

Overview

During usability tests with our paper prototype, we had our participant complete the following actions:

Set up hardware and mobile app:

- Place the device on the dashboard of a car
- Pair hardware with phone app using Bluetooth
- Adjust alert settings, volume settings
- Update privacy for tracking settings

Check driving statistics and leaderboard *(assuming device has been used for 2 weeks)*:

- Understand how you have been driving today and in the past week
 - Overall score
 - Trends
- Compare Driving Safety Scores within contacts (friends)
- Compare self to national scores
- Add and delete a friend

Usability Test 1

Our first participant is a male student in the CSE lab. We chose this environment because there are many students in the CSE labs, and it was relatively easy to find our target user. We chose this participant because he is a potential user of our product; he is an inexperienced driver and is currently looking to purchase his first car. We conducted our test in an isolated room to avoid distractions and miscommunication. We explained to him that he is performing the tasks in his car to simulate a real-life situation. Novin filled the role of computer, JR and Melissa played the part of note takers/observers, and Clarissa served as the administrator.

Usability Test 2

The second participant we chose was also an inexperienced driver and received his driver's license recently. However, he said he often goes on road trips with friends and had driven in different road conditions. We chose this participant because we wanted to have a participant who had fresh experience from driving school. We conducted this usability test in an isolated room and had our user act as if he was in a car. Novin and Jiarui both filled the role of computer, Melissa took notes, and Clarissa served as the administrator.

Usability Test 3

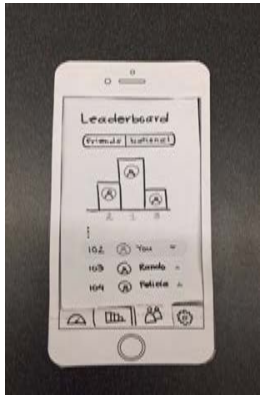





The third participant we chose was a female driver who drives for running errands and her commute to work. We chose this participant because we want to have some opinions from a more experienced driver (5+ years) and a female driver, since our last two participants were inexperienced male drivers. To emulate a realistic setting, we conducted the "hardware installation" actions in a car; for the remainder of the test, we chose a quiet room to test the mobile application. For this final usability test, Novin and Clarissa both acted as the computer, Jiarui took notes, and Melissa served as the administrator.

Summary

We learned from our first test that we should be more organized with our paper prototype, so in our second and third usability tests, we laid out all parts beforehand. We also learned that wording of questions affected our results. When giving unrealistic situations or providing too much context for a particular task, we found that our users could accomplish tasks with no trouble, leading to less helpful feedback. We found that providing ample time was important in uncovering more usability issues.

While conducting the usability tests, we uncovered several major areas of improvement. First, the panda device was extremely user-friendly (all our participants were excited to work with it), but it lacked ease-of-use and clarity. Some users were unsure of how to install the panda, since there was no special clip or suction cups to attach it to their cars. Other users mentioned the inconvenient placement of buttons. The next area of improvement included help and documentation. Certain terminology in the application, such as "Safety Score" and "Allowed Activities" needed clarification (the latter was later removed altogether). Finally, our participants identified statistical visualizations as a major area of improvement. After the three iterations, we settled on detail views for all pie charts and bar graphs.


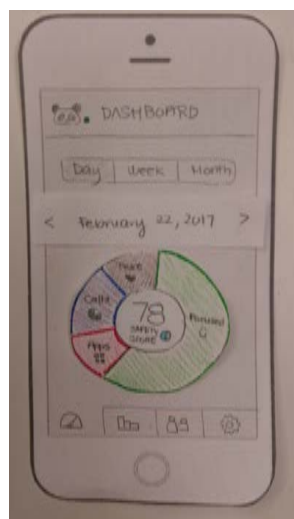



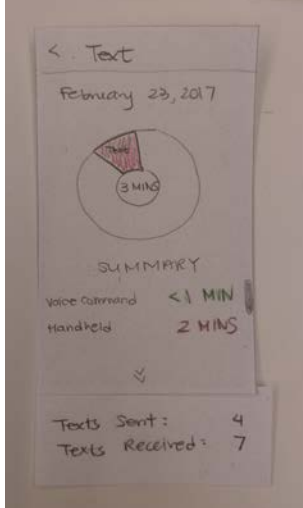
Usability Tests | TEST #1

Image	Issue	Severity	Change	Fixed Image
	<p>Does not support adding new friends.</p> <p>Heuristic: Consistency and standards</p>	2	<p>Added an add friend button in leaderboard. A pop up window will show up and the user can search and add friends through their registered phone number.</p>	
	<p>The day view does not make sense as it shows the data for a whole week.</p> <p>Heuristic: Consistency and Standards</p>	2	<p>Changed back to the tabs we used to have: week, month and year.</p>	
	<p>Not enough information about the different sections represented in the pie chart.</p> <p>Heuristic: Help and Documentation</p>	3	<p>Able to expand the section user clicked on and show the details.</p>	

Usability Tests | SECTION CRITIQUE

Image	Issue	Severity	Change	Fixed Image																								
	<p>"Allowed activities" is a misleading title, since many of these activities are illegal in the first place. It is unhelpful since the main purpose of the app is to track data.</p> <p>Heuristic: Match between system and the real world</p>	2	<p>Delete "allowed activities" in Alerts and replaced with simple controls to change alerting speakers and sound.</p> <p>Add "Top Apps" in stats under day/week/month/year view to show what's the most frequently used app.</p>	<table border="1"> <thead> <tr> <th colspan="2">SUMMARY</th> </tr> </thead> <tbody> <tr> <td>Forwarded</td> <td>40 MINS</td> </tr> <tr> <td>Apps</td> <td>20 MINS</td> </tr> <tr> <td>calls</td> <td>9 MINS</td> </tr> <tr> <td>Texts</td> <td>4 MINS</td> </tr> <tr> <td>Jeep</td> <td>< 1 MIN</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">TEXTS</th> </tr> </thead> <tbody> <tr> <td>Sent</td> <td>20</td> </tr> <tr> <td>Received</td> <td>34</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th colspan="2">Top Apps</th> </tr> </thead> <tbody> <tr> <td>Snapshot</td> <td>3 MINS</td> </tr> <tr> <td>Facebook</td> <td>2 MINS</td> </tr> </tbody> </table>	SUMMARY		Forwarded	40 MINS	Apps	20 MINS	calls	9 MINS	Texts	4 MINS	Jeep	< 1 MIN	TEXTS		Sent	20	Received	34	Top Apps		Snapshot	3 MINS	Facebook	2 MINS
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	<p>Leaderboard for "national" shows too many people in the ranking. It is unnecessary and causes users trouble when they try to find themselves among other drivers.</p> <p>Heuristic: Aesthetic and minimalist design</p>	1	<p>Leaderboard "national" ranking can only shows the top 20. User's personal ranking will always show up at the bottom of the ranking if they are not a top 20 user.</p>																									

Usability Tests | TEST #2

Image	Issue	Severity	Change	Fix Image
	<p>Unable to go to a different day/week/month on Dashboard view.</p> <p>Heuristic: Visibility of system status</p>	4	<p>Added bars to navigate to a different day/week/month on Dashboard view.</p>	
	<p>Week view in stats is still confusing with day views</p> <p>Heuristic: Match between system and the real world Recognition rather than recall</p>	2	<p>Changed the label on the bar graph to make it clear that it is a week view.</p>	
	<p>In detailed dashboard view, participant didn't know how to go back to overall dashboard view once they clicked on to the focused view</p> <p>Heuristic: User control and freedom</p>	2	<p>User goes into a different page to view detailed stats. Back button is added to the page to allow user to go back to their previous dashboard</p>	



User wanted to click on a bar, but there is no breakdown of the numbers

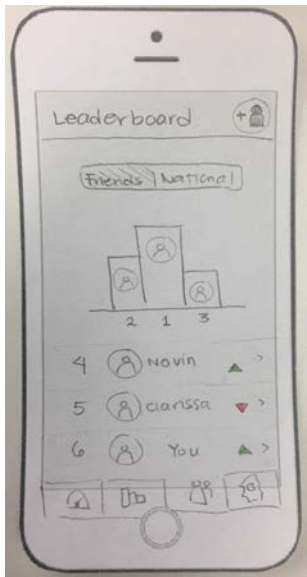
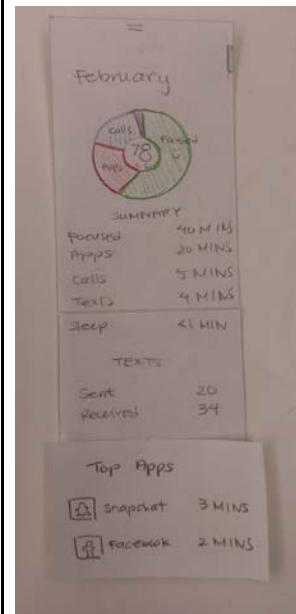
Unable to view detailed stats on week/month/year

Heuristic:

Visibility of system status
Match between system and the real world

4

Allow user to click on bars in month/year view, and click on week as a whole in week view.




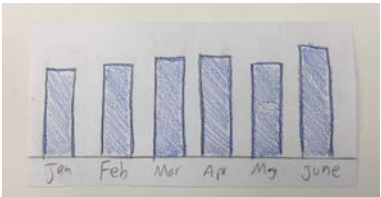

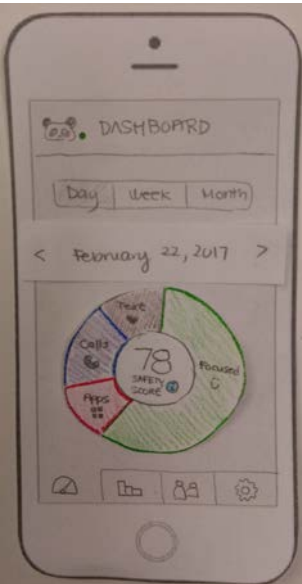
Liked the green and red arrows indicating the changes in friends' safety scores.

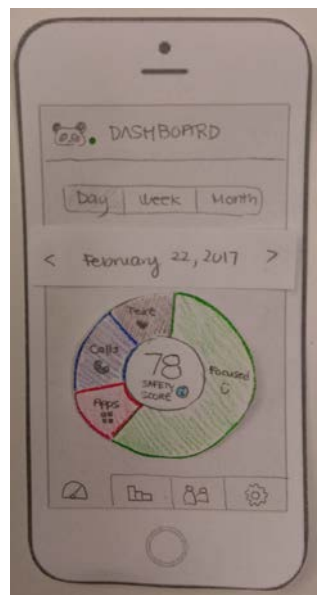
N/A

N/A

N/A

Usability Tests | TEST #3

Image	Issue	Severity	Change	Fixed Image
	<p>The participant did not know that she could click on the bars in Stats page to check out the details.</p> <p>Heuristic: Recognition rather than recall</p>	3	Remove the connecting lines between bars and make the individual bars wider.	
	<p>Having no problem scrolling the bars and switching the week/month/year views.</p>	N/A	N/A	N/A
	<p>The help button (explaining the safety score) on Dashboard page is not noticeable enough. Colored pencil on paper was too faint.</p> <p>Heuristic: Help and documentation</p>	0	The button will become more obvious on an actual screen.	N/A



Did not hesitate to click on the left arrow to view the detailed information for the previous days. Win!

N/A

N/A

N/A

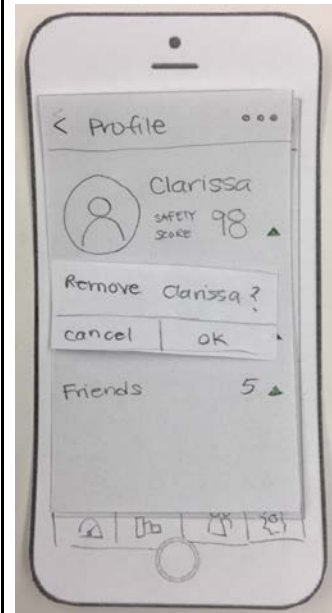


Do not have warning when removing or blocking friends, so user might remove friends by accident.

Heuristic:
Error prevention

2

Add a pop-up confirmation page before a friend is removed.

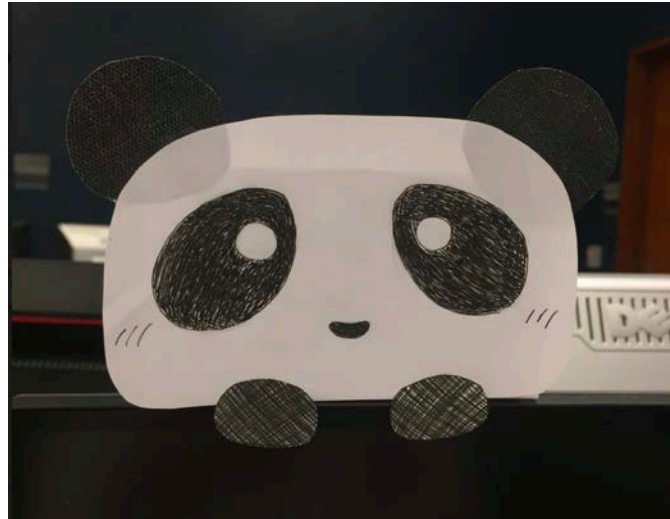


Final Paper Prototype | OVERVIEW



Final Paper Prototype | TASK 1: VISUALIZING AND PROCESSING DRIVING BEHAVIOR

The following hardware prototype allows users to track driving behavior.



(Figure 1.1) Hardware overview. Kinect-like trackers are located in the eyes of a user-friendly panda. The panda clips onto the car's review mirror. Controls are located at the left of the device.



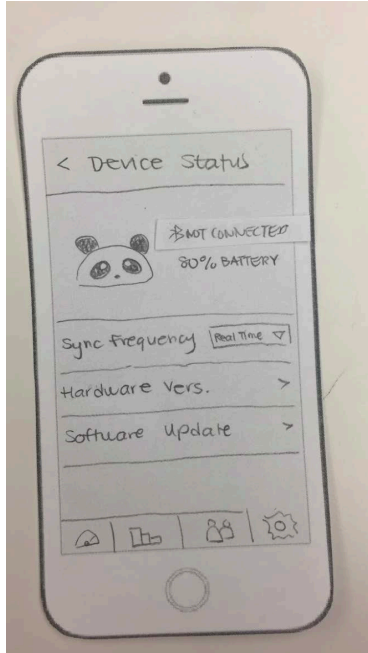
(Figure 1.2) Left side view of panda contains Bluetooth indicator light (green for on and red for off), volume controls, and power switch.



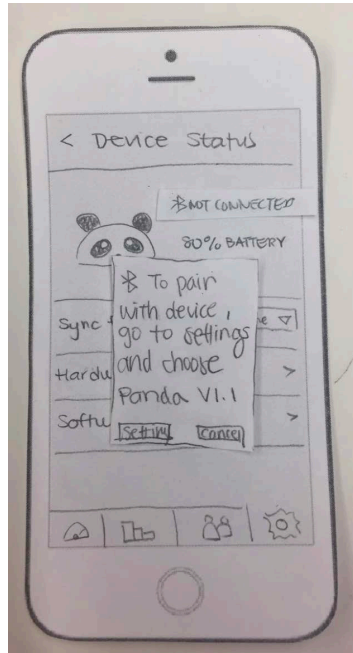
(Figure 1.3) Side view after device has been switch on and paired to phone via Bluetooth

Final Paper Prototype | TASK 1: PROCESSING & VISUALIZING (CONT.)

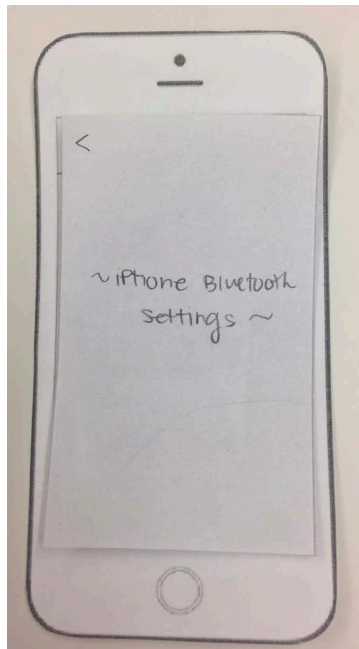
The following mobile screens demonstrate how to pair the panda hardware with the app.



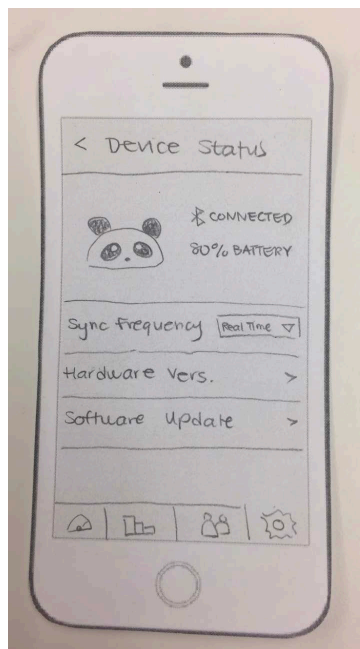
(Figure 1.4, Left) Under Settings > Device Status, the user can pair their device with their app.



(Figure 1.5, Right) The app automatically detects the lack of a connected device, so prompts the user to pair their device. Clicking on "Settings" takes the user to Figure 1.6.



(Figure 1.6, Left) The action in Figure 1.5 leads user to their iPhone Bluetooth settings, where they can pair their device.



(Figure 1.7, Right) The device status is updated to "Connected".

Final Paper Prototype | TASK 1: PROCESSING & VISUALIZING (CONT.)

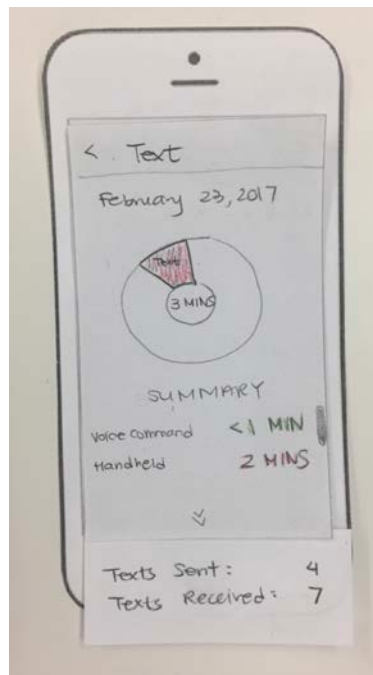
The following mobile app screens display the Dashboard view of driving behavior.



(Figure 1.8, Left) Homepage of recent driving activity. This is the screen that appears upon entering the app if the driver has not driven yet and/or has not paired the device.

(Figure 1.9, Right) Today's driving activity, summarized. The center number represents the driver's Safety Score.

Clicking on the left arrow on the date switches the graph to

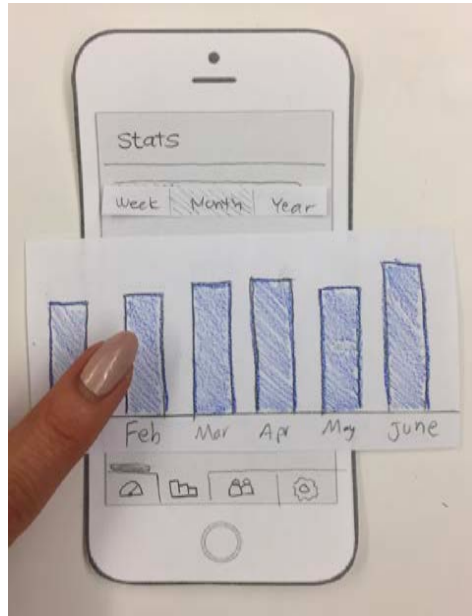
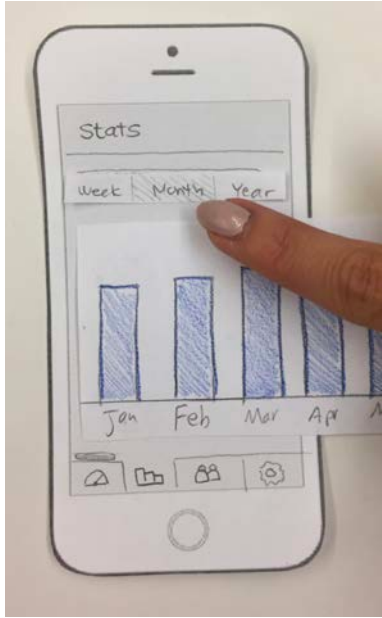


(Figure 1.10, Left) Driver clicks on the "Text" section of the pie chart.

(Figure 1.11, Right) The result of the action performed in Figure 1.10. The driver is taken to a scrollable detail view.

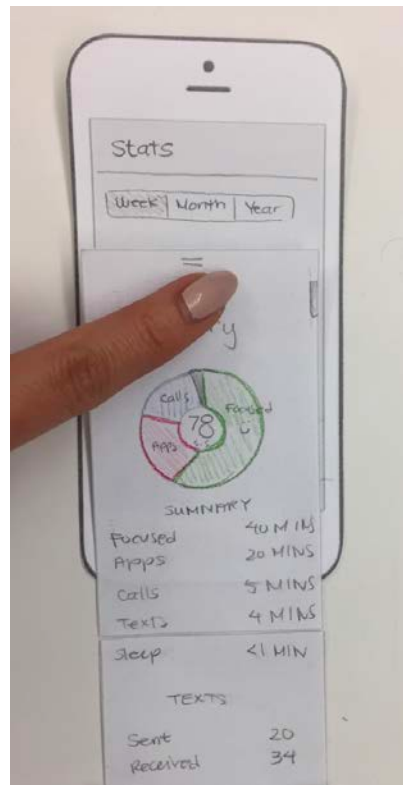
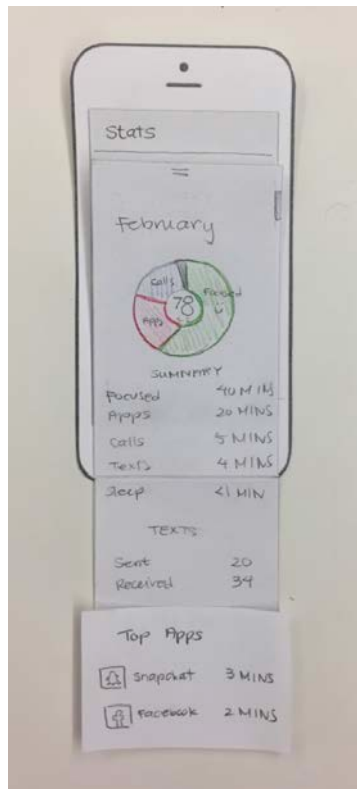
Final Paper Prototype | TASK 1: PROCESSING & VISUALIZING (CONT.)

The following mobile app screens display the Statistics view of driving behavior.



(Figure 1.12, Left) Statistics view can display Safety Scores for weeks, months, or years.

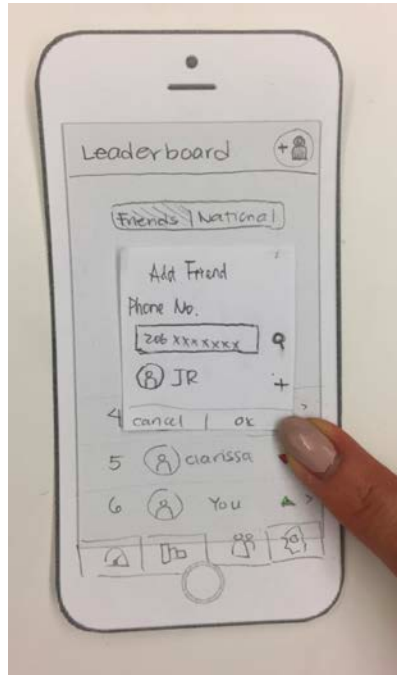
(Figure 1.13, Right) Swiping left and right allows user to navigate the graph. Clicking on a bar leads to the detail view shown in Figure 1.14.



(Figure 1.14, Left) Scrollable detail view for a particular bar in the overview graph.

(Figure 1.15, Right) Swiping down dismisses the detail view.

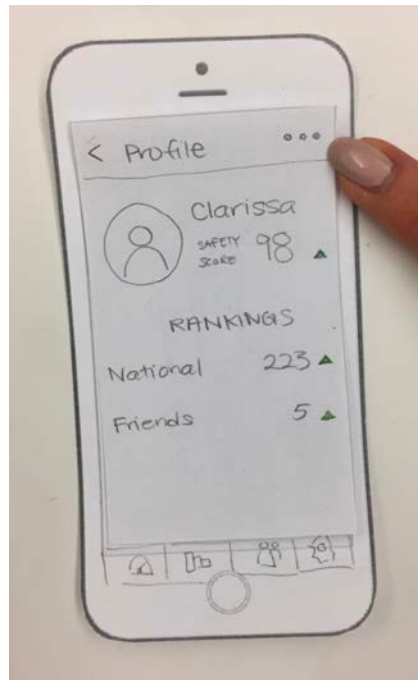
The following mobile app screens display the Leaderboard view.



(Figure 2.1, Left) Default view of the Leaderboard allows driver to see their ranking among friends. Green triangles pointing up indicate that the user has increased in his/her ranking.

Here, our driver is clicking on the "Add Friend" button. See Figure 2.2 for response.

(Figure 2.2, Right) The result of the "Add Friend" action.



(Figure 2.3, Left) Clicking on the name row of a user leads to their profile (Figure 1.15)

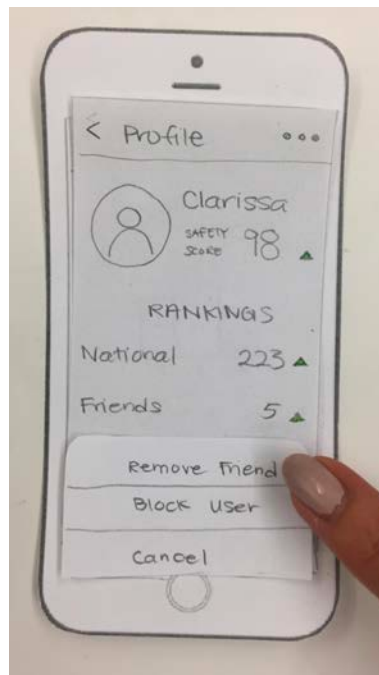
(Figure 2.4, Right) Profile page for a user displays their current safety score and ranking among Nation and friends.

Final Paper Prototype | TASK 2: SHARING & COMPARING (CONT.)

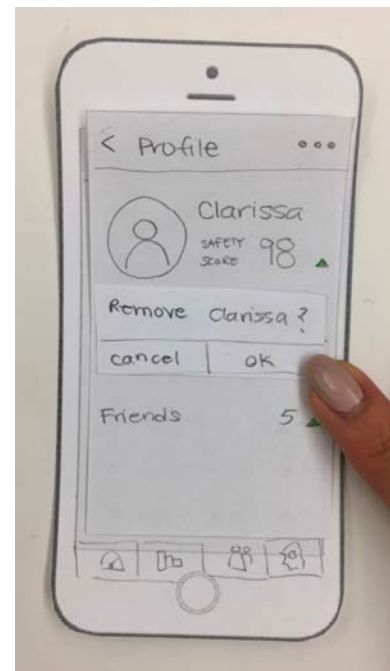
The following mobile app screens display a user's profile.



(Figure 2.5) Clicking on options menu in upper hand corner of user profile.



(Figure 2.6) Result of action in Figure 2.5. A menu appears with the options to Remove/Block this user.



(Figure 2.7) Confirmation window appears when attempting to remove or block this user.

Important Modifications

Expand Dashboard

The dashboard pie graph used to be inactive when a section was touched, but one of our usability testers suggested that they wanted to see finer grain information about each category. For example, they wanted to see why their apps score was so high, so now when they click the apps section they can see that they were on Snapchat for 3 minutes and on Facebook for 2 minutes. This is crucial because the user should be able to see why they get a certain score in a certain area so they can work to improve themselves.

Statistics Bar

The statistics charts did not afford clicking even though they could be clicked to see more details. So we decided to remove the trend line from the top of the bars and thicken the bars. This way each bar is a larger target and is isolated, which gives it more affordance to clicking. This was a serious issue because the user would miss out on a significant portion of the app's capability.

Panda

The panda hardware used to have buttons on the top and no affordance to how it should be mounted in the car. We decided that the best place to put this hardware would be on top of the rearview mirror, so we added clips to the bottom of the panda as an affordance that it can be clipped on top of the mirror. We also moved the buttons to the left side of the device because it would be hard to reach them when they were on top when the device is already so close to the roof of the car. This was a serious problem with our hardware because users would not have a great first experience when trying to install it. Now it is a very easy and intuitive installation.

Add & Remove friends

Initially, in the leaderboard page, we did not support adding and removing friends. A participant pointed out that the users should have the choice to expand or shrink their friend circles. After we added this ability, we realized that the user might remove friends accidentally. To prevent that error, we added a pop-up window to confirm that the user actually wants to remove someone. We consider this a huge improvement because it concerns flexibility of use as well as error prevention.