

Part 3F – Final Report

1. Snow Safe

“Helping people drive safer on snowy or icy roads.

2. Each Team Member’s Name and Role

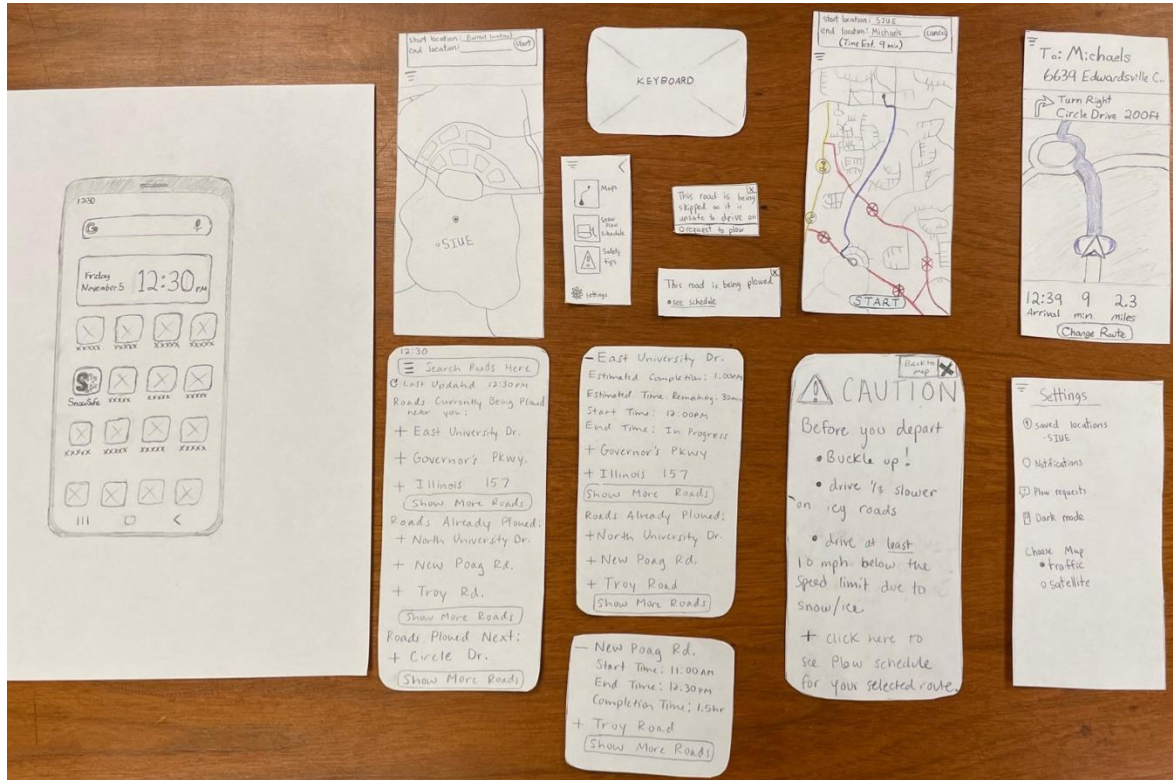
- Kaitlyn Dempsey - 25% testing process, testing results, final paper prototype
- Kristina Tschomakoff - 25% discussion, appendix
- Shaun Raftery - 25% edited paragraphs
- Stephanie Lato - 25% problem and solution overview, initial paper prototype, digital mockup, appendix

3. Problem and Solution Overview:

Poor weather conditions result in approximately 22% of the accidents that occur each year. Nearly 2,000 people die and over 135,000 people are injured each year due to car accidents on icy and snowy roads. We were inspired to tackle this problem because of the many accidents that occurred in Fort Worth, Texas, this year due to the icy road conditions. Our hope is to find a way to make the roads safer to drive on and decrease the number of fatalities and injuries. To accomplish this, we have decided to make an app with features such as including directions to the user’s destination that avoid the most dangerous, snowy roads. After the user enters a destination, dangerous roads are marked with in red and labeled with an ‘X’. This way the user knows which roads are dangerous right away so they can avoid them while driving. The suggested route is labeled purple for the user, and roads that are currently being plowed are colored yellow. The app would also be a way for local city government to provide updated information about which roads have been plowed as well as an estimate of when roads will be plowed. This snowplow schedule can be accessed by the menu in the top left corner or by clicking on a yellow road on the map. This schedule allows the user see an estimate of when the roads will be plowed so they can plan their commute based off of this information.

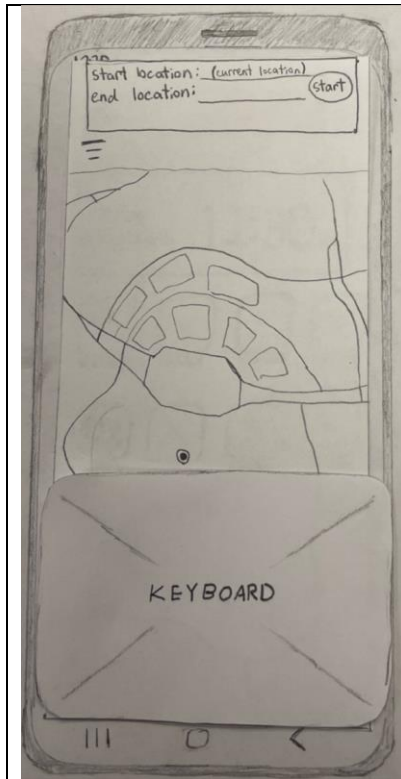
4. Initial Paper Prototype:

Original Full Paper Prototype:

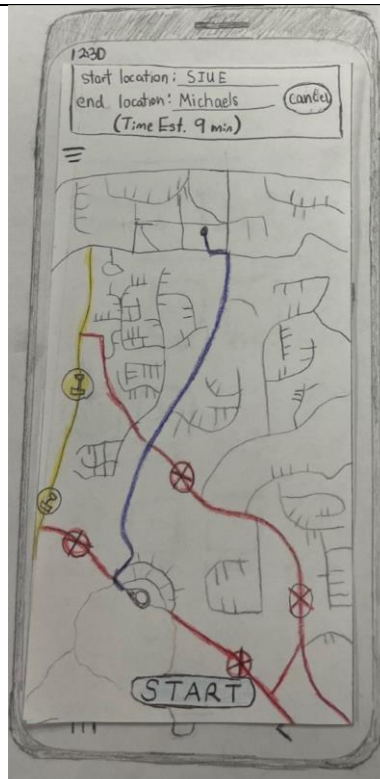


Original Task 1: Giving directions while avoiding dangerous roads

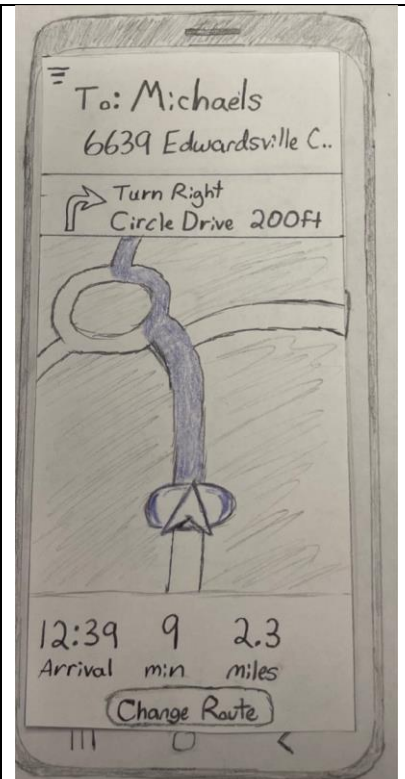
For our first task, we provide a map and directions that take into account the snowy roads after the user enters a destination.



This is the screen users see after they click on the app. They can use the keyboard to enter their destination.



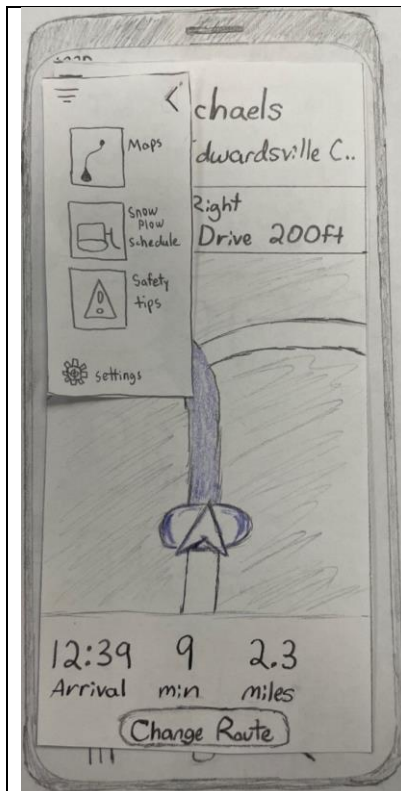
After the user enters a destination, the app displays the suggested route in purple, as well as dangerous roads in red, and roads currently being plowed in yellow. The user can press start to begin their route.



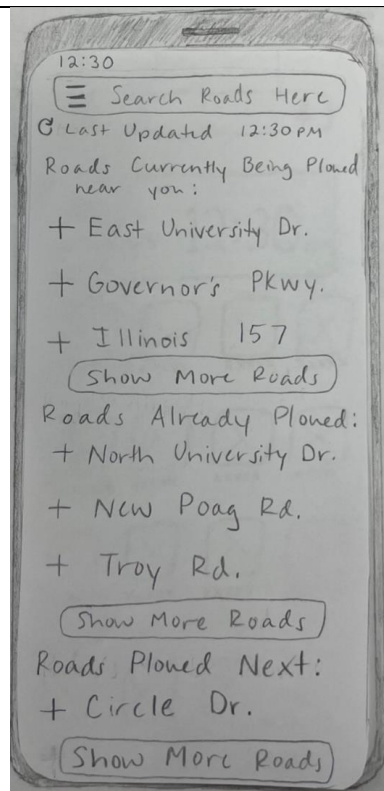
After the user presses start, the app displays a close up version of the directions and route in purple. It also displays other useful information about where to turn next, the address, as well as time and distance estimates.

Original Task 2: Provide a snowplow schedule

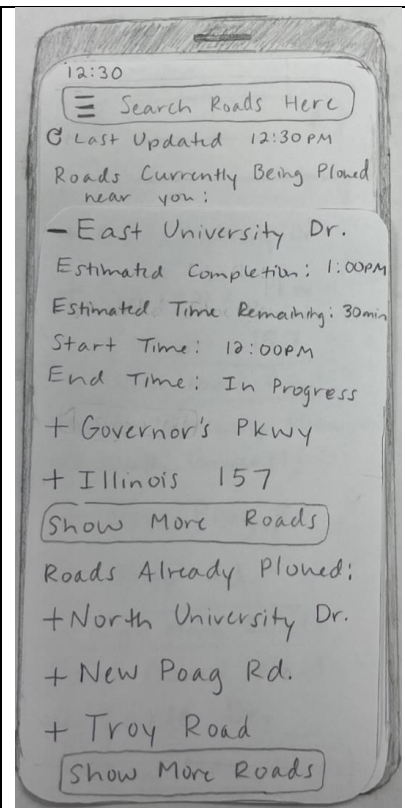
For our second task, we provide a snowplow schedule for users so they can see which roads are currently being plowed, finished being plowed, and going to be plowed soon.



The user can check the snowplow schedule by pressing the menu in the top left corner and then selecting "Snow Plow Schedule".



The app shows the users when roads are currently being plowed, roads already plowed, and roads to be plowed next. The user can refresh the page to get the most updated information.



The user can press the "+" sign on the left of the road names to see more information about time estimates. The rest of the page will shift down. The user can press "-" sign to show less information. Users can also press show more roads if they would like.

5. Testing Process:

In order to collect the data that we needed to finalize our design, we went and asked willing participants to test our design. The first people we tested were students from this class (Group 5, Group 2, Group 9). We met with them in the library during class time and gave them feedback and they gave us feedback. We led them through our app and how to navigate it. Doing it this way allowed us to receive some general feedback overall, but not anything super specific. While this did give us some helpful feedback, we realized it would be more effective to have the testers try and run through the application on their own without explanation, so that is what we decided to do for the next part of the project.

For our next tests, we asked someone we already knew (Susan), to navigate the app and it ended up working better, and we got more specific, helpful feedback. Finally, we asked willing students in the library (George, Ella) to go through and see if they could complete the tasks that we gave them. All of these are potential users. One is a new driver, and the others either need to commute to school or work, so they could all benefit from using our app in bad, snowy conditions.

For these tests, we gave users a general overview of what we wanted them to do. However, we did not walk them through the two tasks. We wanted to be able to observe which buttons they would press and see if they could navigate through the app without help. That was if they had any problems, we would be able to make the necessary changes to the paper prototype before we made the digital mockup. Also, each time we ran these tests we would ask the participants what they thought we could do to improve the design. Overall, observing the participants really helped us notice parts of our design that we could improve in order to make our design better and easier to use.

6. Testing Results:

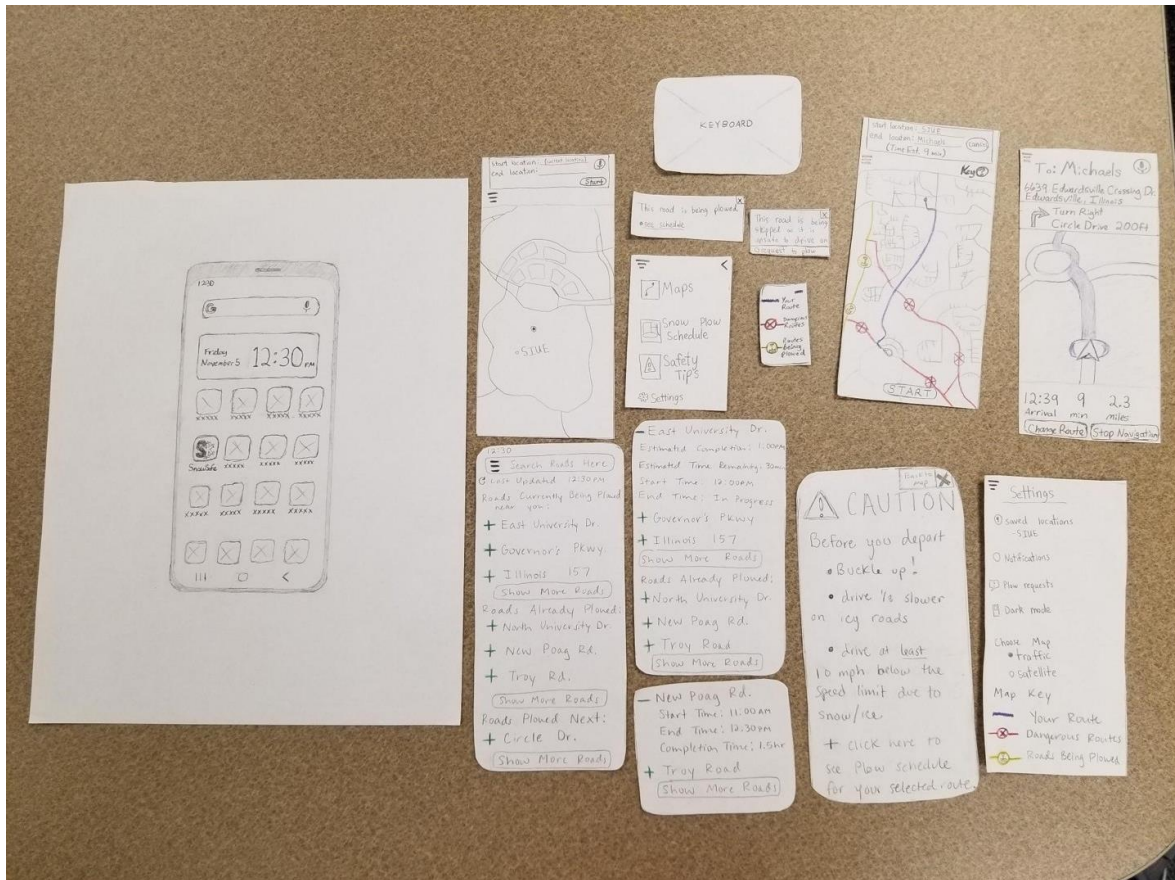
Our first round of tests that we did with the heuristic evaluations with other groups in the class. We received feedback from groups 5, 9, and 2. For these evaluations, we walked the groups through our first tasks. We showed them what the users would press to easily navigate through the two tasks. This way, we were able to figure out some of the more obvious problems that could be identified as we went through how to use the app. We learned that we need to start by cleaning up our design, which included making the time page clearer, and uncluttering some of the other screens. To fix the time page we added more information about how long the trip was estimated to be, including showing the estimated trip time before the route is scheduled. We also cleared up some screens like the plow schedule with the collapsible information. We also added some useful information such as writing out the address of the users destination completely in case they wanted to easily access that information. We also added a stop navigation button so users could easily get out of the directions to their current route. At the end of the class when we completed the heuristic evaluations, one group recommended we just let people test our app without clear directions so that we could maybe find out smaller problems in our design that we wouldn't notice just by telling potential users what to do. So that is what we planned to do for the three usability tests.

Next we tested Susan for the first usability test. Susan is a new driver, so she could benefit from using our app during snowy conditions. As she was going through the test she questioned what the colors on our map were intended to mean. We determined that the “key?” button was not clear enough and made the button bold and larger. We also added the key in the settings page in order for there to be another place where the users could access that information. This user did not struggle with the second task at all.

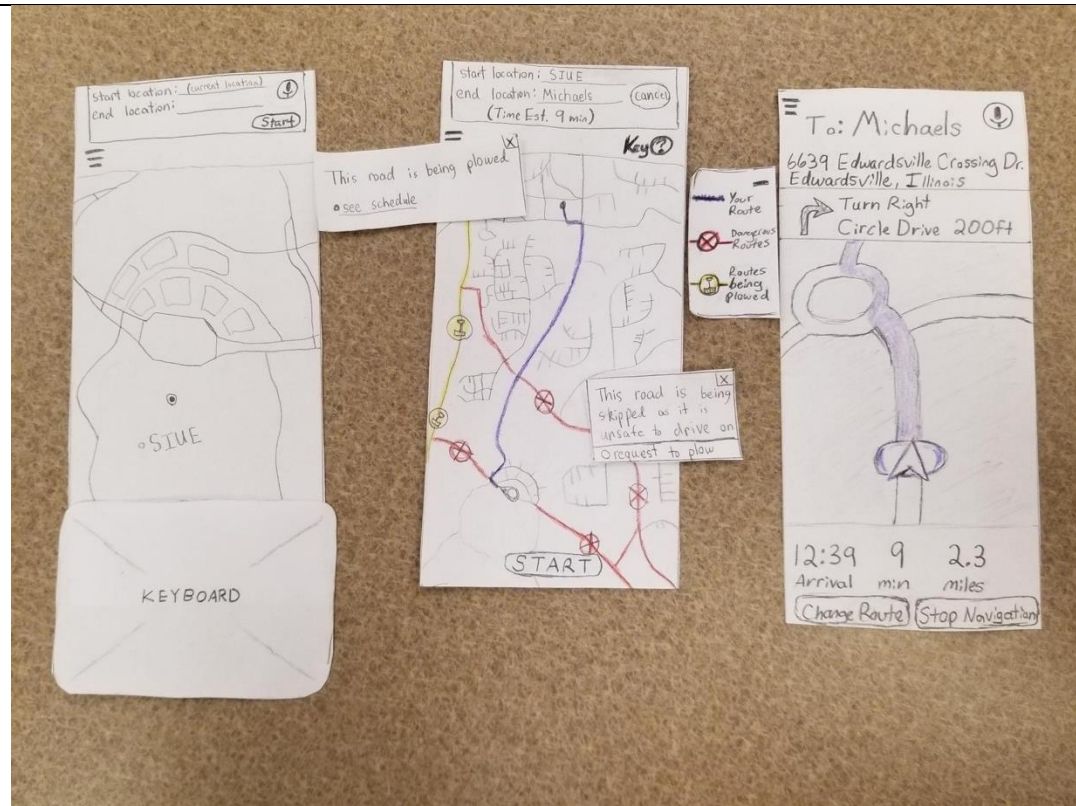
The next person we tested for the design critique was George. He had problems with reading some of the menu words and figuring out what the symbols meant as well. From these tests, we decided to enlarge the menu so the words could be easily read by anyone who uses the app. This also reminded us we needed to make our app easy to use for as many people as possible. So we decided to also include a microphone icon so the user can say what they want their destination to be instead of using the keyboard to type it in. In addition, we also added in the map key into the settings tab so users could learn what the symbols of the map mean even if they don’t know to click the “key?” button.

Our third and last usability test was with Ella. Like George, Ella completed the first test with little to no problems. The second test was a bit harder for her to complete. She had trouble accessing the snow plow schedule. This is why we decided to bold the menu symbol in the top left corner. We also decided to make the snowplow schedule accessible from multiple different places such as the menu, a popup if the user presses on a yellow road, or the warning popup screen that will appear when the user starts their route. We also decided to make the “+” signs green since neither Ella nor George knew they could press those to find more information. We think that making them green will let users know that they have the option to press it and it will display more information. The “-” that replaces the “+” sign after the user presses it will also be green. Users can press the “-” sign to hide the extra information.

7. Final Paper Prototype:

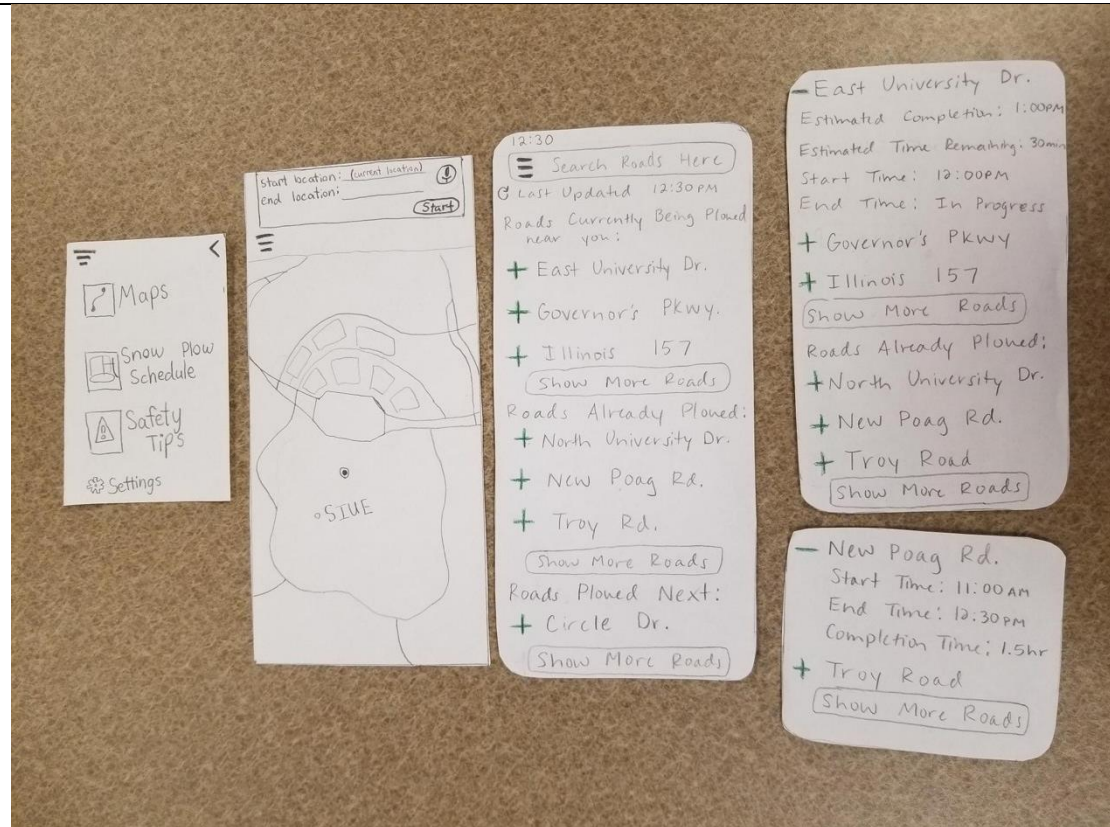


First Task Pictures



Our first task is to be able to get directions to any location specified by the user. After the testing phases we ended up changing different aspects in order to make changing directions and understanding the maps clearer. First, we bolded the key because our testers were having trouble knowing how to figure out what the different road colors meant. We also added a stop navigation button so users could end the directions easier.

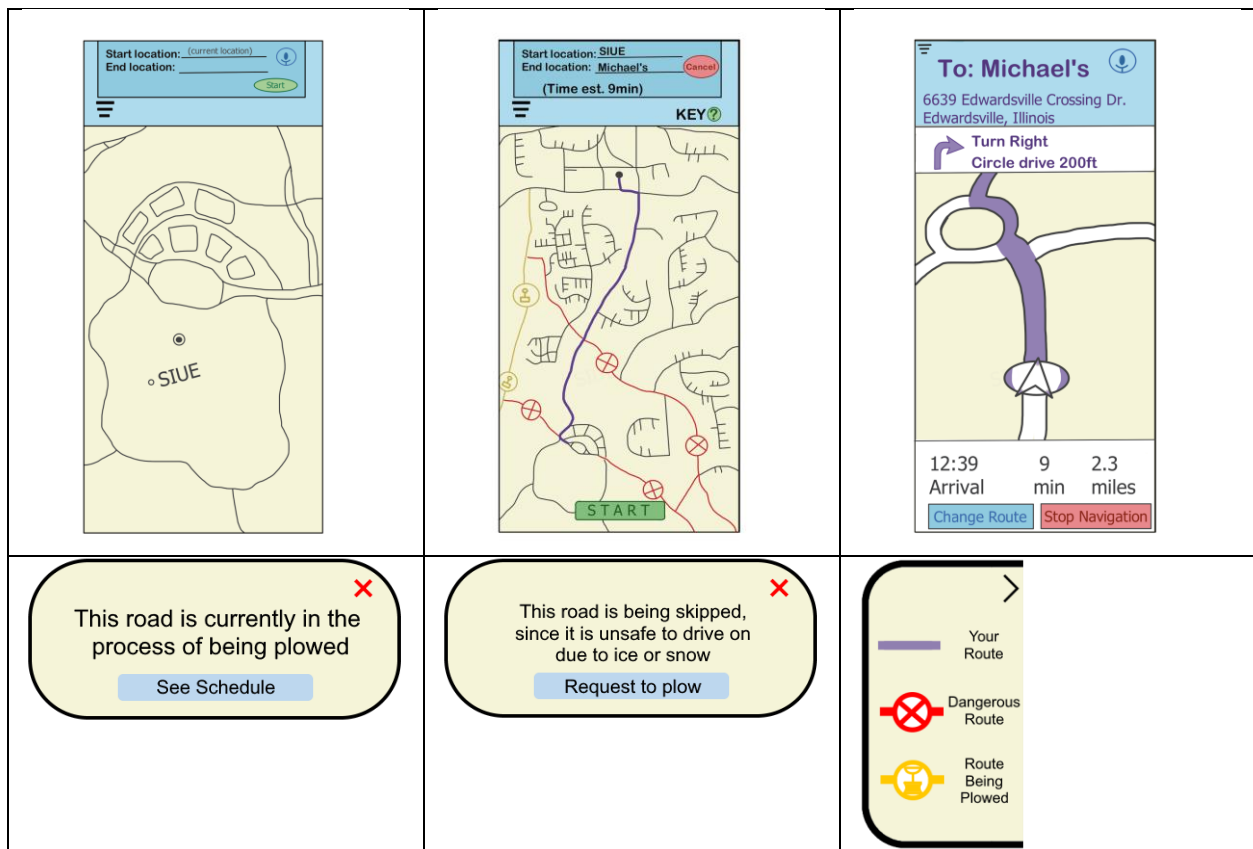
Second Task Pictures



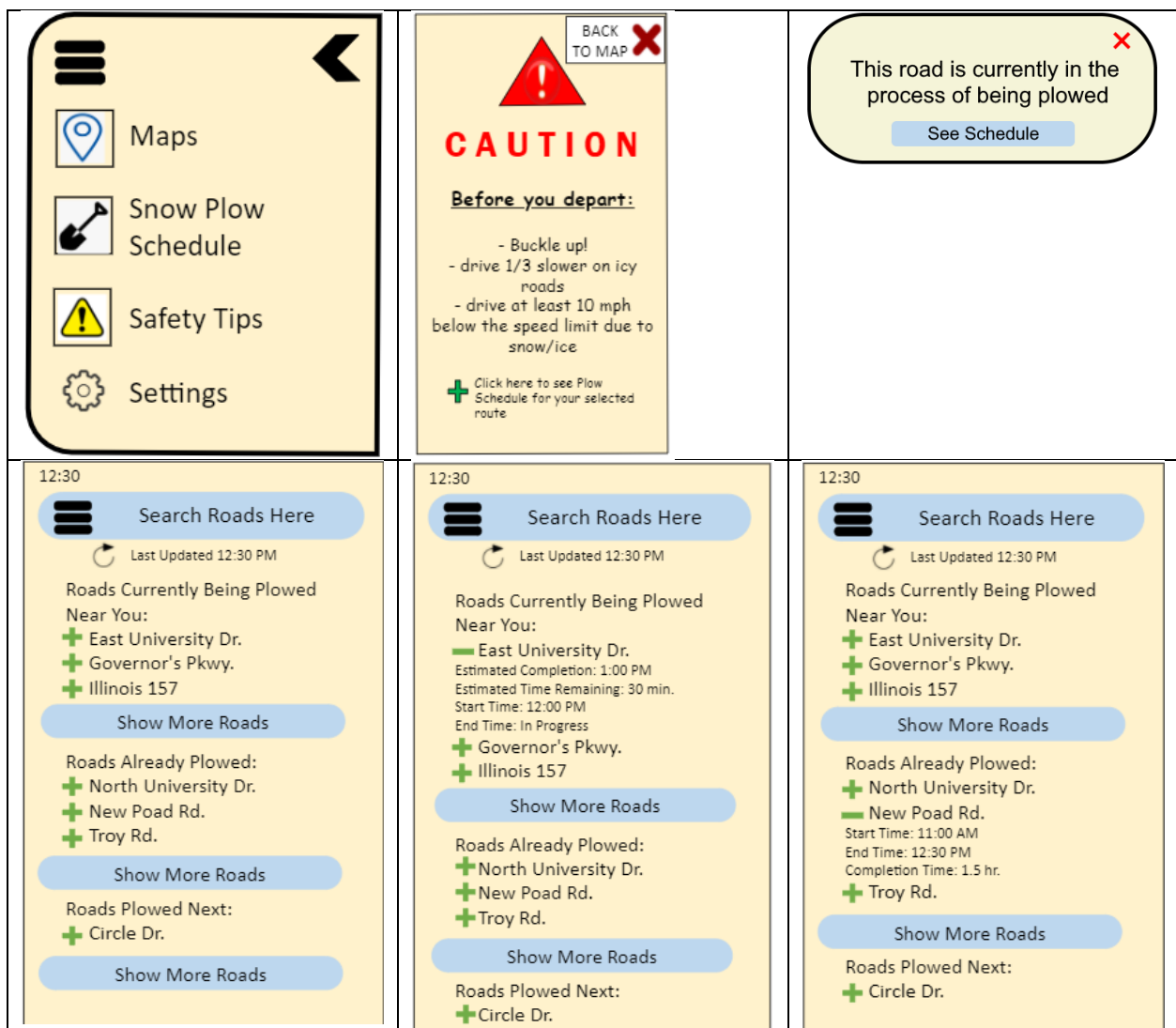
Our second task included getting the snowplow schedule and getting information about when they would be out and how long they would probably take. After the testing phases we ended up changing the pop-out menu and added some small changes to the snowplow schedule design. First, we enlarged the pop-out menu in order to make it easier to read. Then we added some green to the snowplow schedule to show that users can click on the “+” icons to get more information about a specific road.

8. Digital Mockup:

For the first task, we have included the main three images in the first row, and other useful images in the second row. In the first row, we have the first page the user will see when they open the app, followed by what they will see when they enter a destination, and what they will see when they press start. In the second row, we have two popups that will show up on the screen if the users press a yellow road or red road. The last image is what will appear if the user presses the “key ?” button. For the key, we changed the minus sign to an arrow so that the user can press to hide the key. We changed this to be more consistent with our other menu page in our app and to make it clearer what the button does. We also added a background color in the digital mockup. We chose an off-white/yellow background to soften the light of the screen that could be distracting while driving. In the pop ups, our test was changed a little bit for clarity.



For the second task, we have included the three main images of the snow plow schedule in the second row, and different ways to access the snow plow schedule in the first row. Users can access the snow plow schedule from the menu by pressing the three black lines in the top left corner and then clicking the “snow plow schedule” button, or by pressing the “+” button on the warning popup, or by pressing the “see schedule” button on the pop up if the user presses the yellow road on the map. In the menu, we changed the icons for each category in the digital mockup. Specifically, we changed the maps icon to the location symbol, and we changed the snowplow schedule to a shovel. In the warning popup, we changed the bullet points from circles to dashes, as well as moved the caution symbol to above the word instead of to the left of it. In the second row, we have the main pages of the snowplow schedule. We also showed an example of what would appear if the user presses the “+” button. If the user presses the “-” button, the extra information will be hidden again like the first picture.



9. Discussion:

From the process of iterative design, we learned that our ideas will change throughout. We had to be willing to change our original idea in order to better help solve the problem we focused on. Because of the iterative design nature of this project, the final product and other final prototypes did not end up being the same as our initial brainstorming of ideas/plans. Initially, our project brainstorm up through task review in part 2 had an additional design component which we chose not to focus on going forward. This component was still addressing snow on the roads, and we were throwing around the idea of figuring out a way to possibly heat the roads/keep them dry so the snow melts off with either some heating system on the road or car. We ended up focusing on our other idea of an app to keep drivers informed about dangerous conditions both on and off the road. This idea is more practical and it already build and improves upon current practices already in place. And this is the purpose of iterative design, to further refine initial ideas to make them better and better.

In addition, this process helped refine our design further when we chose to focus on the informative app. We first had six tasks in our task review which we were able to narrow down for the purposes of this project in order to focus on the most realistic and important ones. Our six tasks were giving directions to a destination, informing people of safer routes in addition to marking dangerous roads, commuting info from local city management/information about when plows go out, lighting system to help drivers see, heating system to help clear roads, and giving advice on how to drive in poor conditions. The two primary tasks we ended up focusing on for the paper prototype were informing safer routes and marking dangerous roads, and giving snowplow information. The iterative design process made it clear that certain tasks that were either not feasible or practical to the design had to be removed, such as road heating and additional lighting.

During the usability tests, our tasks stayed pretty much the same. We still wanted to give users directions to their destination while avoiding dangerous roads, and give users access to a snow plow schedule. However, our design changed in order to make our app more user friendly. We changed parts of our design to make it more consistent throughout our app. We also changed a few icons so that users would have a better idea of what they represented on our menu after at least one of our participants didn't understand them right away. We added a key for this reason as well. We decided to change some of our buttons to help users realize those buttons would give them more information when some of our test participants didn't know they could press those buttons. I think the amount of iterations on our design was adequate. We think we were able to improve our design of our app especially after all of the usability tests. However, there was possibly more we could have been done because a design can always be refined and improved.

10. Appendix:

Interview Questions:

- Compare/contrast your experience driving in good vs bad weather conditions.
- Do you have any ideas on how driving in bad conditions could be better?
- Do you feel you would benefit personally from something to make driving in snow safer and easier?
- Would you be willing to implement the proposed technology in their vehicle (heaters, lights, etc)?
- Do you have any specific stories about scary or bad experiences while driving in bad conditions?
- Have you experienced a difference in the conditions of different types of roads (highway, city, country)? Do any get more treatments than others? Do you feel safer on a specific type?
- Do you feel safe riding with others during bad weather conditions? Do you feel safe driving others during bad weather conditions?
- Is there certain places when driving in icy conditions that you are more careful in?

Instructions before usability testing: First of all, thank you for agreeing to test our paper prototype of our app, SnowSafe! So we will give you the starting page of paper for our app, and then depending on what you press we will show you different pages. So really all you need to do is pretend you are using our app for the first time, so press on the paper whatever “buttons” you would normally try in order to navigate through the app as if this is an app you just downloaded on your phone. We will give you two different tasks, and ask you to try to complete the tasks solely by pressing buttons on the paper prototype. One member of our group will also be taking some notes based on what you press or don’t press. These notes are just for us to help improve our app. We are going to try not to give you any hints on what to do besides these instructions because we believe that just observing you will help us improve the app better because it will show us potential problems if you have a hard time completing the task. Do you have any questions before we start? ... (user asks any questions they have) ... Okay, the first task is to obtain directions to your destination while avoiding dangerous roads. ... (user completes the first task while we take notes) ... Great! You have completed the first task. The second task is to access the snowplow schedule. ... (user completes the second task while we take notes) ... Good work! You have now completed the second task. This completes our usability test. Thank you again for agreeing to participate! We hope you have a great rest of your day!

Critical incidents from usability testing:

- Users were confused on what the different colored roads meant, so we decided to add a key
- User had trouble reading text on the menu, so we made the font bigger
- User did not figure out how to access snowplow schedule quickly, so we added multiple different ways to access the schedule (pop up, menu, warning page)
- User did not know that pressing the “+” button would show more information right away, so we changed the color of the “+” to green to signify that it was a button users could press
- User did not see menu icon in top left or the key in top right very quickly, so we bolded it to make it more obvious