<table>
<thead>
<tr>
<th>Image</th>
<th>Issue</th>
<th>Severity</th>
<th>Revision</th>
<th>Revision Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td>Not clear on how to connect Bluetooth. There is no button allowing a user to connect their device on the device settings screen.</td>
<td>2</td>
<td>The mobile app will automatically detect if no device has been paired. Following standard Apple procedure, it prompts the user to go to their iPhone settings to pair the device.</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td>No back button or way to dismiss the user profile page. User must click on a bottom tab to leave view.</td>
<td>0-1</td>
<td>Added an Apple style back button to the Leaderboard.</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /></td>
<td>No visual cues for scrolling on the statistics tab.</td>
<td>1-2</td>
<td>Added a scrollbar to the bottom of the screen that appears if the user interacts with the graph.</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>

**Heuristics:**
- Consistency and standards
- Help and documentation
- User control and freedom
- Recognition rather than recall
- Consistency and standards
<table>
<thead>
<tr>
<th>Image</th>
<th>Issue</th>
<th>Severity</th>
<th>Revision</th>
<th>Revision Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td>Derivation of safety score on Dashboard page is not obvious.</td>
<td>3</td>
<td>Added an annotation (“SAFETY SCORE”) under the number. A pop-up appears when user clicks on the information icon, which explains how the score is calculated.</td>
<td><img src="revision1.png" alt="Revision Image" /></td>
</tr>
<tr>
<td><img src="image2.png" alt="Image" /></td>
<td>Friends and National tabs on the user profile page are unnecessary.</td>
<td>1</td>
<td>Removed the Friends and National tab from this screen and updated page to show more relevant information.</td>
<td><img src="revision2.png" alt="Revision Image" /></td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td>Bluetooth on device seems like a button rather than an indicator of connection.</td>
<td>1</td>
<td>Removed the square around the Bluetooth symbol.</td>
<td><img src="revision3.png" alt="Revision Image" /></td>
</tr>
</tbody>
</table>

**Heuristic:**
- Help and documentation
- Aesthetic and minimalist design
- Consistency and standards
<table>
<thead>
<tr>
<th>Image</th>
<th>Issue</th>
<th>Severity</th>
<th>Revision</th>
<th>Revision Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>No option to delete friend</td>
<td>2</td>
<td>Added remove friend button in personal profile page.</td>
<td><img src="https://via.placeholder.com/150" alt="Revision Image" /></td>
</tr>
<tr>
<td><img src="https://via.placeholder.com/150" alt="Image" /></td>
<td>Week view is not consistent with the graph.</td>
<td>2</td>
<td>Added a day view of the data in the statistics.</td>
<td><img src="https://via.placeholder.com/150" alt="Revision Image" /></td>
</tr>
</tbody>
</table>

**Heuristic:**
Consistency and standards
Usability Test

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.

We had our participant complete two tasks:

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 (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

We learned from this process that we should be more organized with our paper prototype usability testing. We might assign two people to be administrator and layout paper prototypes based on the tasks sequences. We also learned that wording of questions might affect testing results. Questions and task instructions might give hints to user and might not effectively reflect the usability of our product. We also want to give more time to the participant to look at the device and explain that the ears of the panda device are speakers.
<table>
<thead>
<tr>
<th>Image</th>
<th>Issue</th>
<th>Severity</th>
<th>Change</th>
<th>Fixed Image</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td>Does not support adding new friends.</td>
<td>2</td>
<td>Added an “Add Friend” button in the leaderboard tab. A pop up window will show up and the user can search and add friends through their registered phone number.</td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td>The day view does not make sense as it shows the data for a whole week.</td>
<td>2</td>
<td>Changed back to the tabs we used to have: week, month, and year.</td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /></td>
<td>Not enough information about the different sections represented in the pie chart.</td>
<td>1</td>
<td>Added views that provide details on various sections of chart. For example, with the “Focused” detail view, users will see the time spent focused on the road and the time spent checking side/rearview mirrors. In another example, in the “Texting” detail view, users will see the number of texts sent and received as well as time spent on this activity.</td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
</tbody>
</table>
Current Paper Prototype | TASK 1: VISUALIZING AND PROCESSING DRIVING BEHAVIOR

The following hardware prototypes allow users to track driving behavior.

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

(Figure 1.2) Top: overview. Middle: Hardware switched off. Bluetooth indicator shows that mobile app is not paired.

(Figure 1.3) Side view with volume controls.
The following mobile app screens demonstrate overall data and statistics on overall driving safety.

(Figure 1.4) Homepage of recent driving activity, categorized. Center number represents driver’s Safety Score.

(Figure 1.5) Detail view when user clicks on a category.

(Figure 1.6) Month view of safety scores with side scroll.
The following mobile app screens demonstrate settings for pairing hardware.

(Figure 1.7) Selecting “Device” takes user to hardware device settings.

(Figure 1.8) Default settings. Connecting device to Bluetooth leads to next pop-up.

(Figure 1.9) Pop-up that takes user to iPhone Bluetooth settings

(Figure 1.10) Users can select sync frequency, which determines how quickly data is sent to the mobile app.
The following mobile app screens display the Driving Safety Score leaderboard.

(Figure 2.1) Friend view of leaderboard. User can select a user to be directed to their profile.

(Figure 2.2) Result of clicking on a user’s profile.

(Figure 2.3) Users can add friends by phone number.

(Figure 2.4) National view of the leaderboard.
Usability Tests  |  PLANS

Target Participants
We aim to conduct our next tests with an experienced driver and a professional driver (e.g. Uber driver).

Goals For Additional Tests
After our first iteration of usability tests, we are interested to see if our revisions are acceptable. We will be conducting additional tests for adding friends, viewing driving details via the pie chart, and controlling hardware settings (e.g. volume). If users believe that onscreen tutorials would be helpful with the product, we will update our design to include introduction screens. Our goal is for our user to understand the entire tool with minimal prompting and explanation.

Team Member Roles
Clarissa – Administrator
Melissa – Note taker and observer
Novin – Computer
Jiarui – Note taker and observer

Approaches
We will try to see if using the app in a more authentic environment, such as a stationary vehicle, will reveal any more issues with our product. As mentioned, we will be careful to word questions and task instructions in a way such that we do not reveal too much information on how the user is expected to interact with our product. Finally, we want to provide sufficient time for our participants to go through each possible interaction with both the panda device and mobile application.