IUPark

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Problem Statement

With over 48,000 students and 2,000 faculty members living within the vicinity of Bloomington's campus, finding a parking spot on campus is like finding a needle in a haystack. It's even more difficult for those who are limited to a certain type of parking permit, or trying to find free or meter parking around popular areas. For our final project, we chose to design an app that identifies and locates parking spots around campus for those who can't find them. The idea was inspired by our own personal struggles with finding parking along with that of our peers. Our goal is to provide a beneficial impact on students, faculty, and visitors of Indiana University Bloomington by reducing the stress and impatience of not being able to find parking and also by helping them avoid hefty parking tickets.
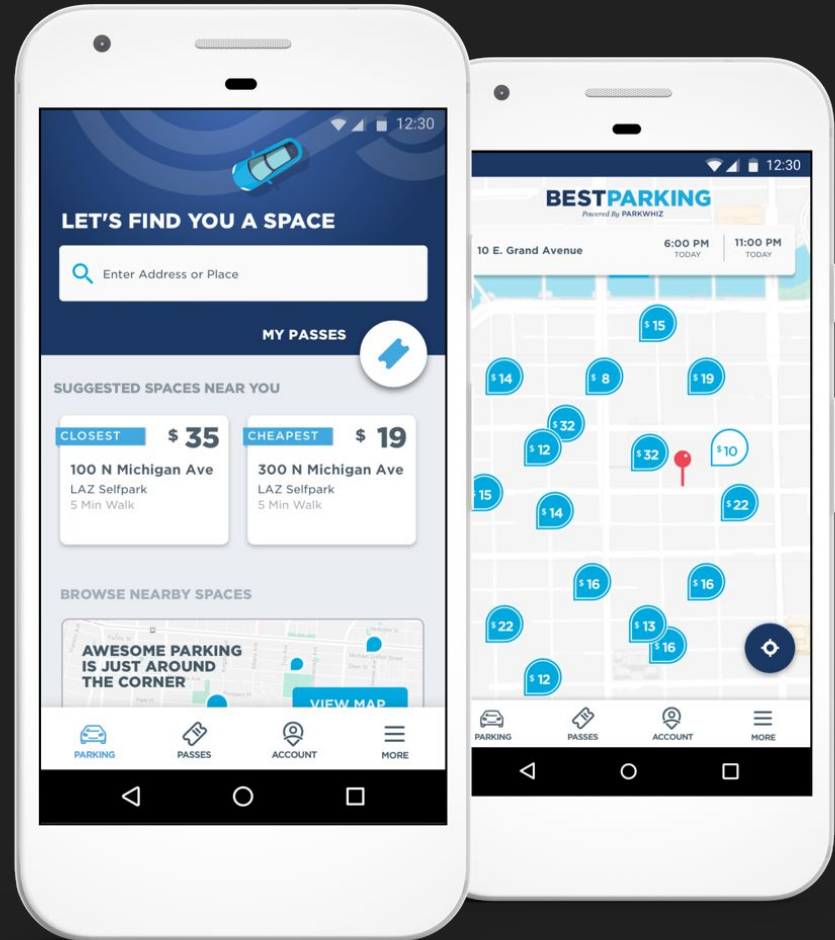
Primary Research

We asked a couple of students about their current issues with parking on campus and their ideas for solutions.

NAME	ISSUE	POSSIBLE RESOLUTION
Chris C.	Can never find out which lots around campus accept which parking permits. Searching online is usually no help.	Have more noticeable and more overall parking permit signs. Have a distinct website or page on IU's website that lists lots and permit types.
Matt F.	Has trouble finding out which lots allow for free parking, which lots cost how much, and which times parking is available in certain lots.	Release posters or a website that details all prices, location, and hours of different lots across IU's campus.

Secondary Research

- After researching several parking apps to compare and contrast with our ideas, we found an app called **BestParking**. BestParking is an app that locates parking spots within the user's area. It allows users to search for parking spots by price to find the best spot for the cheapest. Overall, it saves users time and money when it comes to finding open parking in nearby areas.

Secondary Research

- Another parking app we researched was an app called **Parker**. Similar to BestParking, Parker allows users to narrow down their parking preferences by price and location. Users will be able to locate parkings spots from lots to streets to garages. Also, Parker has a built in timer in the app to remind users of how much time they have before their vehicle will be ticketed or towed.

Persona #1

Mike McCown

Goals
- Find free parking near the food court that I work at
- Know if and where parking is available to save time
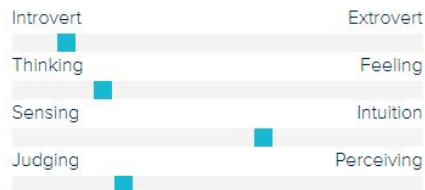- Not be ticketed for not understanding complex parking rules

Frustrations
- Not being able to locate open parking spots quickly
- No way of knowing where close, free parking spots are without searching around
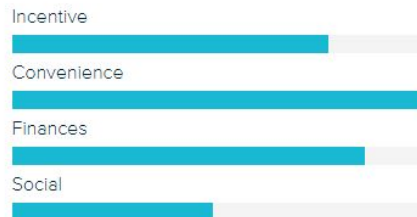- Receiving parking tickets after believing I parked legally

Bio
Student at Indiana University who is also employed on campus at one of the food courts. I currently live off campus and must commute to campus every day for work and class. It is often impossible to find open spots that I am allowed to park in on-campus anywhere near my job. I keep receiving parking tickets as well, making work very difficult and parking very expensive.

"I want to be able to park with confidence that I will not find my car with a parking ticket"

Age: 20
Work: Student, IU Dining
Location: Bloomington, IN
Gender: Male

Personality

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Motivation

Incentive
Convenience
Finances
Social

Persona #2

Kathy Reed

"Parking problems should never interfere with my occupation"

Age: 36
Work: Professor of Informatics and Computing at Indiana University
Location: Bloomington, IN
Gender: Female

Goals

- Instruct students without having outside factors interfere
- Find open, free faculty parking spots around campus that are in close proximity to my different class section locations
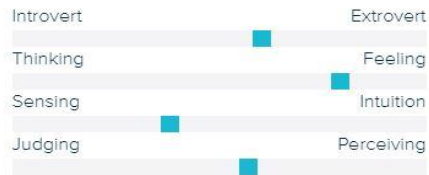- Quickly find parking spots to ensure I will never be late to my class

Frustrations

- Difficult to find parking in various locations around campus as it is hard to know which lots have employee parking without driving through them
- Commonly used parking spots are sometimes full, making finding another open spot tedious and time-consuming
- Have been late to meetings and classes due to not being able to find a parking spot and not being able to plan for it

Bio

Motivated professor of Informatics at Indiana University who loves educating the future of our country. Pride myself in always being on time and trustworthy, but have had issues trying to locate available parking spots at Indiana University. I hope to eliminate outside factors, such as parking, that interfere with me carrying out my work.

Personality

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Motivation

Incentive
Convenience
Finances
Social

Persona #3

Cheryl Sims

"I love visiting my son at Indiana University but am sadly deterred."

Age: 45
Work: Store Manager at Target
Location: Indianapolis, IN
Gender: Female

Goals
- Visit my son at Indiana University when I want to without any worries
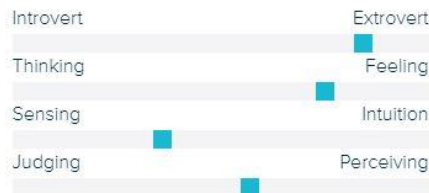- Be able to park in Bloomington without fear of being ticketed or towed

Frustrations
- Receiving tickets almost every time I visit Indiana University
- Not knowing where to park every time in Bloomington, especially if not a weekend
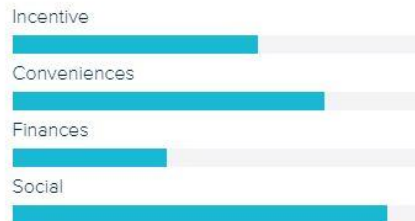- Many parking spots are very expensive to park in around campus

Bio
I am the proud mother of my son who attends Indiana University. I find a lot of free time off of work to visit Bloomington and I love it. Unfortunately, I am often hesitant because it can be such a hassle to find free parking on-campus or even nearby.

Personality

Introvert — Extrovert
Thinking — Feeling
Sensing — Intuition
Judging — Perceiving

Motivation

Incentive
Conveniences
Finances
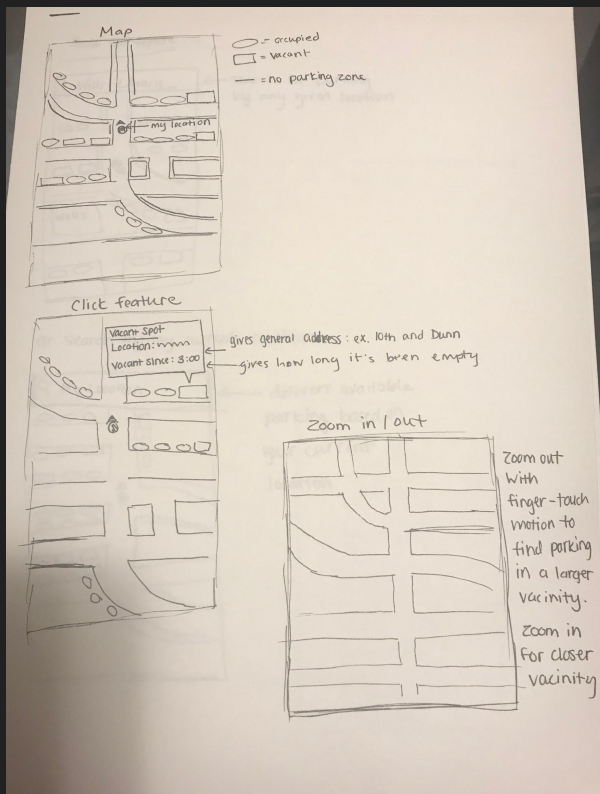Social

Initial Sketches

Figure 1: Initial sketch of in-app location feature and zoom feature that didn't make it in the final prototype
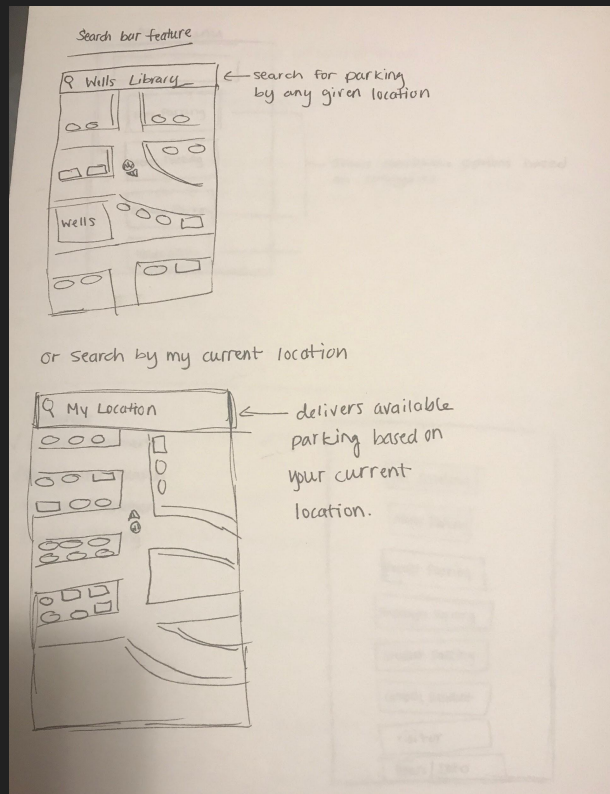

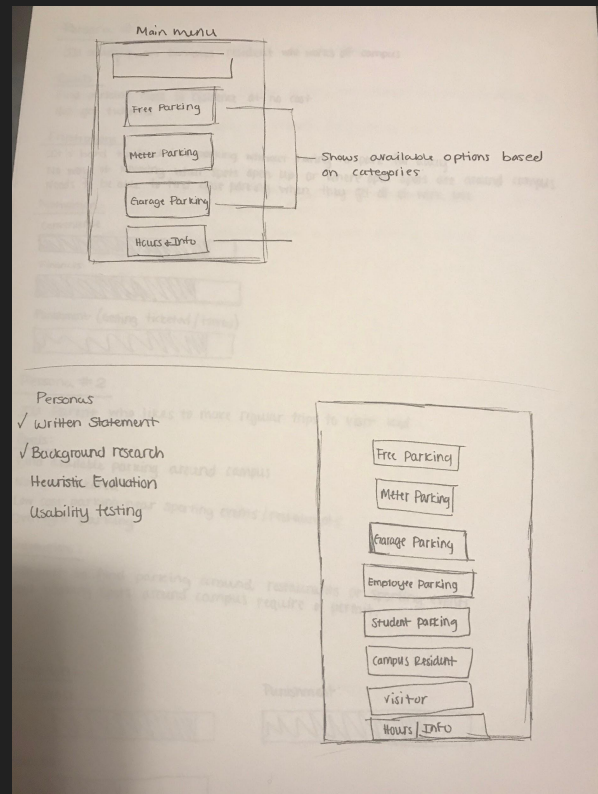Figure 2: Initial sketch of additional in-app location features

Figure 3: Initial sketch of menu feature

Wireframe Outline

While other parking apps color code their indicators based off of the type of parking available, we decided that having a menu that filters out different options would be more intuitive and less cluttered.

Incorporated search bar from Best Parking.

Similar to Parker and Best Parking, our app has indicators that show where parking spots are.
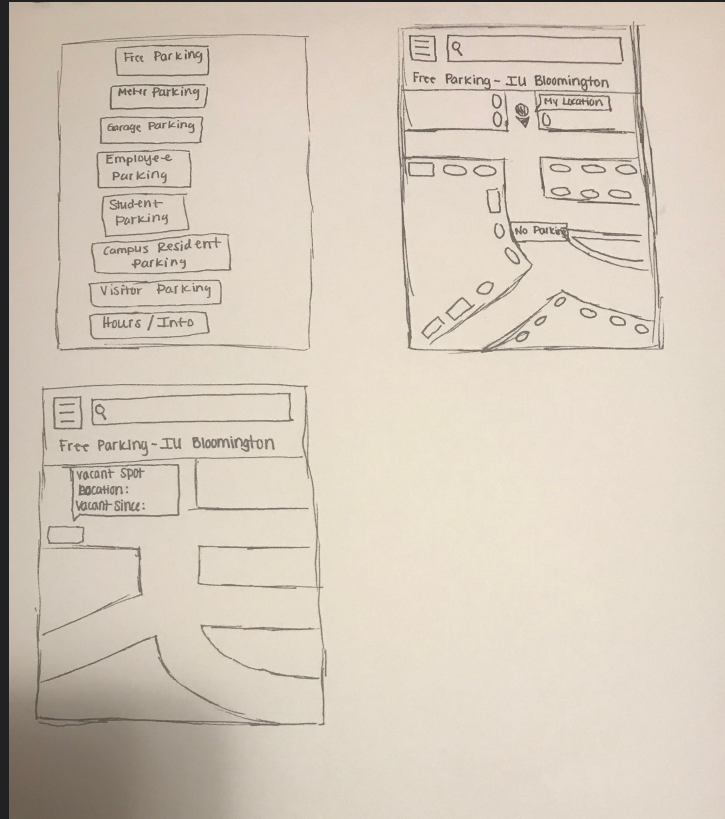
Figure 4: Wireframe outline of in-app concepts.

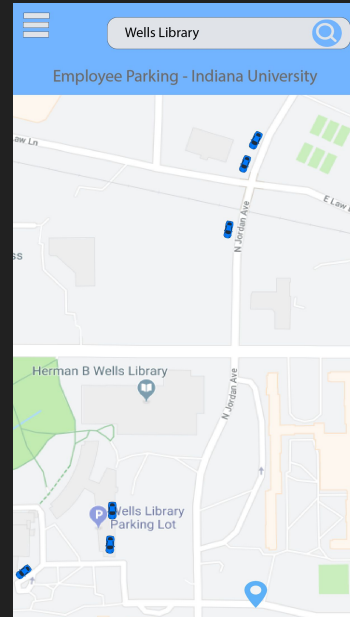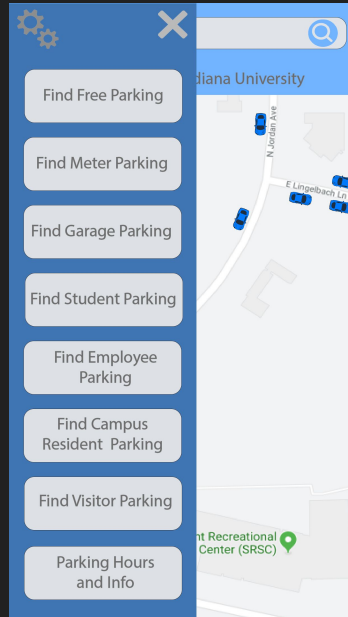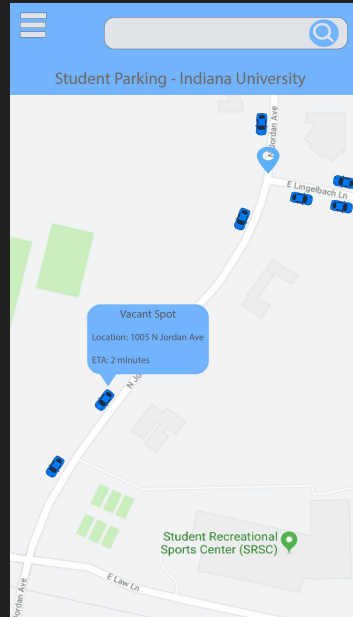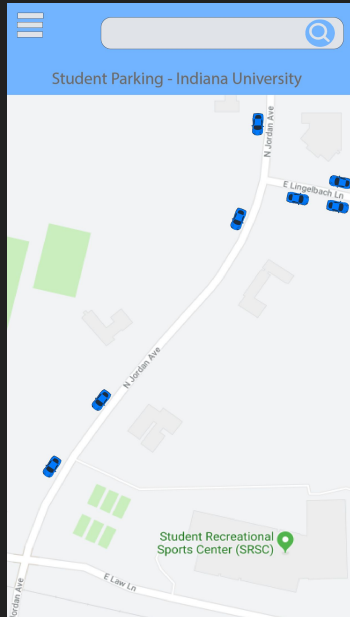# Original Prototype

For initial usability testing, participants were given an interactive prototype with the following pages. Beginning on the student parking page participants were asked to find an employee parking spot in the Wells Library parking lot and were instructed to find out how far it was from their hypothetical location.
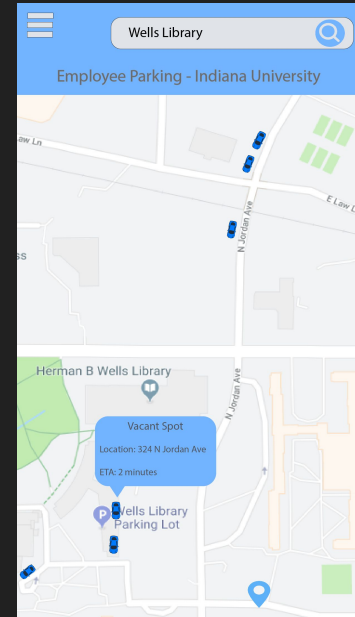
Heuristic Evaluation (Before Final Design)

Part	A-F Grade	Findings	Recommendations
Aesthetics	A	Our app was pleasant to look at and engaged users through colors and real world characteristics	Use only necessary, non-distracting colors and make sure users know what is what
Functionability	B	Some pages would not allow users to go back and some buttons would not bring up the desired page	Update prototype to make buttons accurate and pages returnable
System Real World Accuracy	A+	Our app relates to the real world by using GPS and using realistic images to portray details	Continue to use realistic looking cars, walkways, and buildings to relate to real life

Usability Testing Findings

Question/Task	User 1	User 2	User 3	User 4	User 5	User 6
Use the application to find a parking spot in the Wells Library parking lot	User 1 had some difficulty as she tried to use the search bar and zoom in and out of the app, needed direction where to click, didn't understand the cars meant open spots.	User 2 didn't know how to find it immediately, needed direction on what to click.	User 3 tried to click on the wrong link ("hot spot") first and then got it.	User 4 had no issues finding the student parking, but was confused as the SRSC was clearly marked while Wells Library was not.	User 5 only had difficulty when she was unsure of if the map was located at Wells or not.	User 6 started asking questions (not entirely self-evident at first), and then found the parking spots easily.
Use the application to find how far away the parking spot is from you	User 1 didn't understand she had to click on the car to find the distance, wasn't "obvious" enough.	User 2 knew to click on the car, had less difficulty than user 1.	User 3 easily found out the distance of the parking spot.	User 4 easily found the distance of the parking spot by clicking on the car.	User 5 had no difficulty finding the distance of the parking spot.	User 6 could immediately find the distance of the parking spot.
Use the application to find available staff parking	User 1 found available staff parking easily after I gave her direction of how to find student parking.	User 2 found available staff parking easily after initial difficulty finding student parking.	User 3 had no difficulty finding available staff parking.	User 4 also had no difficulty finding available staff parking.	User 5 found staff parking easily.	User 6 had no difficulty finding available staff parking.

Usability Testing Findings

Question/Task	User 1	User 2	User 3	User 4	User 5	User 6
Would you use this application to help you find parking spots throughout campus? Would this application be effective in doing so?	"Yes I would use this application to help find parking spots throughout campus. With a more developed app and more obvious parking spots, this could be more effective."	"Yes I would use this to help me find parking throughout campus. It was an effective and helpful app after I played around with it for a little."	"Yes I would definitely use this app to find parking. I think it would be effective in doing so."	"Yes I would use this app, but I think that with improvements it could be more effective."	"Yes I would use this and I also think it is really effective and helpful once you explore a little bit and find out what the icons mean and where the pages take you."	"Yes, once I figured out how to use the app correctly, I thought it would be really helpful and applicable to the needs of students."
Are there any features that surprised you?	"I was surprised to see that you guys could track garage parking, because I wonder how you would keep track of that."	"No,I liked the map background so that I can see the road and how far away the spot is."	"No, nothing surprised me, I feel like everything was thought through really well."	"There weren't any features in particular that surprised me, but I was a little confused that the car icon signaled an open spot."	"No I wasn't surprised by anything, it felt really well organized."	"No I wasn't particularly surprised by anything, but I was slightly confused by all of the different types of parking at first. Would the student parking be free also?"

Usability Testing Findings

Question/ Task	User 1	User 2	User 3	User 4	User 5	User 6
Were there any expected features that could not be found in the design?	"The only thing I could think of is how I can't see past one street, it would be nice to be able to move around and interact with the map."	"No nothing seemed to be missing from your design. There was multiple types of parking to choose from on the menu which I liked a lot."	"I can't think of anything that would be missing. It seems like everything is covered."	"No, nothing seemed to be missing, but on the map, I was confused on why the SRSC was marked while Wells Library was not. Maybe if the maps included more major campus buildings, it would be even more helpful."	"No, I think the app does a good job of covering every type of parking that I could possibly want to search for."	"Nothing is missing, but I would like if I could move around on the map a bit more."
How would you describe the feel of the application?	"It's obviously very new because there were only certain things I could look at, but if it were more interactive I think it would have a lot better feel."	"The app feels very simple and easy to use after messing around a little bit."	"It's simplistic and makes parking more accessible, so it's definitely a helpful app."	"I think It gives off a clean feel, and is very organized."	"The whole application was very well organized and I appreciated the physical maps, while I wish I could drag/zoom to get a better visual of where I am on campus."	"I felt that the app was really clean and easy to use after I got through the confusion at the very beginning."

Usability Testing Findings

Task related summary:

- After reading over and analyzing the task related portion of our usability testing, it became apparent that most users needed some initial direction on what was the correct option to click (once clicking on the hamburger menu). This tells us that we need to make our application more intuitive to the user, in terms of what pages take them where. After receiving a little direction, users had no issues finding staff parking; however, we hope to further iterate our application so that no direction is necessary.

Usability Testing Findings

Post-test questions summary:

- It's clear that each user felt this application would be helpful and effective in helping them find parking on campus. Because there is no existing app that helps students find campus parking, we hope to make our next iteration of the app more interactive and intuitive in order to limit confusion due to this concept being something most users have not experienced before. It came to our attention that the main issues stem from the level of usability/interactiveness of the map. Users want more campus buildings marked, as well as zoom/drag features included to allow them to search around for more spots. Moreover, while users enjoyed the simplicity and conciseness of the app, we hope to eliminate any primary confusion they experienced.

Interactive Prototype

After gaining feedback from the usability testing phase, we produced the following improved interactive prototype.

https://invis.io/S5PBJI1M49N#/334555573_Parking_App_11-01

Design Rationale
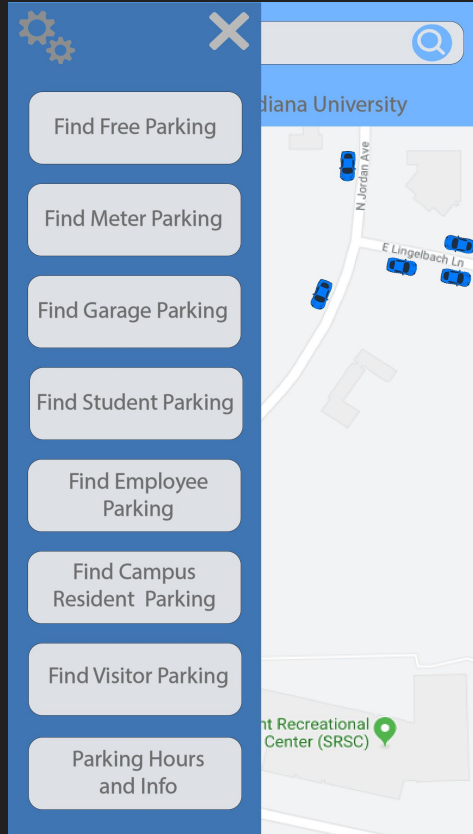
"Keep the noise down to a dull roar" - Steve Krug, Don't Make Me Think Revisited

We created a menu that filters parking spots based on different types of permits. This follows Krug's design principle of cutting down the clutter on a page. This method of organization also prevents users from accidentally parking in the wrong type of spot and risking getting a parking ticket.

Find Free Parking

Find Meter Parking

Find Garage Parking

Find Student Parking

Find Employee Parking

Find Campus Resident Parking

Find Visitor Parking

Parking Hours and Info

Indiana University

N Jordan Ave

E Lingelbach Ln

Recreational Center (SRSC)

Example: The crowdedness of the Parker app is confusing, disorganized and isn't very pleasing to look at.

Carrier 1:38 PM

Parker

$3/hr Meter
Maximum 1 hr

Google

Find Park

Design Rationale
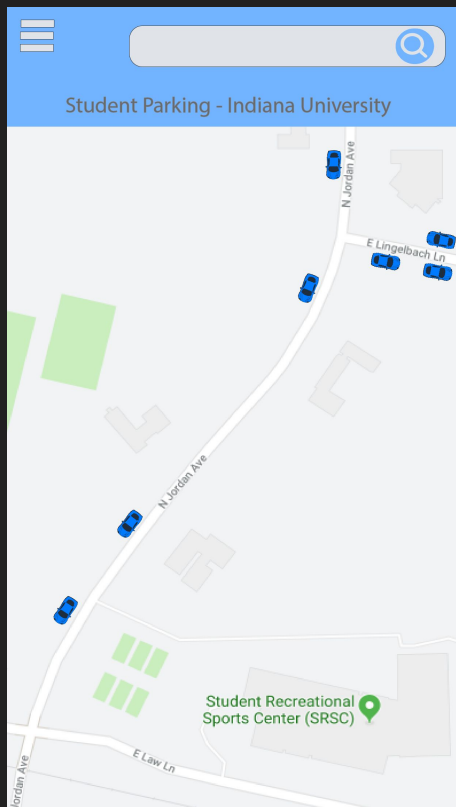
In an additional effort to keep the clutter to a minimum, we placed cars to indicate available spots, as opposed to indicating spots that are already taken. This decision was made because it's much more intuitive to indicate an open spot to someone who's simply glancing at the app as opposed indicating taken spots and forcing users to search for an open spot between the cars.
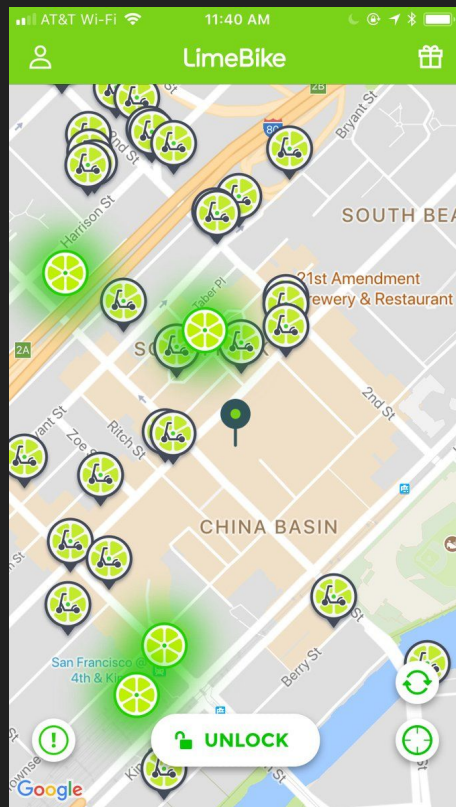

This decision was inspired by the Lime app, which has scooter icons that indicate where available scooters are.

Design Rationale
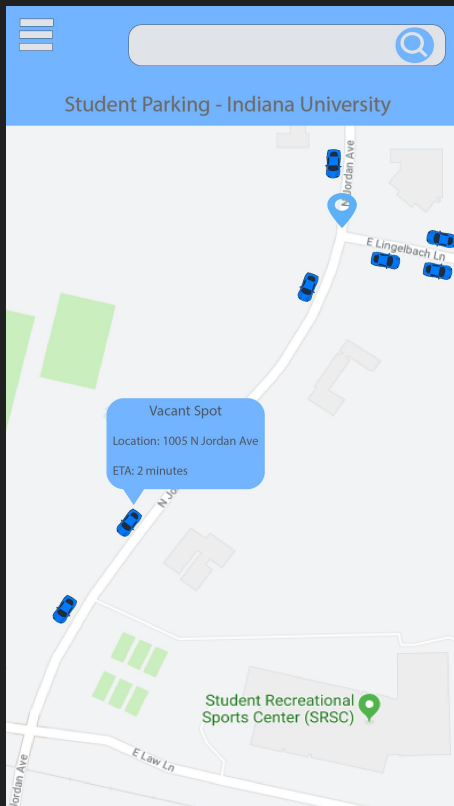
Users can click on each parking spot indicator to learn more information about it, this is reminiscent of the Lime app, where users can click on a scooter which triggers a pop up speech bubble that lists critical information about the scooter. In our case we give the approximate location and give an ETA of how far it is from the user's current location. This decision was meant to help users locate the spot they're looking for smoothly and efficiently.
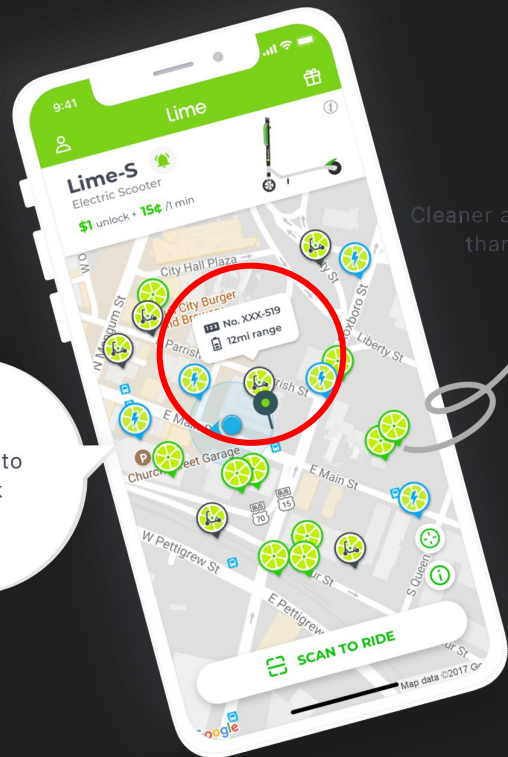
Design Principles

- **Balance**: Our buttons are evenly distributed with the interactive parking map taking up majority of the screen, making it the main focus of the design
- **Proximity**: The search bar is placed above the map but in the header with the menu button, showing users they can search any location and it will then show it on the map
- **Alignment**: The buttons in the navigation menu are aligned and the same size, creating an organized way to navigate the application
- **Repetition:** Each parking screen is recognizable with the reoccuring map and search bar, no matter what type of parking the user is looking for
- **Contrast:** The navigation menu is a different color and slides in from the left, telling users it is not part of the rest of the screen, but its own feature
- **Space:** Negative space is used in the menu to prevent the design from becoming cluttered

Future Works/Implications

- For future development, we would like to incorporate zoom features and being able to navigate smoothly across the touch screen map, which was a feature that a lot of usability testers were looking for.
- We would also like to implement a map feature that gives users live directions on how to get to their parking spot of choice (Similar to Waze or Google Maps).
- Additionally, we think users who utilize metered parking would greatly benefit from having the ability to keep track of their meter time and add additional time from their device.
- If possible, we would also like to incorporate a feature in the future that allows users to reserve their desired spot until they arrive to assure their spot is not taken by another user. This would require a higher usability and interaction level of the parking meter. For example, if a user wanted to reserve a metered spot, they could pay a base fee to keep the meter "locked" until they confirm on their app that they have arrived to the spot and are the one parking there. If another driver tries to pull in, the meter will be unable to "unlock" or receive money and will remain flashing, forcing them to find another spot or risk a parking ticket. To keep things fair, we would only allow parking spot reservations to remain valid until a certain amount of time has passed (say, 20 minutes), until the meter becomes "unlocked" to the public.