

# DASH

## Team

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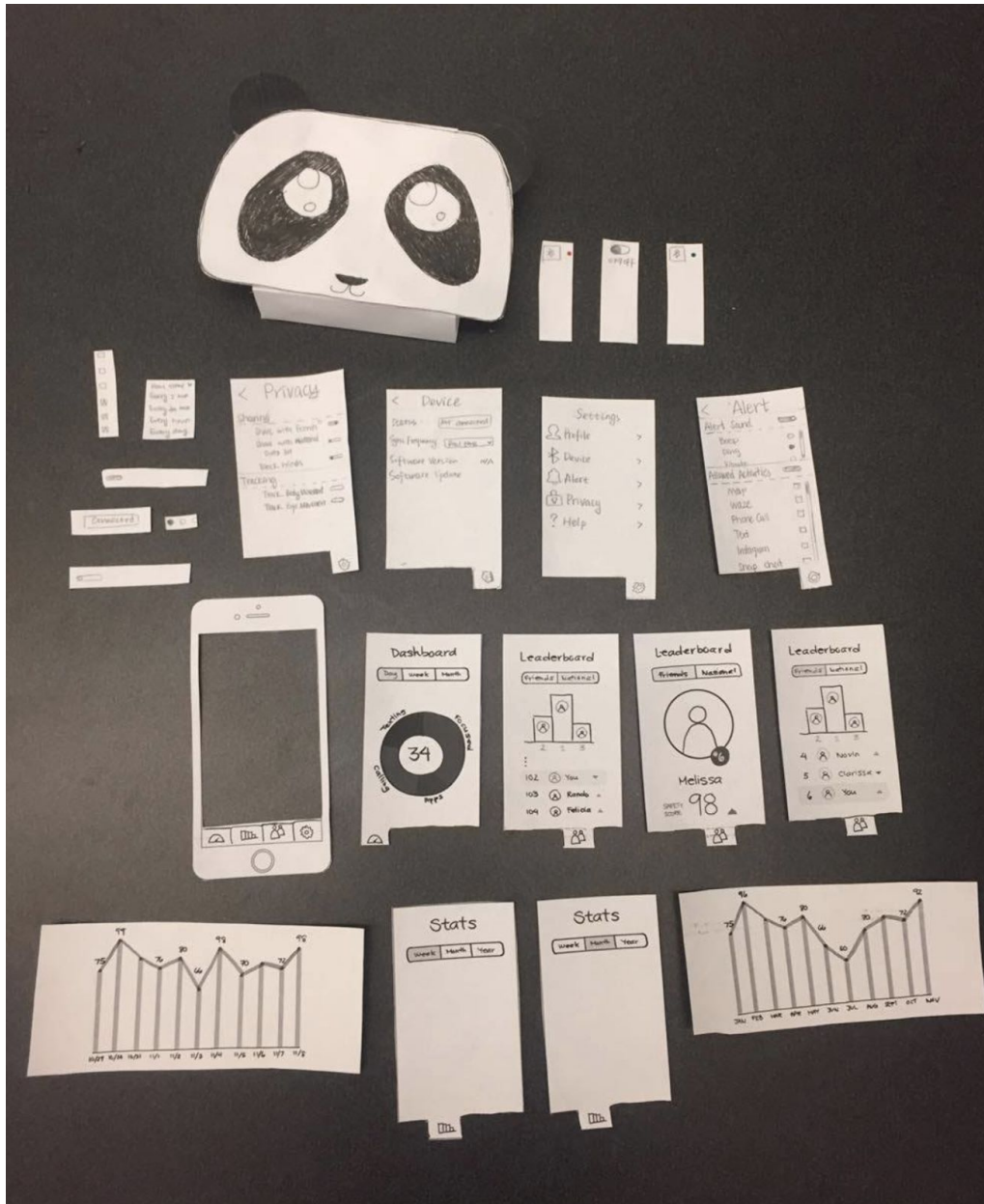
## Problem & Solution Overview

Texting a friend, navigating on GPS, admiring the scenery along a road--these are all common distractions that lead to motor accidents. Distracted driving is a major issue, and many states have enacted laws in response to the alarming correlation between driver recognition error and vehicle accidents. Unfortunately, many people continue to engage in distracting behavior, even though they are aware of the dangers of unfocused driving.

We are designing a movement-tracking hardware and a mobile application, DASH, that allows users to visualize and share data on driving behavior. By providing users with information on how they spend their time driving and giving sound feedback from the hardware, we can motivate them to be more conscious about road safety. The goal of our project is to track, process and visualize driving behaviors, prevent potential accidents, encourage safe driving habits through social sharing of driving safety scores .

# Initial Paper Prototype (1 page) Clarissa

Our paper prototype features two components. The first component is a hardware that tracks eye and body movements. The hardware contains a switch button for turning on and off the device, volume button, and a light that signals the connectivity status of the bluetooth. The second component is a mobile application that visualizes data and allows users to compare their driving statistics with others. There are four main pages in our app, including dashboard, statistics, leaderboard, and setting.



## Task 1: Visualizing and Processing Driving Behavior



Figure 1.1  
(bottom)

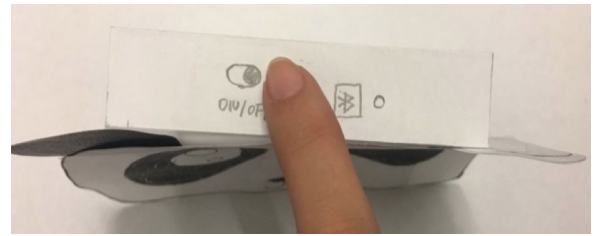


Figure 1.2 (top)

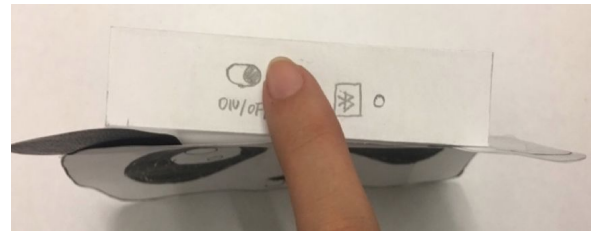


Figure 1.3



Figure 1.4

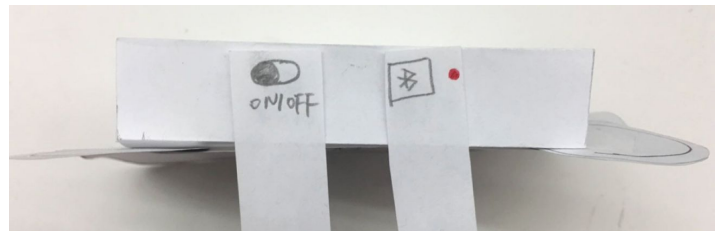


Figure 1.5 (top)

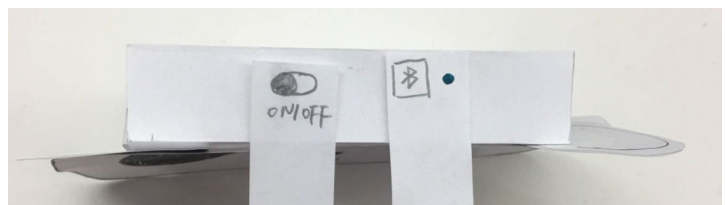


Figure 1.6 (bottom)

Figure 1.1 Hardware overview. Kinect-like trackers are located in the eyes of a user-friendly panda.

Figure 1.2 User can switch tracker on/off.

Figure 1.3 Tracker is now switched off.

Figure 1.4 Side view with volume controls.

Figure 1.5 Bluetooth pairing with mobile device is off

Figure 1.6 Bluetooth pairing with mobile device is on

# Task 1 (cont.): Visualizing and Processing Driving Behavior

The following mobile app screens demonstrate statistics on overall driving safety.

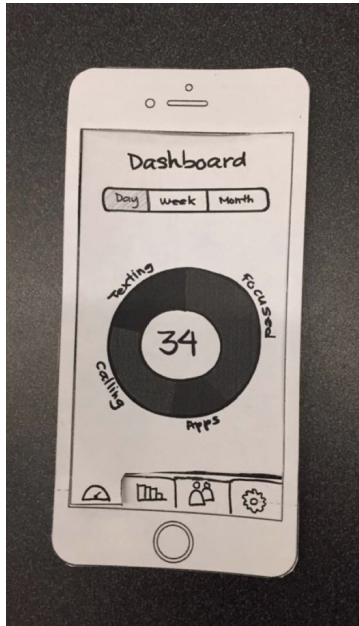


Figure 1.7

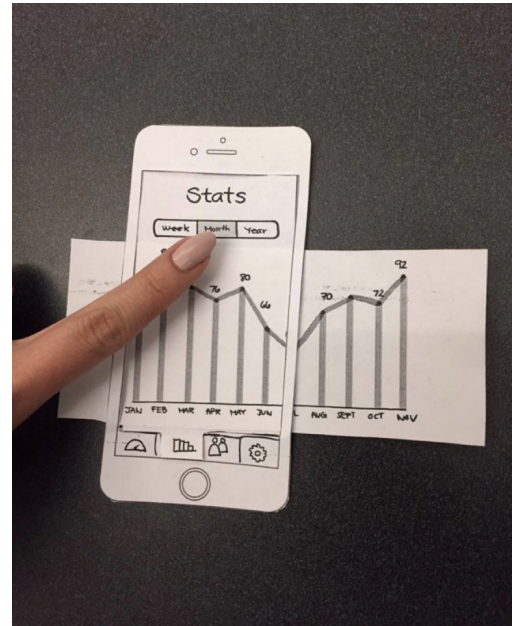


Figure 1.8

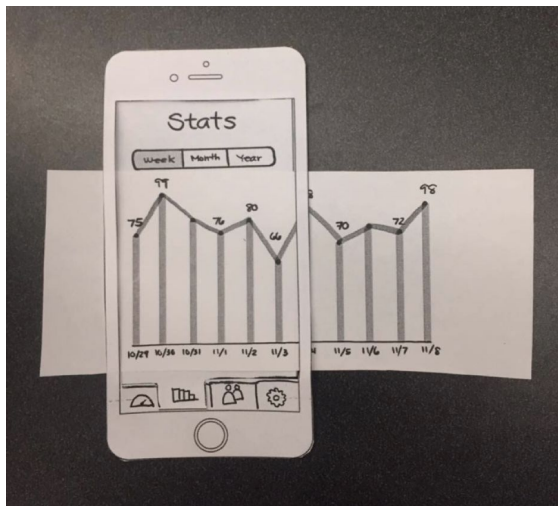


Figure 1.9

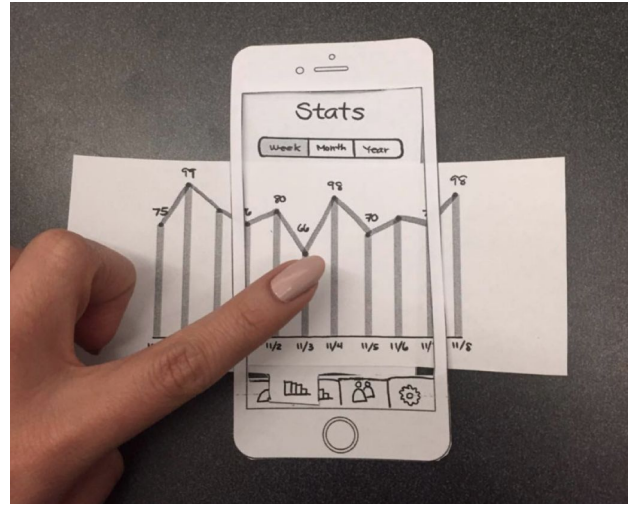


Figure 1.10

ADD ALL THE TASKS FROM 3A

# Testing Process

We decided to use people from the CSE basement labs. We chose this area because students are likely to be drivers, and especially CSE students are likely to be interested in tracking their driving habits just because it is an interesting technological way to solve a problem. We approached them and asked whether they drive a car, and if they answered yes they were qualified to test our design.

We split our testing into two parts. First we wanted to put our users through how we imagined the user to use the app for their first time, and second the activities we imagine they would want to perform after having used the app for a while. We first introduced them to the panda tracking hardware as if they had just bought it and asked them to pair it with the application it came with. Then we had them imagine that they've been using it for some time and that the app has developed some statistics about their habits, and asked them to navigate around the app and perform these different tasks.

For the first test we simply handed the user the panda device and asked them to turn it on, then gave them the first screen of the app, and asked them to pair the device with the app. This confused the user about what they are supposed to do with the panda. So for the other tests, we told the user to put the device on a computer monitor as if it was their rearview mirror. This cleared up the confusion.

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.

Overall our refined testing process was:

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

# Testing Results

## Heuristic evaluation

We identified several valuable issues during our heuristic evaluation. Overall, the tabs and buttons were intuitive because the participants had no problems finding them. However, the initial design lacked some basic functionalities (e.g. back buttons, detailed data views). One other problem we found is that the prototype did not have enough instructions on how to connect to the device. There were also a couple of minor problems, like missing indications about the scrolling functionality in Stats bar chart. With these valuable feedbacks, we made several modifications to our paper prototype. First of all, we added a pop-up instruction page that helps user pair their phone with the device. Then, we added the feature that when you click on the graph (pie chart on Dashboard or bar chart in Stats), you can see the details within. In the end, we fixed all the confusing designs so that the users should be easily to tell if a part is clickable or not.

## Usability testing 1

We identified some important issues during our first usability test. First we learned that the placement of the buttons on our panda device might be awkward especially if we were going to put it on the rearview mirror so we moved them all to the left side of the device, which faces the driver. We also learned that we did not have functionality to add friends so we added this functionality in. The user was also confused as to what the score on the dashboard was, so we added in an information button that pops up an explanation of what the safety score is. We also found that the up and down arrows in the leaderboards was easy to understand.

## Design critique

We also received two valuable feedback from TAs and peers during “design critique” section. The first design issue was the “allowed activities” functionality in alert setting. It was pointed out that the primary goal of our application is to track data, and allowing users to choose what activities/app are allowed while driving is out of the scope of our application. Thus, we deleted the “allowed activities” functionality, modified it to compute and show the most frequently used app, and add it the new functionality ‘Top App’ in Stats page under day/week/month/year views. The second design issue was the unlimited number of people we are showing in the national view

of leaderboard. Showing that many people's ratings does not only hinder user's ability to find their own ranking, but also overload user cognitive space with unnecessary information. In results, we updated our national leaderboard to show the ranking of the top 20 people. And, we made sure user's ranking will always be visible either among the top 20 or after the top 20, so it was easily accessible.

## Usability testing 2

After improving our testing process, such as rephrasing our questions, we encountered some critical incidents, both positive and negative, that helped to improve our application's functionality and design to a higher level. One positive incidents we had was that the participant liked the green and red arrows indicating the changes in safety scores. Regarding to negative incidents, we discovered that our application lacked the functionality of navigating to a different day/week/month on the Dashboard view. In addition, once the participant click on a specific portion of the pie chart to view detailed analysis, there wasn't a way to go back to the overall dashboard view. Therefore, we added an bar on top of the pie chart to specify the date that the dashboard is showing and the ability for users to switch between days/weeks/months. We also added a back button on each detailed analysis page. Another improvement we made was on the Stats page. The usability test showed that the week view with individual dates listed is still misleading and user would like to access detailed analysis through Stats page by clicking on the bars. In results, we changed the label of the bar graph for week view to only show the beginning date and end date of the week. We also allowed access to detailed analysis through clicking on the bar in Stats page.

## Usability testing 3

The third usability test went smoothly, as we have discovered and fixed most of the issues in the previous iterations. We were glad to hear the positive feedback that our third participant gave us. There are only two problems that we found in this usability test. The first one was that the participant did not realize that she could click at each individual bar in the bar chart to check out details until we told her. To fix that, we made the bars blue and fatter, and then removed the connecting lines between bars. The second problem, pointed out by our third participant, was that users might remove friend by accident and there was nothing to prevent that user error. Hence, we added a pop-up confirmation page before a friend was actually removed.



## Final Paper Prototype (1 page) (melissa)

Present your final version of your paper prototype, as you did for your initial paper prototype above. Convey the critical aspects of your design, including your two primary tasks.

## Digital Mockup (1 page) Melissa

Present your digital mockup. Convey the critical aspects of your design, including your two primary tasks. Briefly discuss any changes you needed to make as you switched to your digital tools instead of paper. Briefly discuss any changes you made in response to critique. Include descriptions of how your design supports each of your primary tasks (e.g., one paragraph per task).

## Discussion (1 Page) Novin & JR

Reflect upon and discuss your project and your results. For example:

- What did you learn from the process of iterative design?

We found this whole prototypes and testing iterations process really effective. Although we tried our best to make the initial design perfect, there were always problems that we were not expecting. We modified our design based on the feedback we got in every iteration. Doing this this iteratively were particularly rewarding, because we gathered different opinions from participants and it helped us identifying new problems that came up in the revised designs. We also learned that low-fidelity prototypes are more efficient at early design stages because we tried to make nice-looking paper prototypes on a Surface but we changed most of them after iterations.

- How did the process shape your final design?

Our design changed drastically through the process of iterative design. With the help of the feedback from usability tests, the critiques from peers and TAs, we improved our design in each iteration. We conserved most of the basic functionality we had in the initial design, and added a couple of new features that we found valuable to our product. In addition, we identified and fixed a lot of widgets that are not intuitive to users. For example, we added detailed information to each section in the Dashboard summary, we changed the design for the bar chart in Stats so that the users won't miss the app's capability, and we now support adding and removing friends, etc. In a word, our design becomes more and more mature over this process.



- How have your tasks changed as a result of your usability tests?

Our tasks were more specific for our first test, but we found that this was holding the user's hand through the task and causing us not to get all the feedback we could be getting. This led us to generalize the task and instead of presenting all the steps to the user, we defined the end goal of the task and the tools they would need to accomplish that goal.

- Do you think you could have used more, or fewer, iterations upon your design?

The number of iterations we went through was ideal. It was not so few as to where we wouldn't find all the important issues with our design but it was not too much so that we would obsess over the smallest issues. It led us to a clean and useful design with most or all of the major flaws kinked out.

# Appendix

Attach copies of all materials involved in your testing. Includes any instructions or task descriptions you handed out or read aloud to your participants. Include identified critical incidents from your usability testing. The appendix materials and screenshots do not count in your page limit.c

## Usability Testing:

We made sure all of our participants have a driver's licenses and had some experience driving a car. For all of our participants, we explained the purpose of our product and the expectations for both parties to avoid confusions and allow seamless testing experiences. We had participants imagine they are using our product in their car to simulate a real life situation. We asked them to do two main tasks, answered some follow up questions and debriefed them after.

We had two main tasks:

Set up:

- Place the device in car
- Pair with phone app
- Alert settings, volume setting
- Privacy tracking settings

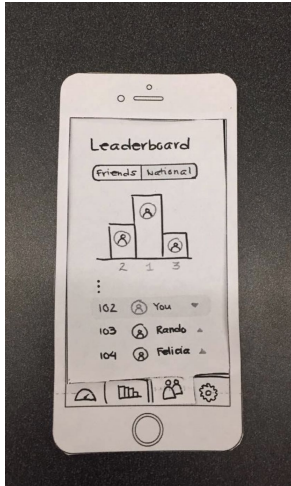
Assuming you have been using the app & device for the 2 weeks, you want to check some stats:

- Understand how you have been driving
  - Yesterday
  - This week
  - This month (what's your top used app)
- Checkout your ranking among friend, as well as among the States.
- Add a friend
- Check out a friend score
- delete a friend

Critical Incidents:

Test 1:

Image	Issue	Severity	Change	Fixed Image
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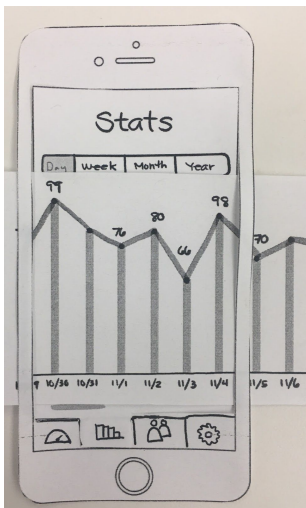
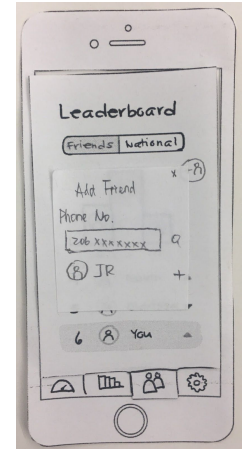
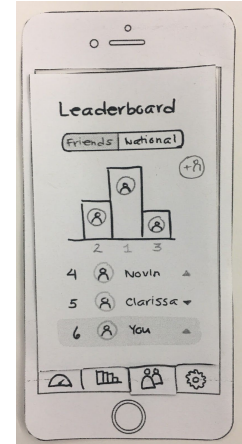


Does not support adding new friends.

Heuristic:  
Consistency and standards

2

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.

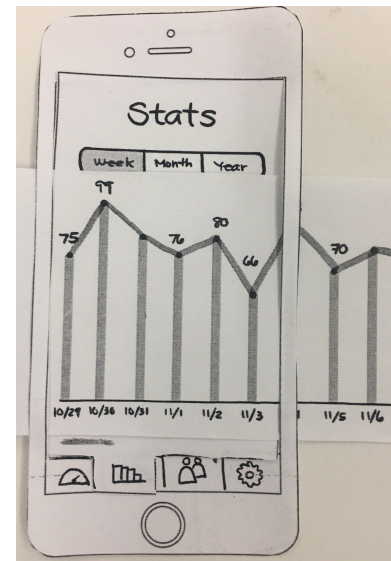


The day view does not make sense as it shows the data for a whole week.

Heuristic:  
Consistency and Standards

2

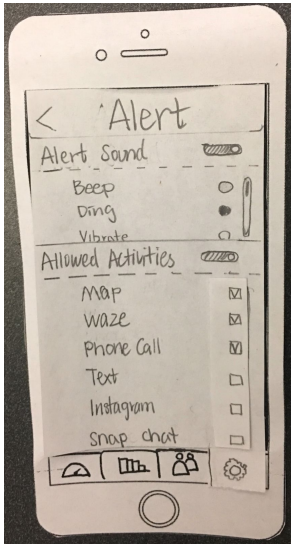
Changed back to the tabs we used to have: week, month and year.



	<p>Not enough information about the different sections represented in the pie chart.</p> <p>Heuristic: Help and Documentation</p>	<p>3</p>	<p>Able to expand the section user clicked on and show the details.</p>	
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Section Feedback:

Image	Issue	Severity	Change	Fixed Image
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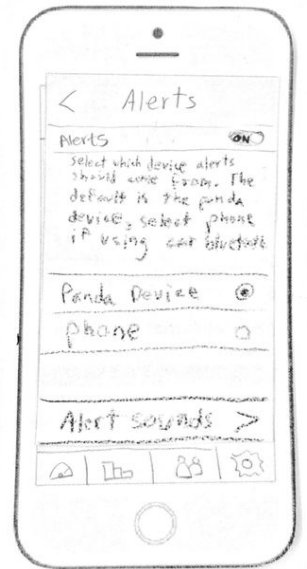
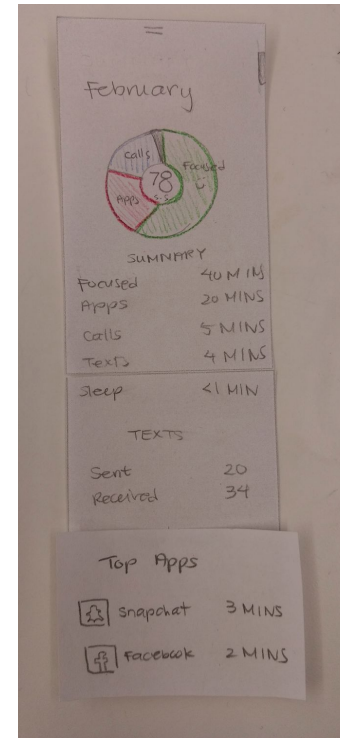


"Allowed activities" should not be allowed since the main purpose of the app is to track data.

Heuristic: Match between system and the real world

2

Delete "allowed activities". Add "Top App" in stats under day/week/month/year view to show what's the most frequently used app



	<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>	<p>1</p>	<p>Leaderboard "national" ranking only shows the top 20. And user's personal ranking will always show up at the bottom of the ranking.</p>	
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Test 2:

Image	Issue	Severity	Change	Fix Image
	<p>Unable to go to a different day/week/month on DashBoard view</p> <p>Heuristic: visibilit of system status</p>	<p>4</p>	<p>Added bars to navigate to a different day/week/month on DashBoard view</p>	

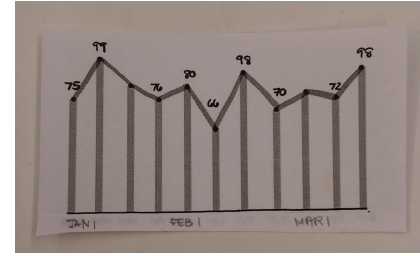


Week view in stats is still confusing with day views

2

Changed the label on the bar graph to make it clear that it is a week view.

Heuristic: match between system and the real world. Recognition rather than recall

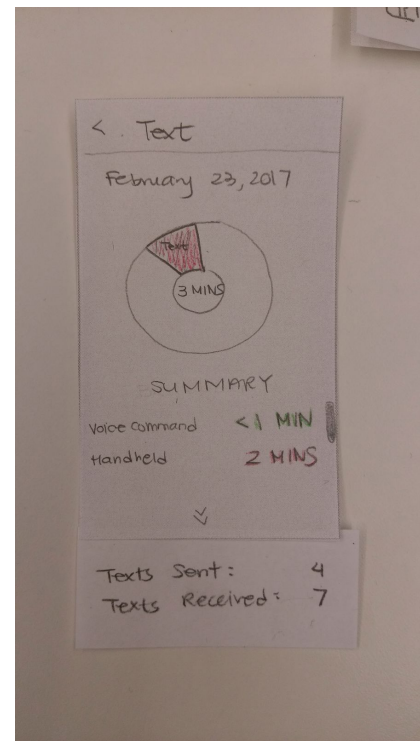


In detailed dashboard view, participant didn't know how to go back to overall dashboard view once they clicked on to the focused view

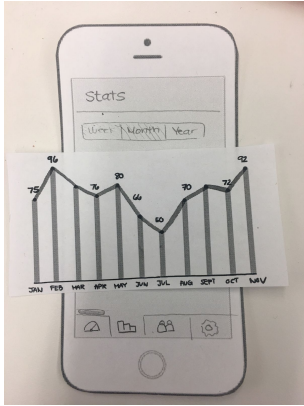
2

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 view

Heuristic: user control and freedom







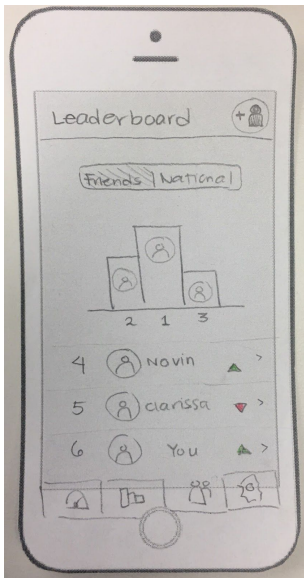
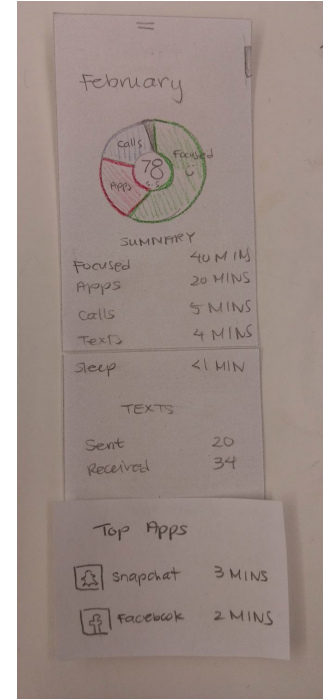
User wanted to click on a bar, but there is no breakdown of the numbers

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.



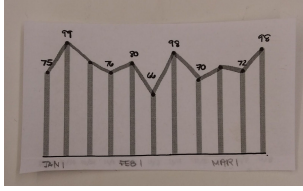
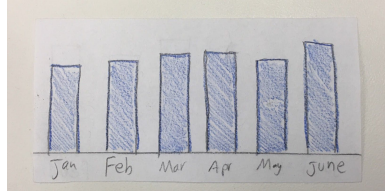
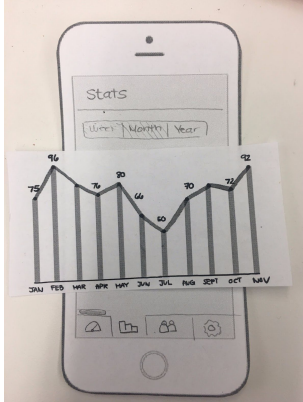
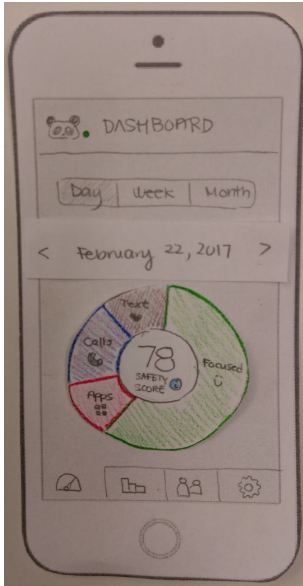
Liked the green and red arrows indicating the changes in friends' safety scores.

N/A

N/A

N/A

Task 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.</p> <p>Heuristic: Help and documentation</p>	0	The button will become more obvious on an actual screen.	N/A

	<p>Did not hesitate to click on the left arrow to view the detailed information for the previous days.</p>	<p>N/A</p>	<p>N/A</p>	<p>N/A</p>
	<p>Do not have warning when removing or blocking friends, so user might remove friends by accident.</p> <p>Heuristic: Error prevention</p>	<p>2</p>	<p>Add a pop-up confirmation page before a friend is removed.</p>	