Tom and Dan who expressed that they would rather spend more time looking for cheaper spot. Amy, on the other hand, also takes price into consideration, but she would rather save herself time and stress by paying a higher rate if it means she is done sooner. Tom have many different strategies when it comes to finding a most cost effective solution by going as far as gathering friends to get the commuter rate on campus lots. Dan chooses to park 25 minutes from his work as a tradeoff to getting free parking. Although this was not expressed as much by Amy, it does impact her parking situation which is why she also decides to park a bit farther away from campus as it is slightly cheaper.

Another common factor among the three was location. While Tom opts for a cheaper spot, he expressed his concern over location various times throughout the interview. He finds that E-18 as the only option for commuters with a parking pass is unfair because it may be the case that it is across campus from his destination. He also mentioned that when he can, he will choose to use street parking because it is most often closer to his destination. Dan also shares the same concern as his parking location is still quite far from his work. However, as mentioned before, he would rather prioritize cost to this factor. Amy seemed to have this as her most important factor. She chooses to pay UW daily parking rate because it means that she is nearer to her destination. She also mentioned that when it comes to other events, she will choose to pay and park in the provided parking locations because she is able to arrive earlier to the location. She finds that often times, finding a cheaper spot, which is usually only a couple dollars less, means that she has to park in a farther location and this does not seem reasonable to her.

The last factor express among the three were safety concerns. This factor was most evident when speaking to Dan, but Tom and Amy also keep it in mind when parking. Dan mentioned that some of the cars parked in the area he frequents have been vandalized. He worries that one day it may be his car, but he chooses to continue parking there because finding another location may be too much work. Tom and Amy do not express this concern as much because they find themselves parking on campus most of the time. They find that locations near campus are safe so they don't need to stress about it too much.

After completing the interviews, it was easy to see that each person has different priorities of parking factors, and it supports our design to have characteristic of sorting by different factors. In doing this, we are able to appeal to a majority of drivers by letting them decide what their priorities are rather than imposing what we believe is more important.

Answers to Task Analysis Questions

1. Who is going to use the design?

Any driver who is interested in finding parking according to what they consider to be the most important factor (price, location, etc.). This includes drivers who have a hard time finding parking spots in places that they frequent as well as locations that are new to them like attending a special event in an unfamiliar are for example. People who manage parking resources could also be benefitted from our design by managing their properties more efficiently. It may be the case that they are being overlooked because they don't consider one of the factors that people consider the most while looking for parking. By including the integrated car device, both drivers and parking managers benefit by being able to more closely manage their cars while also expediting the process of getting in and out of a lot.

2. What tasks do they now perform?

Drivers currently spend a lot of time searching for parking locations in different areas, including some far from their destination, in order to save money. This means that in addition to their usual commute time, they take into account the additional time spent looking for an open location. Parking in unknown areas can also put their vehicle at risk of damages due to the unfamiliarity of what is a safe area. Others prefer to pay the higher rates than waste their time searching and to avoid stressing over parking. Some drivers also prefer to rent out parking spaces from other people in order to avoid the stress of searching as it guarantees them a spot. Another common strategy among drivers is asking their friends for advice on the best locations to park and forming carpools to get a lower parking rate. Parking managers manage their spots through some form of ticketing system where they give incoming drivers a ticket indicating where they can park. This can lead to having drivers wait in a lengthy queue as they await their turn without being completely sure if there will be space available.

3. What tasks are desired?

People are interested in being able to find affordable parking in a reasonable location within a reasonable amount of time. As of now, one or more of these factors are prioritized over the others in order to be able to find parking. In addition to this, people are interested in being directed to parking locations instead of the actual destination. Drivers are also interested in being able to locate where they parked their car. Parking lot owners would like to expedite the process of managing the cars using their lots and they would also like to be able to let potential customers know of their availability.

4. How are the tasks learned?

Drivers already have some kind of strategy in finding parking and this design will only build upon it by assisting them in expediting the process. There are some relevant existing technologies like Google Maps or Waze whose use is similar to this design giving them the option to refer to previous experience. Parking managers will be able to draw upon their experiences of ticketing drivers since this design will give them ability to manage the cars in a similar manner but remotely with better efficiency.

5. Where are the tasks performed?

The tasks are primarily performed at the user's destination and while they are in the car looking around for parking spaces. As they are searching they can filter through the suggestions based on their preferences. The parking manager will perform their tasks as the cars are coming in and out of their locations. They can make other drivers aware of the availability in the areas they oversee.

6. What is the relationship between the person and data?

User data is collected as they are driving and parking can be recommended based on their prior parking habits and preferences. Personal location and destination data is stored privately for each user and is not shared. However, user reviews and feedback on previous suggestions and parking availability can be shared among different users. Parking managers can use the reviews and logistics about their locations to let drivers know what their availability is throughout the day.

7. What other tools does the person have?

Most drivers have access to a smartphone with various navigation apps and since self-pay parking is available at several locations around town, most users will probably have various payment methods like credit cards and PayPal. Parking managers will need their spaces integrated with some sort of sensor system to detect the integrated device located in cars.

8. How do people communicate with each other?

Users can leave reviews and share their parking experience and resources so others can find parking more easily. They can also share certain information with their friends in case they are carpooling together or need to split parking costs. Parking managers can keep a real time update of their availability to keep their potential customers aware.

9. How often are the tasks performed?

For people who commute, this is a daily task. This is more common among drivers who don't have a set parking space and instead need to search for a location every time they drive. For some other users, they may only use our product when they go to events as they normally do not drive to campus. This varies among parking managers, but the tasks are usually performed during business hours.

10. What are the time constraints on the tasks?

Generally users prefer to spend as little time as possible to find parking. As expected, people believe that parking should be a subtask to arriving at a location that requires little to no effort. This, however, is not the case which causes the driver to have to plan ahead what their parking strategy will be to avoid being late to their event/destination. Parking managers are also interested in expediting their process of checking cars in and out of locations.

11. What happens when things go wrong?

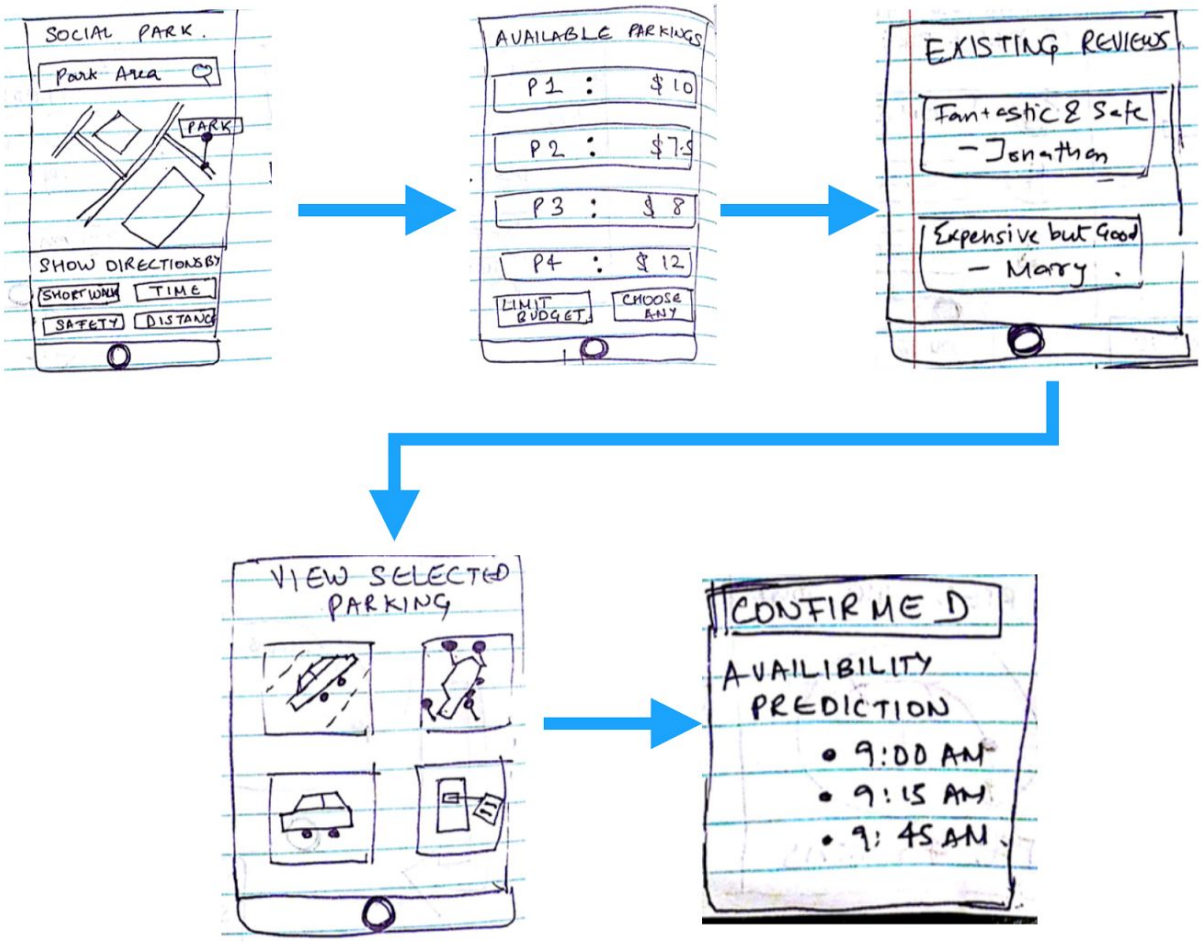
If people cannot find a prefered parking within a reasonable time, they will neglect some of their concerns to park. For example, people will pay more to get to a big event on time. Other drivers will prefer to simply leave the area as they find that they have spent too long looking for a space and they are now too late in arriving to their destination. In the case that drivers are unaware of availability, parking managers may lose potential revenue by not being able to relay this information.

Proposed Design Sketches

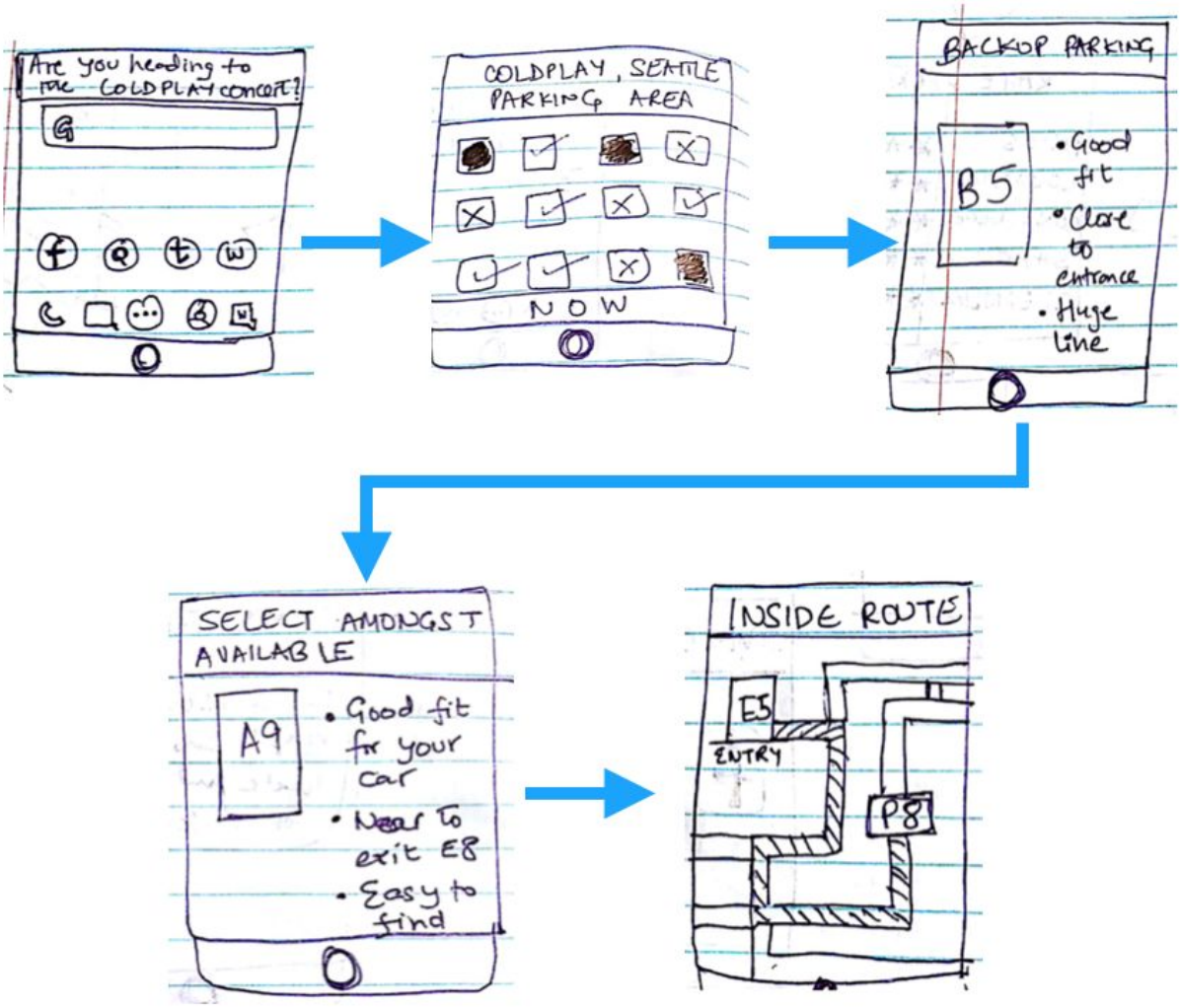
Design Idea #1 - Smartphone App

For this design, we are solely relying on a mobile app as our platform. Since we're focusing in parking around University of Washington, we can safely say most drivers will have access to a smartphone and reliable internet connection. So we consider this to be a good solution for a large number of users. Most drivers have experience using some sort of a navigation app such as Google Maps or Waze, so they will have a good foundation to start using our app with minimal learning required.

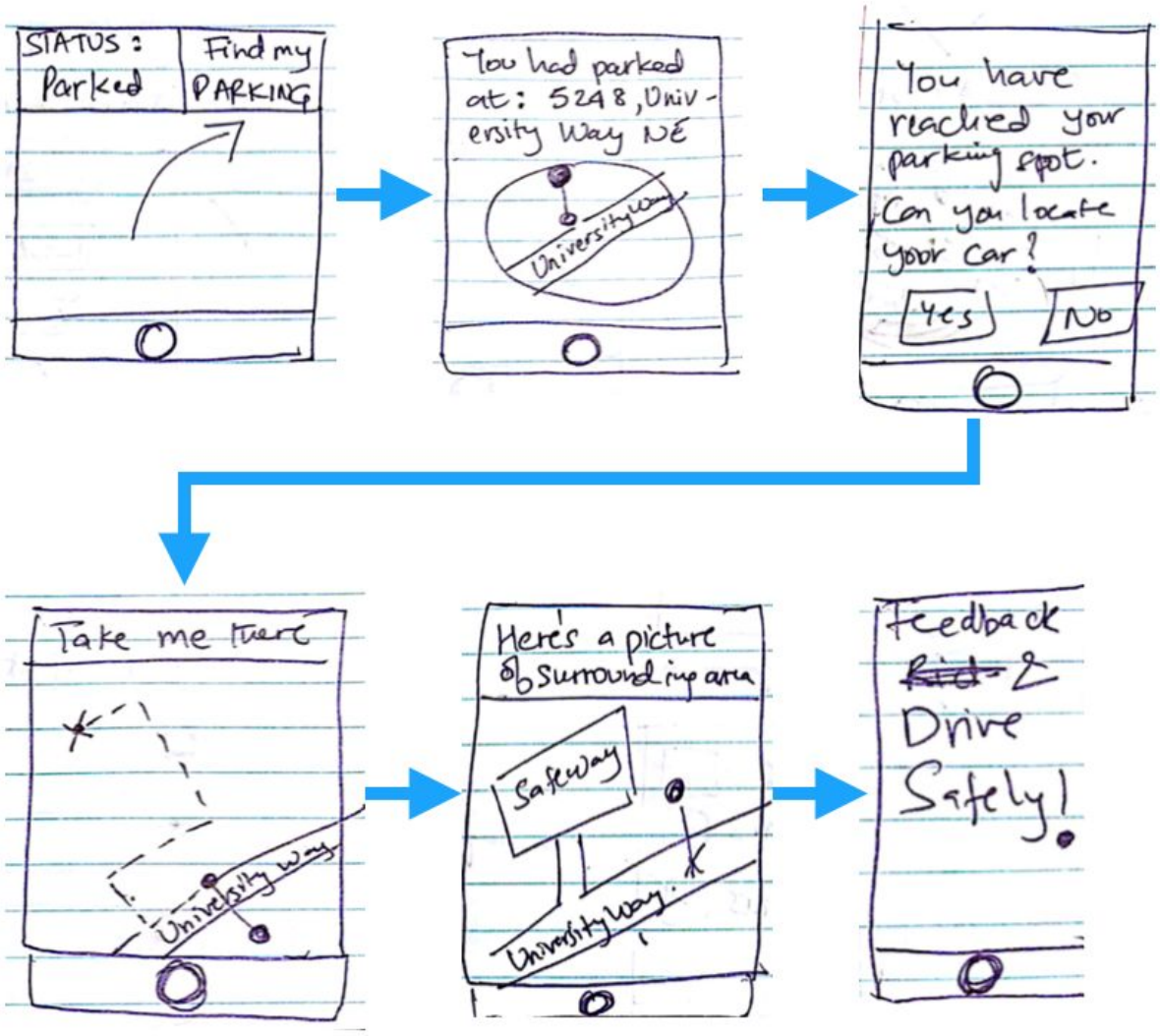
Task #1: finds parking filtered by factors like price, distance, and safety:



Task #3 - parks at big event



Task #5: reports and shares availability data as general parking management
Task #6: finds parked car

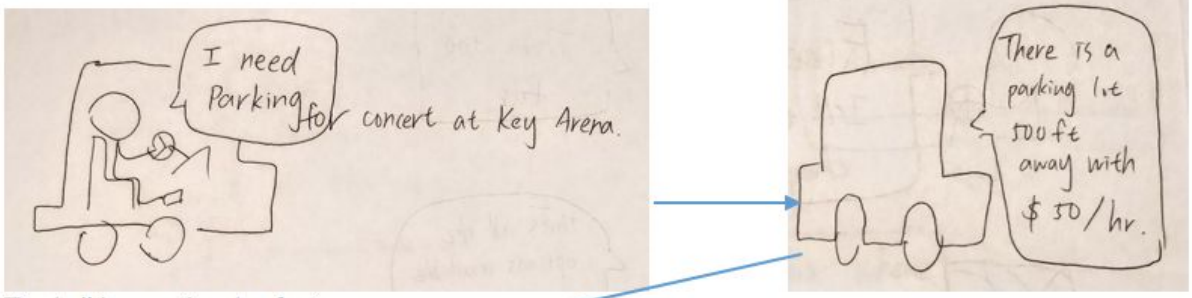


Design Idea #2 - Voice Guidance System Inside the Head Unit

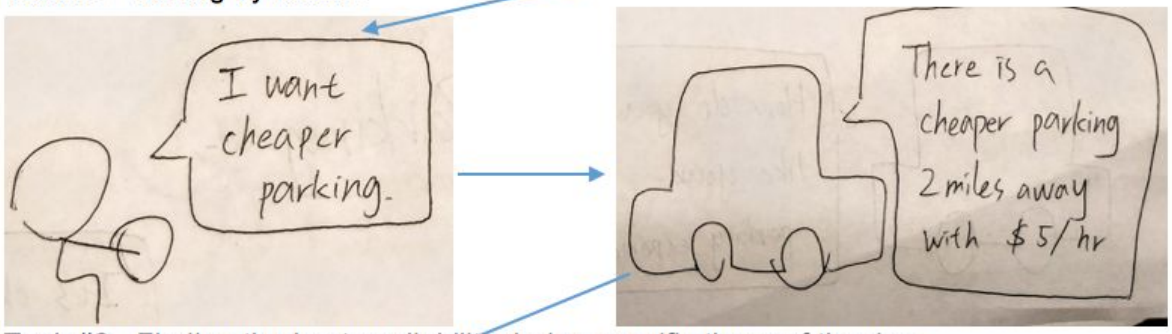
This solution can be implemented in partnership with car manufacturers. Most modern car have a main head unit or control module that the driver can interact with. More expensive cars will also have a screen (sometimes touch-enabled) and sometimes built-in navigation. Incorporating our design into the existing vehicle head unit will allow for a more seamless user interaction. It can potentially be a safer solution compared to a cell phone app because there are no other distractions involved with the head unit (e.g. facebook messages, snapchat notifications, etc.)

In order to make this design work with a larger variety of vehicles (that may not have a screen), we propose a design that is mostly based on voice commands from the driver that are followed by voice guidance from the head unit.

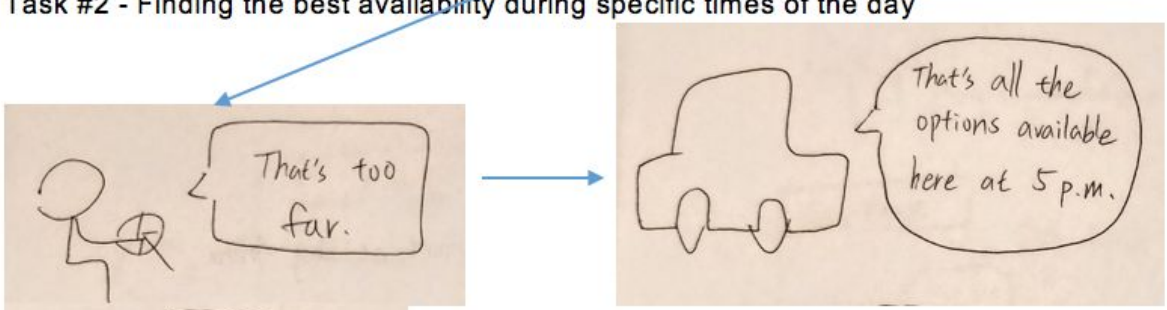
Task #3 - big event parking searching

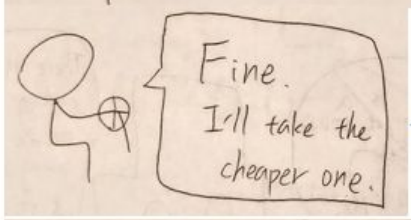


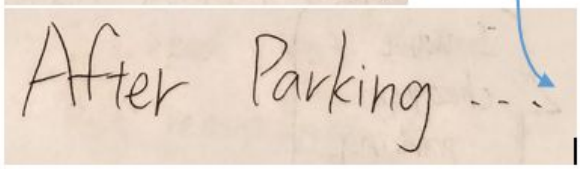
Task #1 - sorting by factors



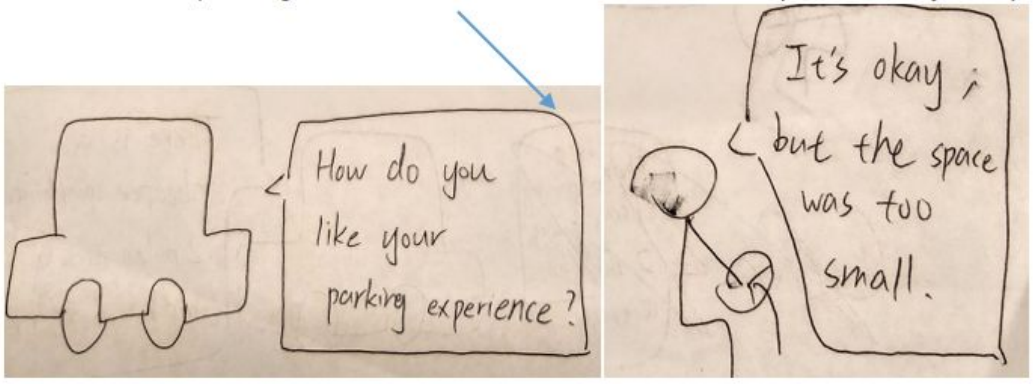
Task #2 - Finding the best availability during specific times of the day







Task #4 - rate parking locations based on different factors (feedback system)

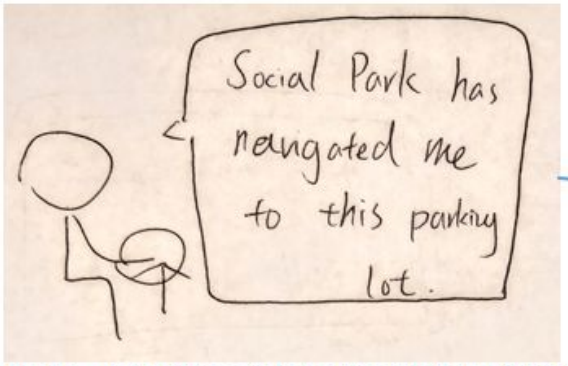


Design Idea #3 - Integrated Parking Assistant

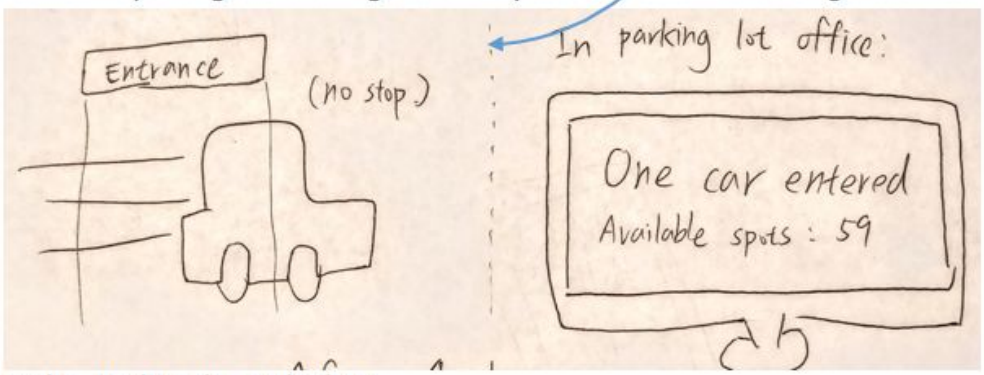
For our third design, we propose a small device that already comes integrated in the car. This device can serve multiple purposes for both the driver and the parking lot owners. For the driver, it can help expedite the process of getting into a parking lot by eliminating the need of stopping when coming in and out of the lot. The device will instead recognize when the driver has arrived at a lot and will also let the parking lot owner know that there is a new car. With this information, the parking lot owner can keep an updated number of available spots. Once the driver has departed from the lot, the lot owner is notified once again, updating the available spots number, and the driver receives a bill with their total for the parking session sent to their phone. The biggest advantage to this device is that because the car is recognized as its own entity, the driver is able to use their phone to track their parking location.

The downside for this design might be that it won't appeal to as many users because not everyone might be comfortable with a device that is always tracking their vehicle information. This was a concern that we came across during our initial interviews as well.

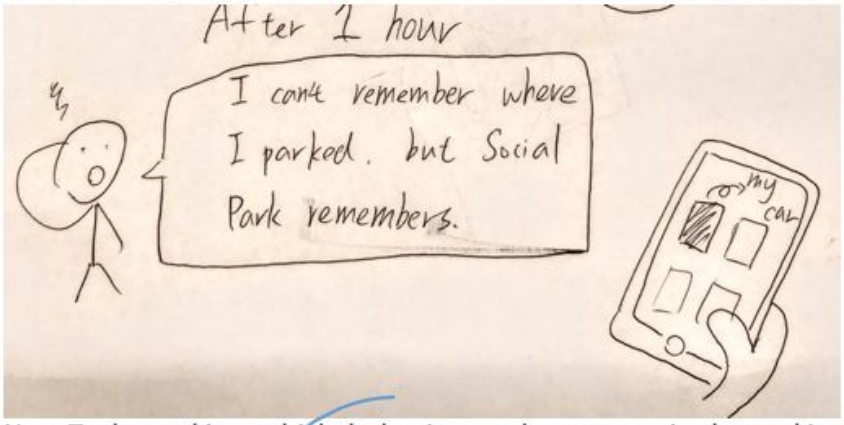
Task1,2,3 – finding parking



Task5 - Reporting and sharing availability data as lot owners using a business accounts



Task6- Finding the parked car



New Task: tracking vehicle behaviors and outcomes in the parking lot

Design & Tasks Decision

In choosing what design we would pursue, we took into consideration the critique we received and we concluded to design a combination of a mobile application and an integrated device in the vehicle. A mobile application would be the most convenient option for drivers. It is the best way for them to be able to easily filter through suggestions based on their preferences. Also, if they prefer to give voice commands, most smartphones already have some voice assistant present that they can use if they would like. The integrated device was included because it is the most efficient way to be able to track a car. With the integrated device in the vehicle, we also had the opportunity to consider the business aspect. While the device can help direct the driver back to their vehicle, it can also help the parking managers administer the cars more efficiently. This made the decision of tasks quite simple. During interviews and critiques, we found the main objective of this design should be to assist the driver in finding a location based on their unique preferences. This is what ultimately made task 1: filtered parking suggestions a priority. The other task we decided to include was the managing of parking locations more efficiently to share availability because it was an alternative way to use the integrated device from a business aspect perspective.

Written Scenarios

Senarios #1

Task 1: find parking spots filtered by different factors like price, distance, and safety

Sam arrives in the destination in Seattle downtown area. However, all the street parking around him is full, so he decides to open the SimPark mobile application to help him find parking near his current location. As Sam always tries to save money, he chooses to sort the finding result by price. Unfortunately, the cheap parking is too far away, and he doesn't want to walk for long distance. Hence, he decides to sort the searching by distance to find a parking with reasonable price and distance. He find one that meets his need based on the information shown in the app. Eventually, he parks well, and he decides to leave a review for this parking space for other user experience.

See storyboard #1.

Senarios #2

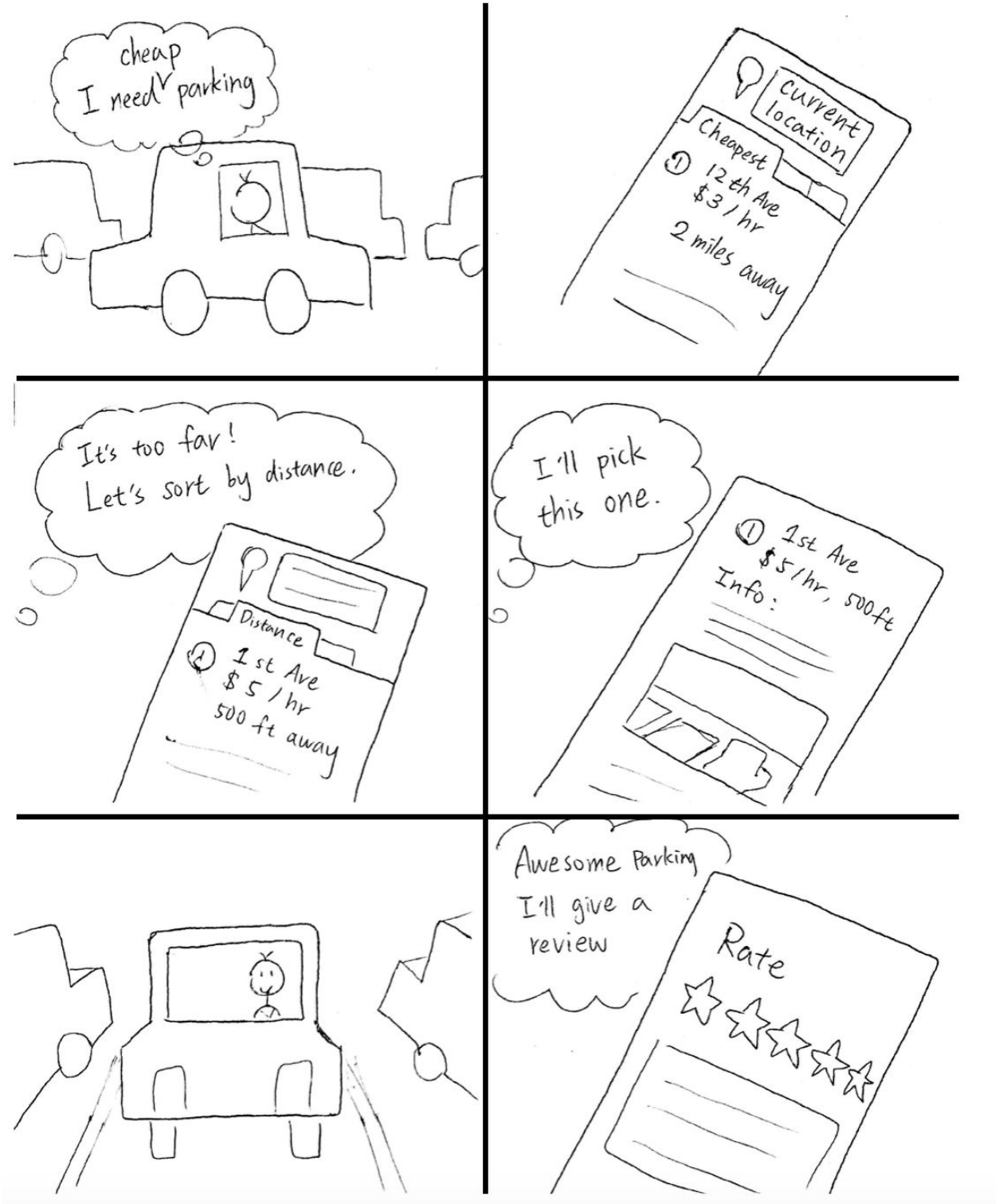
Task 2: empower parking management

Justin is going to park in a giant public parking lot. With SimPark device installed on his vehicle, he can enter the parking lot smoothly without pausing at the gate. While he is entering, the sensor at the parking lot senses his vehicle and sends the entering vehicle's information to the parking data office. Justin is bad at parking, and he parks across two parking spaces this time. The parking data office detects Justin's vehicle is not parked well, so it contacts Justin to repark. After an hour, Justin is ready to leave. As before, he can leave the parking lot directly, because the sensor senses his vehicle is leaving. The parking fee is calculated automatically and is charged and paid via SimPark app.

See storyboard #2.

Storyboards of the Selected Design

Storyboard #1



Storyboard #2