

Design Alternatives & Initial Evaluation Report

Navya Gupta, navya.gupta@mail.utoronto.ca

Alana Hodge, a.hodge@mail.utoronto.ca

Aonushka Aeron, aonushka.aeron@mail.utoronto.ca

Vijayalaxmi Hiremath, viju.hiremath@mail.utoronto.ca

Mohamad Hamdy, mohamed.hamdi@mail.utoronto.ca

Artem Albert, a.albert@mail.utoronto.ca

March 16th, 2020

CSC 318: Designing Interactive Systems for Users

TA: Zichong Lu

Executive Summary

As a group, we set out to implement the results and discoveries found in our field studies in our solution's design as efficiently as possible. We considered multiple design options as a group over the course of multiple brainstorming sessions, and using the feedback that we gathered from each initial design sketch, we iterated over our designs to eventually settle on our current low-fidelity design, which we describe in this document. We believe this design is able to address the needs of our users and the complex solution that is needed for their rather complex problem. This document consists of two low-fidelity prototypes of this interface; one paper prototype of the interface and a collection of storyboards of the different tasks that can be supported by the system.

Table of Contents:

Design Alternatives.....	3
Paper Prototype of The Current System Design.....	6
Storyboards of the Current Design.....	10
Evaluation of The Low-Fidelity Prototype.....	13
Lessons Learned and Implications for Design.....	22
Appendices.....	24

- 1. Design Alternatives (Sketches)
- 2. Paper Prototype
- 3. Storyboards
- 4. Think Aloud Video Links
- 5. Group Evaluations Table
- 6. Lessons Learned Figures
- 7. Who Did What - A Breakdown

Design Alternatives

The sketches can be found in Appendices, as the document “1. Design Alternatives”.

Design Concept 1

This concept comes in the form of an app that uses a gyroscope and a compass. When the user's car is parked, the app senses it and marks the user's status as “parked”. It then starts tracking the user's steps as they walk into the shopping mall and walk around. When the user wishes to get back to their car, the app then backtracks and traces the user's steps. It shows the traced out path back to the car and syncs the user's steps back to it.

Advantages

- User friendly
- Does not require GPS or any network services. Only requires a gyroscope and compass.
- It can track elevation (e.g. stairs, elevator) in the Z plane - whereas a regular GPS app would track in only 2 dimensions
- Nature of data collection allows for the app to calculate features based on your own steps (e.g. can calculate how long it will take you to return, etc.)

Disadvantages

- User has to exit from the same entrance that they entered from.
- Parking sensor issues (parked vs stopped).
- Could be inaccurate.

Informal feedback

- Worries about inaccuracy.

Design Concept 2

This idea uses screens that are stationed at every entrance. Every parking spot is marked as well and the user saves the spot identifier under their name at the screen. When the user is done with their shopping and wishes to go back to their car, they just search up their name at the screen and it displays directions from the current entrance to the car. The user can take a picture of the directions and use it to get to their car.

Advantages

- Easy to use + User friendly
- Unique idea (with no known competitors)
- Does not require smartphones or active participation (no app interaction when you park, when you want to leave etc)

Disadvantages

- Multiple people using it at the same time (may cause line-ups)
- Users might forget the directions - back to the root problem
- Might be cost inefficient for parking lot owner/store
- Requires spots to be marked

Informal feedback

- Concerns about hygiene. People might not want to touch the public screen.
- Seems tedious.

Design Concept 3

This idea requires three things: every parking spot needs to be marked by an identifier/parking spot number; a screen at every entrance that users can operate; an app that is QR code friendly.

A user would park his car and take note of its spot number. He then would go to an entrance and then enter the spot number on the screen at the entrance. The screen would then display a QR code according to the spot number. The user must scan that code on the app. Then he may go about his shopping. When coming back, he can exit from any entrance. He must then scan the QR code at the screen at whichever entrance he is at and the directions to his car will be sent to his phone. He then can use the directions to get to his car.

Advantages

- Identifiable Markings
- Doesn't require real-time tracking
- Navigates user from exit to parking

Disadvantages

- Every parking spot would have to be marked and tagged (cost inefficient and time consuming)
- Not accessible to non smartphone users
- Limited accessibility options for certain demographics (i.e. elderly people)

Informal feedback

- A lot of QR code requirements. Could be redundant.
- Cost inefficiency concerns.

Paper Prototype of The Current System Design

PARKEEE is a parking assistance app for mall shoppers. Shoppers who wish to find and locate parking can sign in to the app and select the mall that they parked at. Once selected, shoppers can save their parking spot number and position in the app and enjoy their shopping experience.

When they are ready to leave, they select the “leaveee” option in the app, and let PARKEEE know which mall exit they are at or near to. PARKEEE then gives the shopper directions back to their parking spot, either through written directions or an interactive map, as per the shopper’s personal choice.

The Paper Prototype can be found in Appendices, as the document “2. Paper Prototype”

The Design Features

Users are able to sign up for an account with PARKEEE in order to save their mall location history. This makes it easier for shoppers to utilize the app when they are visiting a mall that they’ve been to before; they don’t need to search for and select the mall when it is already in their history. This feature is intended to make using the app as efficient as possible.

Users are also given the option to view their directions back to their parking spot as either an interactive map or as written directions. This design feature was intentionally implemented so as to communicate information in a natural way for the user to use. Some users tend to prefer a visual map, while others prefer written directions and steps, and this design feature is meant to ensure that users can utilize and understand the information as much as possible.

Within the written directions, the Users are able to see the number of steps they need to take in that particular direction in a given step, denoted by a specific number of ‘e’s (i.e. if there are four steps between their current position and the next directional instruction, the User will see four ‘e’s). This design feature is part of the aesthetic and minimalist design of the system, and is intended to communicate the number of steps to take in one direction, so that the User has an accurate representation and visibility of how far and how much action is required to return to their parking spot.

The Users are also able to enter the designated shopping mall entrance/exit that they are currently at or near, in order for the app to direct them from that exit to their parking spot. This design feature was implemented to avoid the need for user’s to return to the exact place that they entered the shopping mall from, which aids with user flexibility and freedom. This feature allows for the user to have an accurate view of their location compared to their parked car, in order to match what they see on the app to the real-world around them, and to potentially have an easier and more efficient route back to their car as a result.

Advantages of the Design

The prototype’s design has multiple advantages. For example, the users are not required to be at a particular mall entrance/exit in order to get directions back to their parking spot. Thus, they are more flexible in when and where they use the application, and the information that the application gives them is more accurate to their immediate location.

Furthermore, this application design is able to communicate directions in multiple forms (interactive map versus written directions) to ensure that users are able to access information in the method that’s most effective for them. Having this design feature also means that the

application could potentially support other directional instruction types in the future, depending on user demand.

Additionally, the application features a minimalist and aesthetic design. Only the necessary information is presented and visible to the user for ease of use, and for user-friendliness. As a result, the application is less confusing to use and understand for first time users.

Finally, as per our usability studies, the application is simple and easy to use overall. This allows for more users to use the app without issue, and errors will thus be quickly spotted when necessary, because the simple design allows for information to be relayed effectively.

Disadvantages of the Design

The design's features do present several disadvantages that may be remedied as the fidelity of this prototype is increased. First, the design requires that shopping malls be registered with the system, and each individual parking spot in the shopping mall parking lot be pre-marked and registered as well. This would theoretically require a lot of resources, specifically time and a potentially high cost.

Second, the entrances of the shopping mall would have to be similarly marked and registered into the system. While one can assume that most if not all shopping malls have clearly marked and denoted entrances, loading these into the virtual “profile” for the shopping mall in the system would also be time consuming.

The design also currently has no way to indicate to the user which exit is recommended from where they currently are. For example, even though they may be close to exit A, the reality is that the closest exit to their parking spot might actually be exit D. As a result, the app will give

them directions from exit A to their parking spot, even though the journey to exit D and then to the parking spot might be more efficient. This is a disadvantage for users, as it limits the efficiency of returning to their parking spot and car.

Storyboards of the Current System Design

**All five (5) storyboards can be found in the Appendices, as document number 3.
“Storyboards”**

**Note: Each number underneath the corresponding storyboard represents its own sketch
within the Storyboard.**

Storyboard #1: User arrives at a mall they have never been to, and they would like to use the app to remember their parking spot.

- 1) User finds a parking spot and parks the car.
- 2) User already has account created, so they tap the add button
- 3) Search for the mall and add it
- 4) User exits the vehicle and finds the parking spot number to input into the app.
- 5) User inputs parking spot number into app.
- 6) Proceeds to go shopping

Storyboard #2: User completes the shopping experience and would now like to return to their vehicle from inside the mall.

- 1) User visually searches for the closest exit to begin the navigation process.
- 2) User arrives at exit and looks at exit number
- 3) User opens the app and it automatically asks if he would like to leave, they choose yes.
- 4) App asks for the Exit number and the user enters it.
- 5) Map is shown on screen, leading the user to the designated parking spot.
- 6) User finds the car and goes on their merry way to wherever they came from.

Storyboard #3: User arrives at a new mall but the mall is not yet registered with our directory.

- 1) User finds a parking spot and parks the car.
- 2) User already has account created, so they tap the add button
- 3) Search for the mall and it does not exist.
- 4) App will show a prompt thanking the user for adding a new mall to our directory.
- 5) In the background it adds it and starts tracking the user's oath in order to learn the mall's parking lot.

Storyboard #4: User arrives at a mall that they have already saved, and they would like to use the app to remember their parking spot.

- 1) User finds a parking spot and parks the car.
- 2) User opens the app, sees the mall that they are at and taps it.
- 3) User exits the vehicle and finds the parking spot number to input into the app.
- 4) User inputs parking spot number into app.
- 5) Proceeds to go shopping

Storyboard #5: User is ready to leave the mall but the exit they enter into the app is too far away from their parking spot. So the app will suggest a different, more appropriate exit, and lead the user to it.

- 1) User visually searches for the closest exit to begin the navigation process.
- 2) User arrives at exit and looks at exit number
- 3) User opens the app and it automatically asks if he would like to leave, they choose yes.

- 4) App asks for the Exit number and the user enters it.
- 5) Prompt appears, saying exit is too far, please go to exit number x.
- 6) Map appears inside the mall to direct users to the closer exit, and ultimately to the parking spot.

Evaluation of the Low-Fidelity Prototype

Evaluation Method

We decided to use think aloud and cognitive walkthrough as our evaluation methods. In Cognitive Walkthrough, we use a small number of experts to evaluate a design from inspecting the interface. In think alouds, we ask users to verbalize their thought process. We ask participants to explain what they are doing, or trying to do, and what they are thinking and why.

We conducted our Cognitive Walkthrough in Studio 5 and used our peers as experts. Additionally, for the Think Alouds, we recruited our friends and family members to be our experts.

Among our group, we divided ourselves into facilitators, computers and note-takers. The facilitators conducted the usability study and interacted with the experts. The notetaker made notes of any observations or comments by the experts. The computer conducted all the functionality a computer theoretically performs. We started the study by greeting our experts, introducing ourselves and providing a brief explanation of our application. We then asked for their consent as we are collecting their personal data and started our usability study.

Evaluation Protocol

Our app, PARKEEE is a new parking assistant. Users can sign in, mark the mall of their choosing, save their car's location, shop, and then depending on their mall exit follow a defined path back to their car. Through our app, the user can enter their parking spot number when parking. When leaving the mall, the user opens up the app and enters the mall exit they are

leaving from. The app then displays a path from that exit to the saved parking spot. To test the functionality of our app, we formed the following interaction recipe:

Tasks

1. Register with a new account and save your parking spot.
 - a. Click sign up on login page instead of entering login information
 - b. Enter name, email and password
 - c. Click sign up
 - d. Click add new button on your favourite malls page
 - e. Enter the shopping mall specifically Square One
 - f. Click done
 - g. Choose parkeeeing
 - h. Enter parking spot number as 1
 - i. Click done
2. Sign in and save your parking spot in a NEW (unsaved) shopping mall.
 - a. Enter username and password
 - b. Click Go!
 - c. The rest of steps are same as above
3. Sign in and save your parking spot in an existing shopping mall.
 - a. Enter username and password
 - b. Click Go!
 - c. Click on existing shopping mall specifically Square One
 - d. Choose parkeeeng

- e. Enter parking spot number as 1
 - f. Click done
4. Go get your car from Square One Exit 4.
- a. Click on existing shopping mall specifically Square One
 - b. Choose leaveeeng
 - c. Enter exit number as A
 - d. Click done

Results - Cognitive Walkthrough

Round Number	Expert Name	Expert Group	Notes/Feedback	Assessment
1	Yichen Cui, Jicun Zhen	Team 404	<p>The experts displayed confusion when entering the parking spot.</p> <p>The experts questioned if the arrow on the map was going to be interactive.</p> <p>The experts claimed our design was straightforward.</p> <p>The experts questioned if there will be a back button on the direction page to go back to maps.</p> <p>The experts suggested to explain</p>	Very helpful

			<p>what parkeeeng and leaveeng means.</p> <p>The experts suggested adding an option for a scenario where the user wants to find their car for other reasons other than leaving.</p>	
2	Wen Xiu, Yu-Hsuan	A-Stars	<p>The experts needed explanation that the e's indicate the number of steps left to be taken.</p> <p>The experts seemed to be navigating with ease and comfort.</p> <p>The experts suggested that when a user enters a new mall, instead of redirecting them to another page, we should just integrate to the current page.</p>	Very helpful
3	Charbel, Yetunde	Jeremy	<p>The experts completed all tasks quickly and with ease.</p> <p>The experts required explanation on the meaning of terms leaveeng and parkeeeng.</p> <p>The experts needed explanations on</p>	Very helpful

		<p>the functionality of maps and directions.</p> <p>The experts were unable to figure out that the e's indicate the number of steps left. However, they also commented they would be able to understand it in action.</p> <p>The experts displayed confusion on entering the exit number. For example, the experts questioned if they enter an exit they are currently at or leaving from.</p> <p>The experts questioned if they have to be present at the exit to enter the number.</p> <p>The experts asked what happens if the user pulls up the map from inside the mall or at a store.</p> <p>The experts suggested not including the option to park when users reopen the app to leave.</p> <p>The experts also questioned if we can</p>	
--	--	--	--

			use the app in any mall.	
4	Venura, Yetunde	Widget Warriors	<p>The experts commented that our app was very smooth and intuitive.</p> <p>The suggested improvements on the parking spot drop down menu.</p> <p>The experts questioned if the parking spots are pre-added.</p> <p>The experts were curious as to how we plan on saving the parking spots.</p> <p>The experts also asked if our app will be catered to specific shopping malls.</p>	Very helpful
5	Safa, Shaheera	Define and Refine	<p>The experts seemed confused about the buttons.</p> <p>The experts questioned if the user has to login every time.</p> <p>The expert suggested having a forgot password option.</p> <p>The experts needed clarification on what an exit number is.</p> <p>They questioned if the data about the mall will be pre-added.</p>	Very helpful

			<p>The experts recommended displaying distance in metres in addition to e's.</p> <p>The experts suggested having an option to logout.</p>	
--	--	--	---	--

Results - Think Aloud

Number	Expert Name	Notes/Feedback	Assessment
1	Neraj Manamperi	<p>The expert suggested that instead of username, have an email because the sign up did not include an username option.</p> <p>The expert suggested clearer clarification of parking spot number.</p> <p>The expert questioned what happens if the mall does not have parking spot numbers marked.</p> <p>The expert needed clarification on what leaveeng means. Does it mean leaving the car or just leaving the mall?</p> <p>The expert displayed confusion on how to go from entering the exit number page to next page.</p>	Very helpful

		<p>The expert had to be explained that the e's indicate the number of steps left.</p> <p>The expert did not choose mall from the drop down menu.</p> <p>The expert needed clarification on what exit number is.</p> <p>The expert questioned if our app is just for shopping malls.</p>	
2	Nancy	<p>The expert performed all tasks with ease</p> <p>The expert displayed confusion between parkeeeng and leaveeng.</p> <p>The expert complimented our user interface.</p> <p>The expert appreciated the directions feature.</p>	Very helpful
3	Sara	<p>The expert had no trouble registering.</p> <p>The expert liked the map and directions feature.</p> <p>The expert commented that the app was simple and easy to use.</p> <p>The expert was able to understand the parkeeeng and leaveeng buttons.</p>	Very helpful
4	Looby	The expert completed all the tasks	Very helpful

		<p>successfully.</p> <p>The expert questioned the e's in the directions.</p> <p>The expert displayed confusion on different amounts of e's on left and right turns.</p> <p>The experts suggested including distance on the directions.</p>	
--	--	--	--

Lessons Learned and Implications for Design

The experts responded well to the paper prototype during the evaluations, noting that the design was very clean, easy to understand, and the features were straight-forward. The screen wasn't cluttered with options and the few available buttons were all descriptively labelled, clearing up any confusion about their meaning or intended purpose. According to expert feedback, the design of the prototype was generally well done. Users successfully completed the given tasks very quickly during the cognitive walkthrough exercise with minimal help from the facilitators. Users could accomplish tasks like adding new malls, saving their car's location, and returning to their car with ease. The usability of the paper prototype was generally well received and considered intuitive. However, there were some issues with the design in terms of function and logistics.

Experts encountered some issues when returning to their cars. There was a slight confusion over the directions screen which displayed instructions with distances on how to return to the car's location. Experts found that the system of trailing "e's" to represent remaining distance, similar to a count-down, wasn't exactly clear and had to be explained when asked what it was. One expert, however, suggested that it could simply be attributed to the nature of the paper prototype and that they could see themselves figuring out the function during use. This issue can be resolved fairly easily. The design could be modified to include distance in metric units instead of the trailing "e's" system next to the directions on the navigation page. It's a common feature in current map applications so users should be fairly familiar and fairly comfortable with what it represents, resolving the confusion while keeping the same utility.

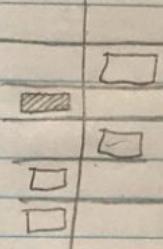
There were also smaller design fixes suggested to alleviate confusion such as: removing the option of parking when the user pulls up the app to leave the mall and find their car, and adding “back” buttons so the user could move back and forth between the map instructions and the text based directions. These are relatively easy and trivial fixes but they would stand to make the design less complicated and easier to use.

Another suggestion was the idea of making multiple trips to and from the mall to a user’s car; the current design only covered one-way trips. The user would save their parking spot number, go about their business, and later return to their car to leave. The paper prototype didn’t offer the user the option to save their car’s location so they could make another trip to the mall without having to restart the process of parking all over again. The solution for this particular case is to change the design to include an extra option after the navigation page where users, upon returning to their car, can choose to either end their trip to the mall entirely or end the navigation instructions. If they choose to end their trip then it indicates that they intend to leave the parking area and the app proceeds as it was originally intended. If the user opts to end the navigation instructions, then the navigation page closes but their car’s location remains saved indicating the user intends to leave again and needs to be able to return to this location. When they’re finally ready to leave for good they go through the same process of leaving as they would with the original return trip: entering the exit they’re leaving from and following the directions to their car, opting to end their entire trip, and finally driving away from the parking area.

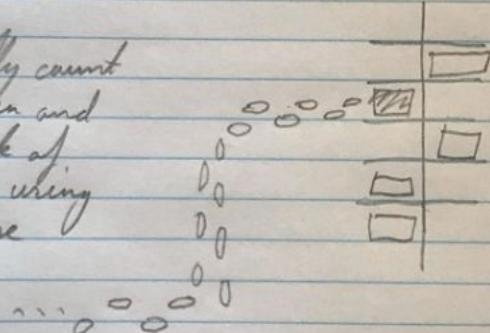
Design Concept 1

Inspiration: Ants, pheromone tracking
Tracking without GPS

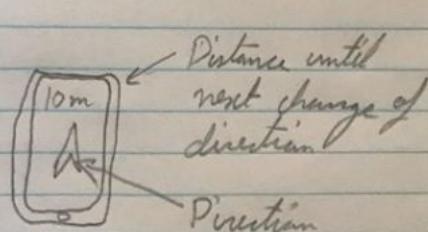
- ① App Server that
car is parked.
Immediately start
tracking about the
person drives is
about to take



- ② Continually count
steps taken and
keep track of
direction using
Gyroscope



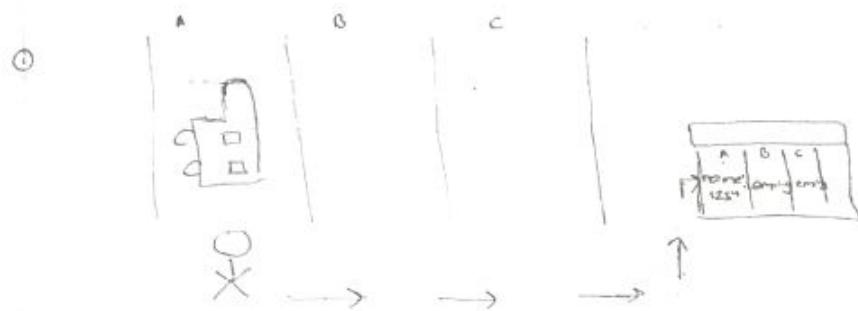
- ③ When driver
is ready to
return to
car app will show
the following:



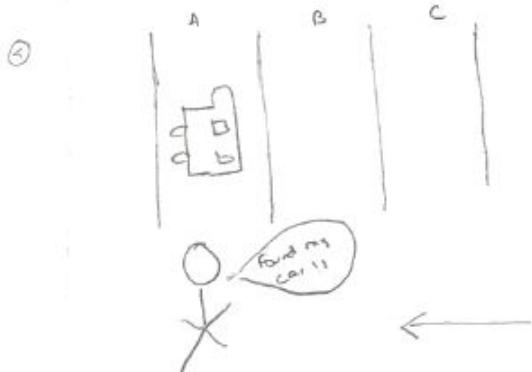
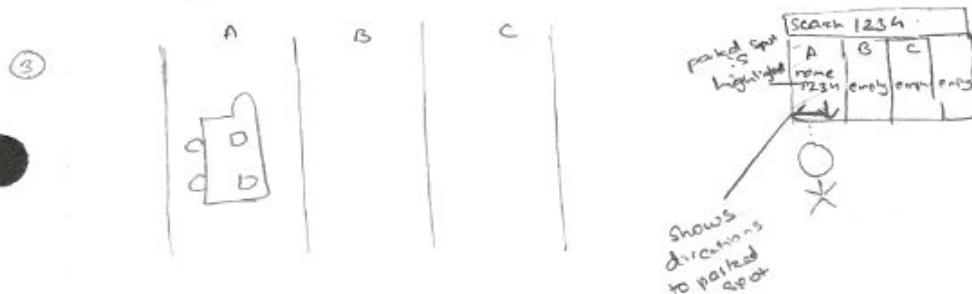
You just need to align themselves with arrow

Hector

Design Concept 2



② Shopping time!!



Search P		
A	Empty	Empty
normal 1234		



Search Q		
A	B	C
empty	empty	empty



Design Concept 3

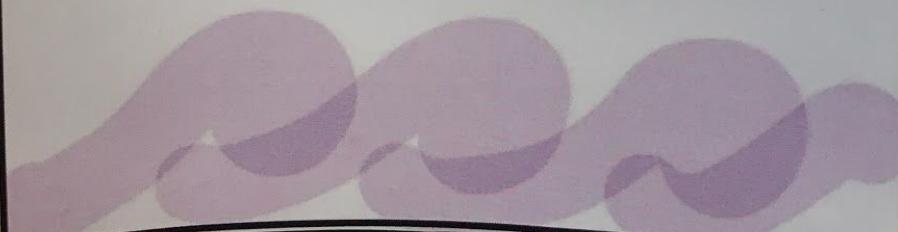
PARKEEE

Login or [Sign up](#)

Username: _____

Password: _____

GO!



PARKEEE

Sign up

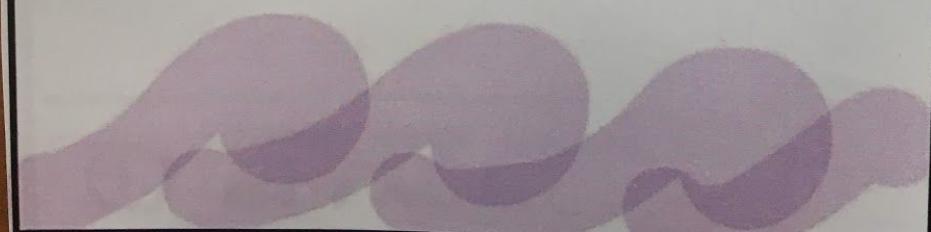
Name: _____

Email : _____

Password: _____

Confirm Password: _____

Sign up



PARKEEE

Your Favourite Malls

♥ Square One

♥ Sherway Gardens

⊕ Add new

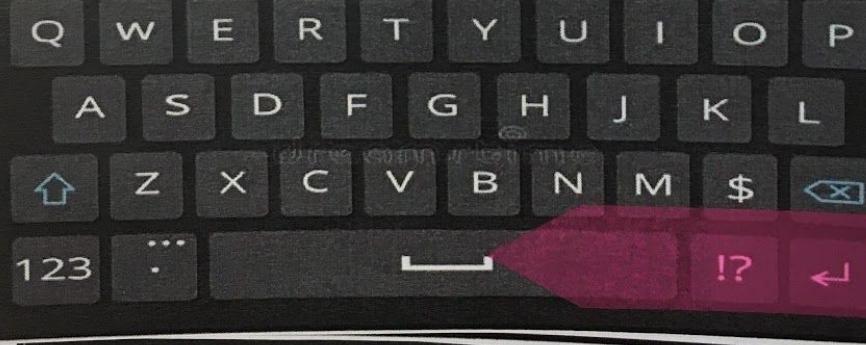
(i) Choose your current location or
add a new mall to your favourites

PARKEEE

BACK

Enter The Shopping Mall

I



DONE

PARKEEE

ParKeeeeng

Leaveeeeng

DONE

PARKEEE ng

Enter Your Parking Lot No.

1

DONE



DONE

PARKEEE_{ng}



Your information
has been recorded !

HAPPY SHOPPING ❤

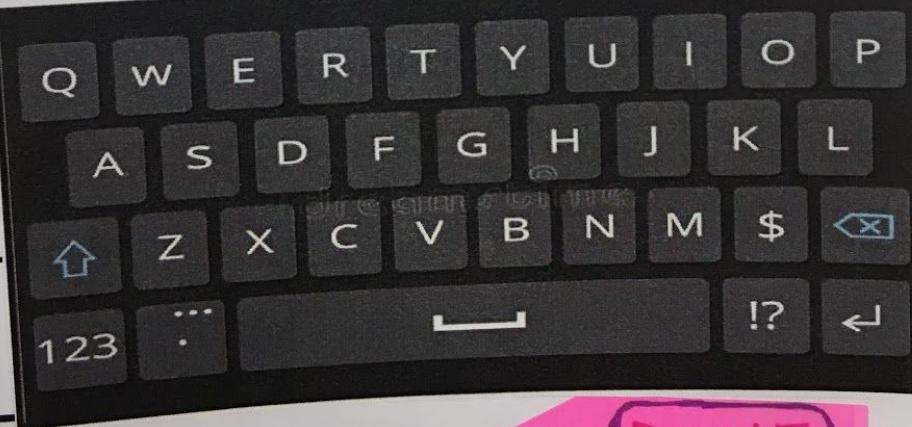
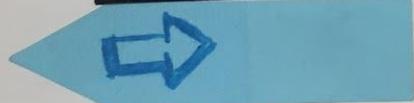
BACK

DONE

LEAVEEE^{ng}

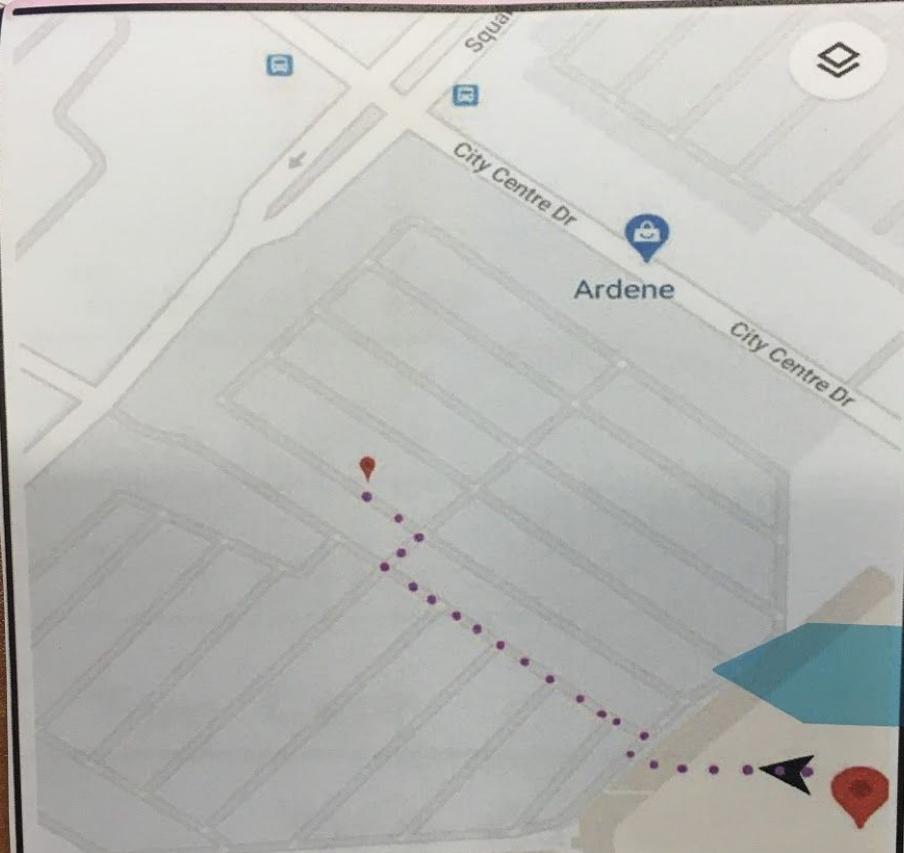
Enter Your Exit No.

1



DONE

LEAVEEE_{ng}



Directions

(DONE)

LEAVEEE ng

Directions

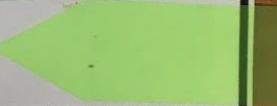
Turn Left *eee*

Turn Right *e*

Turn Left *eeeeeee*

Turn Right

You've Reached!



DONE

STORY BOARD #1

User arrives at a mall they have never been to, and they would like to use the app to remember their parking spot.

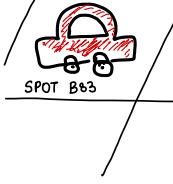


PARKEEE

Your Favourite Malls

- Heart icon: Square One
- Heart icon: Sherway Gardens
- Plus icon: Add new

Choose your current location or add a new mall to your favourites



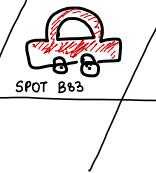
PARKEEE

Enter name of new Shopping mall...

- Yale Shoppers World
- Yorkdale Shopping Mall

Back

Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M \$
123 ... !? ←



Yorkdale Shopping mall

PARKEEE

Your Favourite Malls

- Heart icon: Square One
- Heart icon: Sherway Gardens
- Heart icon: Yorkdale Shopping mall
- Plus icon: Add new

Choose your current location or add a new mall to your favourites



PARKEEE

Parkeeeng

Leaveeeng

PARKEEE_ng

Saving Under : Yorkdale Mall

Enter Your Parking Lot No.

valid ✓

Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M \$
123 ... !? ←

PARKEEE_ng

✓
Your information has been recorded !

HAPPY SHOPPING ❤

STORY BOARD #2

User completes shopping experience and would now like to return to their vehicle from inside the mall.



Exit 7

PARKEEE

Your Favourite Malls

- Heart icon: Square One
 - Heart icon: Sherway Gardens
 - Heart icon: Yorkdale Shopping Mall
- ⊕ Add new

Choose your current location or add a new mall to your favourites

PARKEEE

Parkeeeng

Leaveeeng

LEAVEEE ng

Currently in : Yorkdale

Enter Your Exit No.

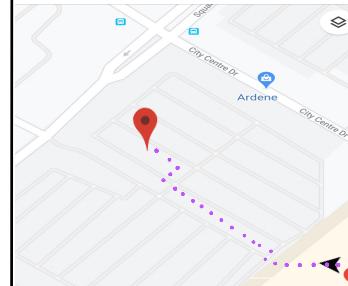
Exit 7

valid ✓



LEAVEEE ng

From Exit 7 to Parking B83



Directions

LEAVEEE ng

Directions

Turn Left eee

Turn Right ee

Turn Left eeeeeeee

Turn Right

You've Reached B83 !

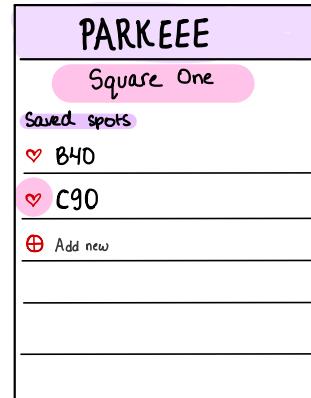
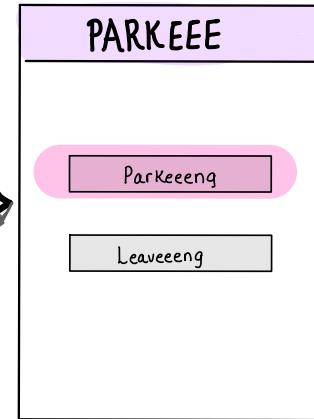
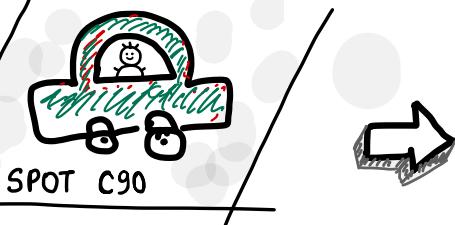
STORY BOARD #3

User arrives at a new mall but the mall is not yet registered with our directory.



STORY BOARD #4

User arrives at a mall that they had already saved, and they would like to use the app to remember their parking spot.



STORY BOARD #5

User enters exit into the app is too far away from their parking spot.



Exit 7

PARKEEE

Your Favourite Malls

- Heart icon: Square One
- Heart icon: Sherway Gardens
- Heart icon: Yorkdale Shopping Mall
- Plus icon: Add new

Choose your current location or add a new mall to your favourites

PARKEEE

Parkeeeng

Leaveeeng

LEAVEEE ng

Currently in: Yorkdale

Enter Your Exit No.

Exit 7

valid ✓

Q W E R T Y U I O P
A S D F G H J K L
Z X C V B N M \$
1 2 3 ... ! ?

LEAVEEE ng

You entered Exit number: 7

The distance from Exit 7 to BBB is 15 min

Suggested: Exit number 2. Exit 2 to BBB is 5mins

Suggests the exit closest to spot

User can select the suggested exit to see path from current to suggest

LEAVEEE ng

From Exit 7 to Exit 5

Directions

Think Aloud Video Links

Think Aloud #1:

<https://drive.google.com/file/d/1kUPgelr82BcOxerVeDmlZ7DSmsOZphiY/view?usp=sharing>

Think Aloud #2:

<https://drive.google.com/file/d/12Eo2hcSbOkzoCljzEaXecnV1XHADOVr5/view?usp=sharing>

Think Aloud #3:

<https://drive.google.com/file/d/1eAbjXFVEb275HxnJWzSTcpJ36MtKTwYF/view?usp=sharing>

Think Aloud #4:

https://www.youtube.com/watch?v=-aol5SNmY8&feature=youtu.be&fbclid=IwAR0SrAv8UwvVy_2TcsJBDe9qh5b6RC_Uctv9ykvnJAn_m5nVRIOz_koPuSM

Group Evaluations Table

Round Number	Design Group	Facilitator's Name	Computer Name	Note-taker Name	Assessment
1	A-Stars	Riddhesh, Yuhao	Yang	Yu-Hsuan	Very well prepared
2	Team 404	Zhibo Zhou, Jian Zhou	Yifei Gao	Yichen Cui	Very well prepared
3	Widget Warriors	Jake, Taha	Dean	Yeshoda	Very well prepared
4	Jeremy	Daniel, Yetunde	Rajvir	Mo	Very well prepared
5	Design & Refine	Sean	Joohyun	Haseeb	Very well prepared

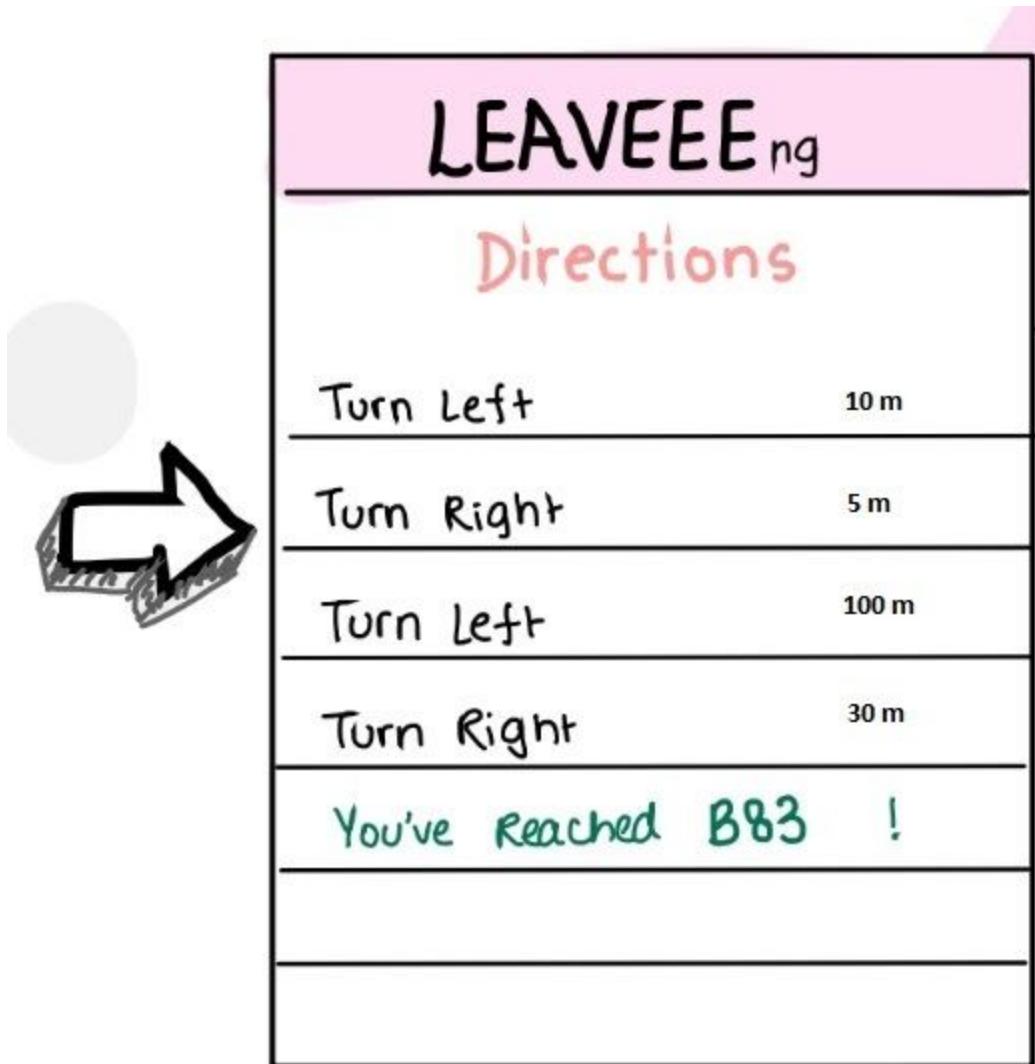


Figure 1. The modified directions page with distance displayed in metric units as a substitute for the trailing “e’s” system.



Figure 2. The modified directions page with additional options at the bottom, offering the user the choice to end navigational assistance but not necessarily their trip to the mall in the case that they want to make multiple trips back and forth between the mall and their car.

Who Did What - A Breakdown

Alana Hodge

- General Formatting (2 hour)
- Executive Summary (1 hour)
- S4 - Design Alternatives (6 hours)
- Section 2 - Paper Prototype and the Current System Design (2 hours)

Total: 11 hours

Navya Gupta

- S4 - Design Alternatives (6 hours)
- S5 - Paper Prototype Design (2 hours)
- Section 4 (4 hours)
- Section 4 - Expert Usability Test (20 minutes)
- General Formatting (1.5 hours)
- Appendices - Group evaluations, think aloud video links, formatting appendices (10 minutes)

Total: 14 hours

Viju Hiremath

- S4 - Design Alternatives (4 hours)
- S5 - Paper Prototype Design (4 hours)
- Section 1 - Design Alternatives (1.5 hours)
- General Formatting (1.5 hours)

Total: 11 hours

Mohamad Hamdy

- S4 - Design Alternatives (1 hour)
- S4 - Presentation preparation (1 hour)
- S5 - Paper Prototype Design (4 hours)
- Section 3 - Storyboard and current system design (1.5 hours)
- Section 4 - Expert Usability Tests (1.5 hour)

Total: 9 hours

Artem Albert

- Section 5 - Lessons Learned (2 hours)
- S4 - Design Alternatives (1 hour)
- S5 - Paper Prototype Design (4 hours)

Total: 7 hours

Aonushka Aeron

- S4 - Design Alternatives (5 hours)
- S5 - Paper Prototype Design (4 hours)
- Section 3 - Storyboard and current system design (3.5 hours)

Total: 12.5 hours