Tango

CS 147 Winter 2021

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Project Name & Value Proposition

Project Name: Tango

Value Proposition: *It takes two to transit!*

Team Members

Alex Escudero - *Designer*

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Problem and Solution Overview

Just like how it takes two to Tango, we believe that it also takes two to transit! Tango's mission is to match students with other students in their area using the same public transportation. This way, students will have a transit buddy on their journeys — which helps to make their daily journeys safer and more fun.

Our needfinding results demonstrated that college students often feel uncomfortable riding alone on public transportation. However, they struggle on a regular basis to find friends taking public transportation at the same time.

Tango helps student commuters discover their travel buddies, Tango also helps buddies break the ice by providing game options for buddies during the ride, so that they have a transit buddy who can be accountable for their safety and vice versa!

Needfinding Interviews

Before we decided to focus on the issue of personal safety on public transport, we explored across different sub-topics under the broad umbrella of health and wellness, including health habits tracking, mental health and personal transformation, and physical safety.

We interviewed extreme, moderate and non-users of health and wellness apps, hoping to capture a range of user insights and perspectives that will help us understand our target audience better. With regards to safety, the interview questions that we asked included:

- ❏ What makes you feel safe when you’re in public?

- ❏ How safe do you feel walking in your neighborhood alone?
- ❏ Have you had any recent experiences in public spaces that made you feel safe or unsafe?

We gathered a range of responses, with the common thread being people being able to derive safety from being in groups, and the importance of support from the community.

> *"Confidence in my physicality comes from weight lifting and makes me feel safe."*
>
> - Interviewee A (Male in mid-20s)

> *"I always go out with friends, I don't drink, and I always let people know where I'm going"*
>
> - Interviewee B (Female college student in early-20s)

> *"I always try to exercise with a buddy and to keep a close contact that knows his whereabouts at all times."*
>
> - Interviewee C (Male college student in early-20s)

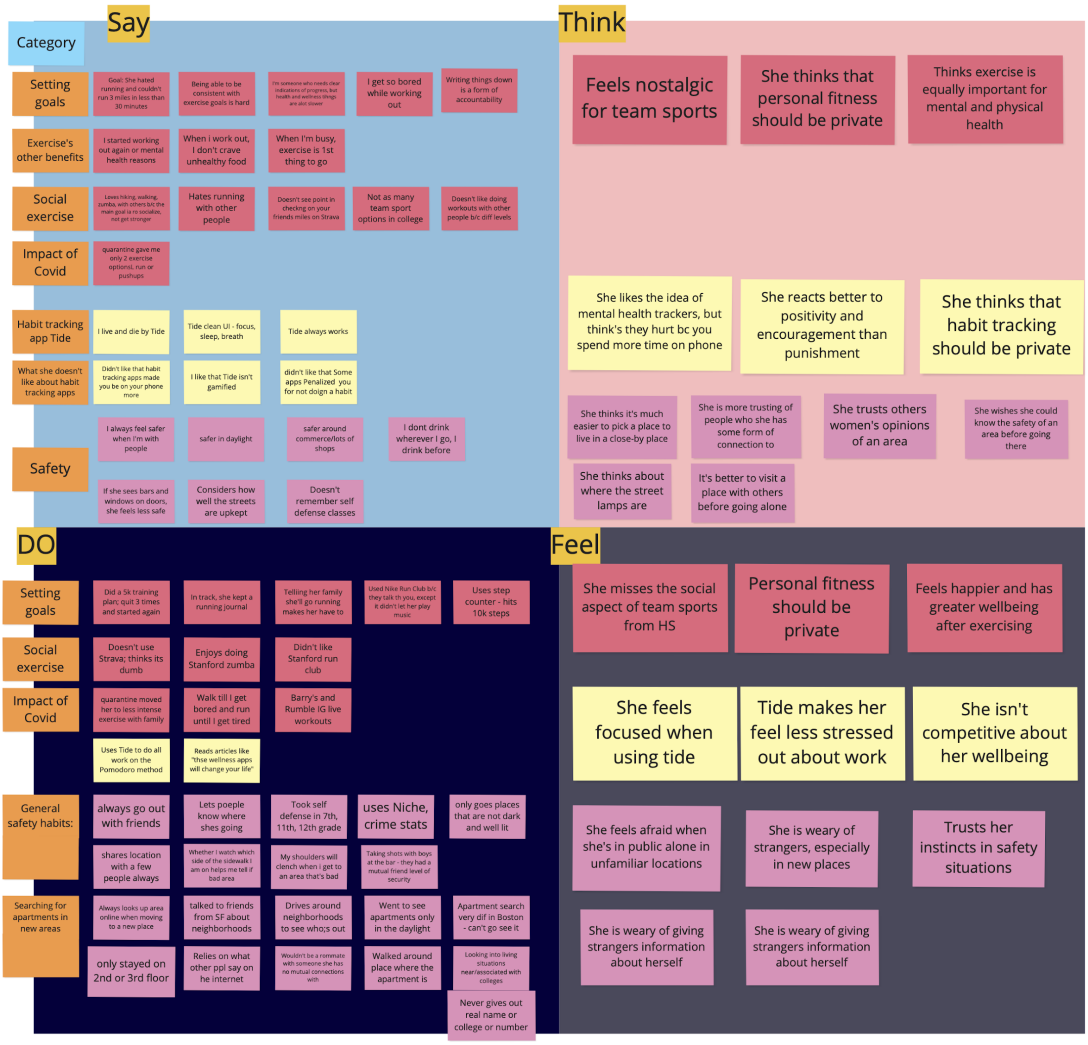


Figure 1: An empathy map created post-interview

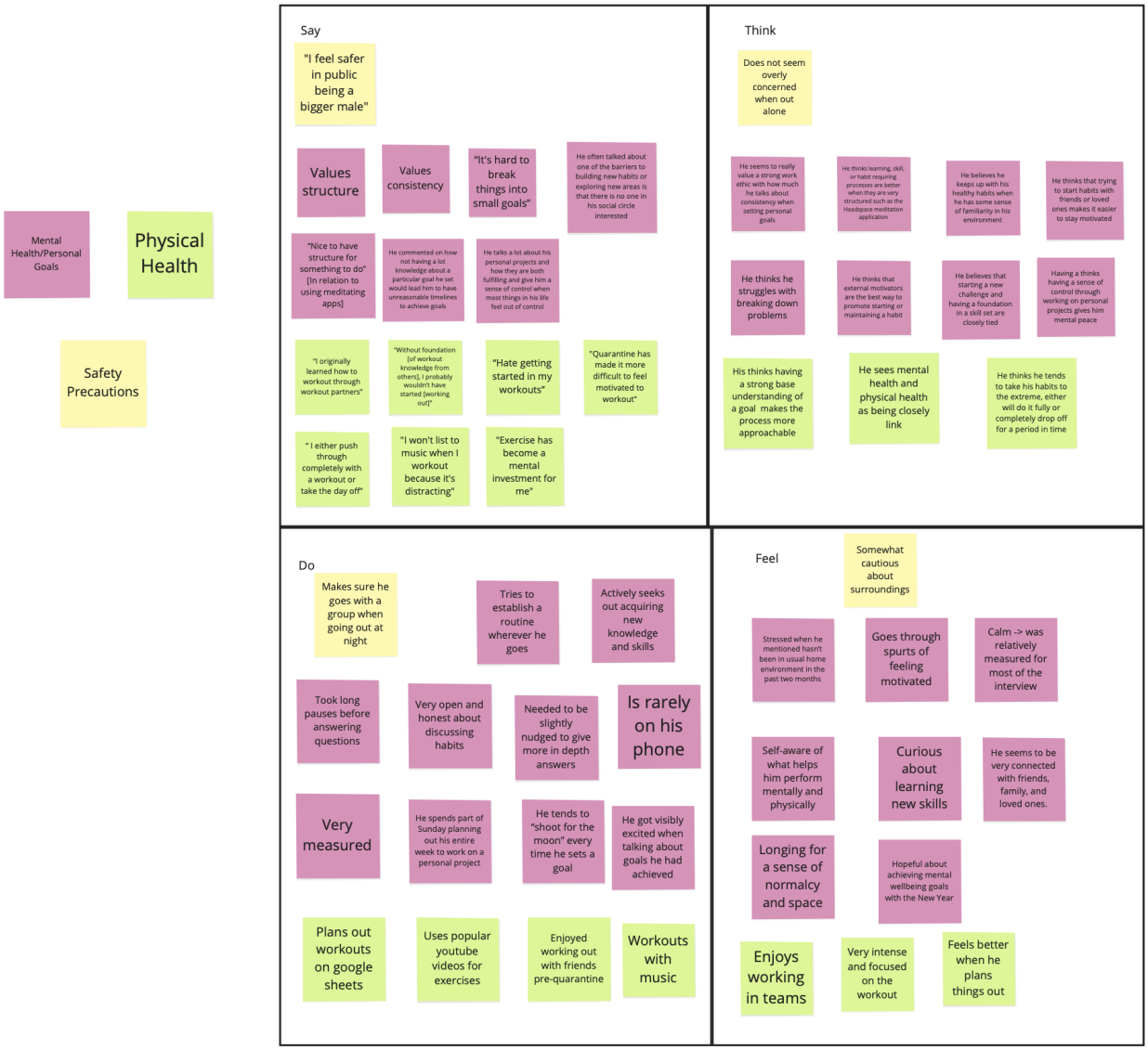


Figure 2: Another empathy map created post-interview

From the interviews and empathy maps, we decided to focus on the topic of "Physical Safety in Public Spaces" because it is not as much of a well-explored or well-defined space compared to other aspects of health, such as health habit tracking, meditation, or fitness apps

We then conducted two more needfinding interviews to investigate more surrounding the topic of safety and gained valuable insights.

"I know there are important actions that I should take now to ensure my safety, eg. designating emergency contacts, in case there is a real emergency, but I don't feel a pressing need to act on it at the moment."

- Interviewee D (Female college student, mid-20s)

"As long as I'm doing everything in my reasonable power to be safe, I'm okay taking a risk. There's a certain level of risk I can withstand.

Knowing what is happening around you goes a long way."

- Interviewee E (Female, mid-50s)

POVs, HMWs and Experience Prototypes

Final 3 Points of View (POV) and How Might We's (HMW)

POV 1: Rekha, College Student

We met ... Rekha, a 20 year old college student who rides public transportation to get to her in-person internship because she doesn't have a car.

We were amazed to realize that ... she feels significantly safer on public transport when she is with other people, but COVID-19 has made it so that she is more frequently alone.

It would be game changing to ... help Rekha feel and be safe on public transportation.

Sample HMWs for POV 1

- ❏ HMW equip commuters with the skills to protect themselves?
- ❏ HMW help public transit workers help foster safety on train?
- ❏ HMW make students feel less alone on public transit?
- ❏ HMW improve train car designs to make students feel safe?

- ❏ HMW set up a train so that student commuters can never be alone in one section of the car with just one other person?
- ❏ HMW utilize other passengers to make each other feel safe ?
- ❏ HMW encourage other passengers to be upstanders if they see an uncomfortable situation?
- ❏ HMW give commuters safety in numbers at all times?
- ❏ HMW create an alarm system on a train?
- ❏ HMW give every passenger their own personal security guard?
- ❏ HMW we discourage harassment/violence from potentially dangerous passengers?

POV 2: Stanford International Graduate Student

We met ... a Stanford international graduate student who recently moved to Stanford's campus from her home country.

We were amazed to realize that ... she has not really seen the need for 'apps' for safety, or take certain actions, but that may be because she hasn't been able to explore her new neighborhood as much as she wanted to due to COVID.

It would be game-changing to ... encourage her to overcome her 'inertia' of action and start taking action to safeguard her personal safety.

Sample HMWs for POV 2

- ❏ HMW use city data to paint a picture about a neighborhood?
- ❏ HMW introduce a tourist/newcomer to a city to an accredited local to help them safely navigate a city?
- ❏ HMW we crowdsource safety reviews for major cities/tourist spots?
- ❏ HMW teach tourists/newcomers to a city about basic safety practices?
- ❏ HMW we be able to give a virtual tour of a city focused on safety?
- ❏ HMW we provide typical college safety resources such as 5SURE to the general public?
- ❏ HMW make safety information about an area more accessible?
- ❏ HMW make a virtual visit more informative than a physical one?
- ❏ HMW connect new coming residents to one another?
- ❏ HMW give everyone who moves to this city a newcomer guide?

- ❏ HMW simulate the feeling of walking around in a neighborhood without actually walking in it?
- ❏ HMW connect her with safety resources available in the neighbourhood she is in?

POV 3: Tamar, Well-travelled Mother of 3

We met ... Tamar, a middle-aged, well-travelled mother of 3.

We were amazed to realize that ... despite being a cautious person, she still occasionally prioritizes sense of adventure ovr safety and engages in activities with a moderate or high element of risk, eg. visiting locations with less footfall and traffic

It would be game changing to ... provide her with a way to have meaningful experiences without compromising on her and her family's safety.

We focused on completing the HMWs for the other 2 POVs, which we felt were closer to our target audience (college students), and did not brainstorm HMWs for Tamar's POV.

3 HMWs, Solutions, and Experience Prototypes

After much discussion and deliberation, we came up with the top 3 *HMWs* statements that we found the most compelling, according to criteria such as feasibility, impact and ethics - we listed them out on the large title post-its on the Miro board below (Figure X). We then proceeded to brainstorm possible *solutions* for each of the 3 best *HMWs*, listed on the smaller post-its below the large ones.

After selecting the top 3 *solutions* overall, we then proceeded to generate *experience prototypes* in order to test each of our solutions, since solutions make certain assumptions - eg. human behavior, trust, or interest - which would potentially determine the effectiveness of the solution.

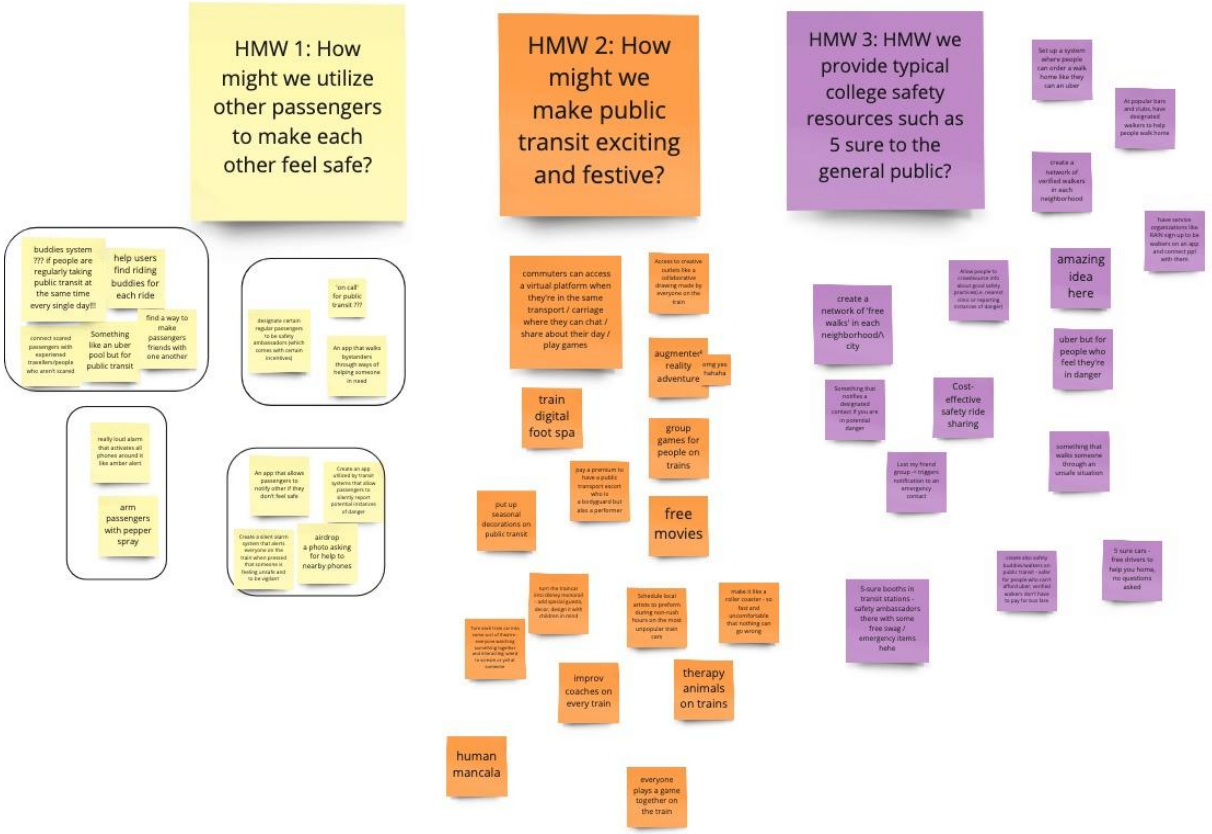


Figure 3: Brainstorming Solutions from each of the Top 3 HMW

The section below is grouped into three broad themes, each headed by a unique HMW statement, respective proposed solution, as well as experience prototype. The three HMWs are:

- HMW utilize the strength of crowds, using other passengers to help one another feel safe?
- HMW encourage students to more effectively engage with their own safety?
- HMW utilize the strength of crowds, using other passengers to help one another feel safe?

Utilizing Strength of Crowds

Full HMW: How might we utilize the strength of crowds, using other passengers to help one another feel safe?

Solution: Each time students use public transit, we will match the user with a buddy who is traveling in the same direction. We can then promote safety by letting them keep a lookout for each other.

Experience Prototype 1: Prototype Service

- Assumption: Users would be receptive to being grouped with trustworthy transit buddies.
- Method: Craft a Boston U mock student project on public transit safety, sending it to other BU students. Use a click tracker to gauge interest (T = public transit)
- Results: Counted 20 clicks out of 34 total impressions
- Validity: Idea is valid! Majority of students took action to sign up and expressed interest in signing up for the app

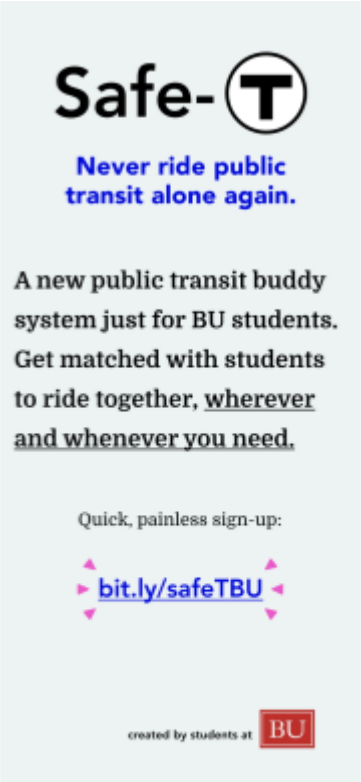


Figure 4: Experience Prototype 1 - Prototype Service at Boston University

Encouraging Students to Prioritize Safety

Full HMW: How might we encourage students to more effectively engage with their own safety?

Solution: An app that readily notifies users' designated contacts whenever the user feels like they are in a potentially unsafe situation. Notification auto-includes essential information, eg. last location of user, device battery level. This is better than manually texting, as it is hard to include so much essential information in the text in a short amount of time.

Experience Prototype 2: Emergency Text Testing

- Assumption: Users are more likely to respond or look at a message on their phone while focusing, if the message is marked as important.
- Method: On a zoom call, the test subject (Aisling) read a book with her phone face up next to her. 2 minutes into her reading, her friend Kendall sent her a normal text message and 4 minutes in, Kendall sent her an emergency message starting with the title "HELP EMERGENCY" (Figure X)

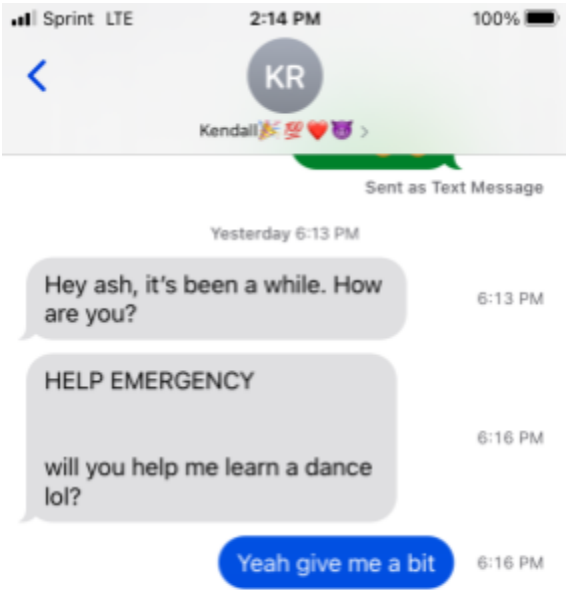


Figure 5: Experience Prototype 2: Emergency Text Testing

- Results: While Aisling ignored the first text, she responded to the second text immediately, even if the content was not urgent and she was in a reading test, because she felt panicked and saw an urgency and a need to reply quickly.
- Validity: Assumption is valid! People will be more likely to respond or look at a message on their phone while focusing on another task, if the message is marked as urgent, extremely important, or when the sender's safety is perceived to be at risk.

Creating a Friendly and Festive Atmosphere on Public Transport

Full HMW: HMW make public transportation more friendly and festive?

Solution: Provide an entertainment platform for commuters on the same public transit that enables an interactive and collaborative gaming experience, to help passengers connect with one another and to build community

Experience Prototype: Interactive Game Experience

- Assumption: Users would be receptive to playing a virtual game with a stranger.
- Method: Pair two strangers over zoom and have them play a game of skribbl.io
- Results: Playing the game allowed them to interact in a more natural and light-hearted way.
- Validity: Both participants enjoyed the experience. Caleb stressed the importance of hearing or seeing the other player, simulating a real-life experience! Assumption is valid.

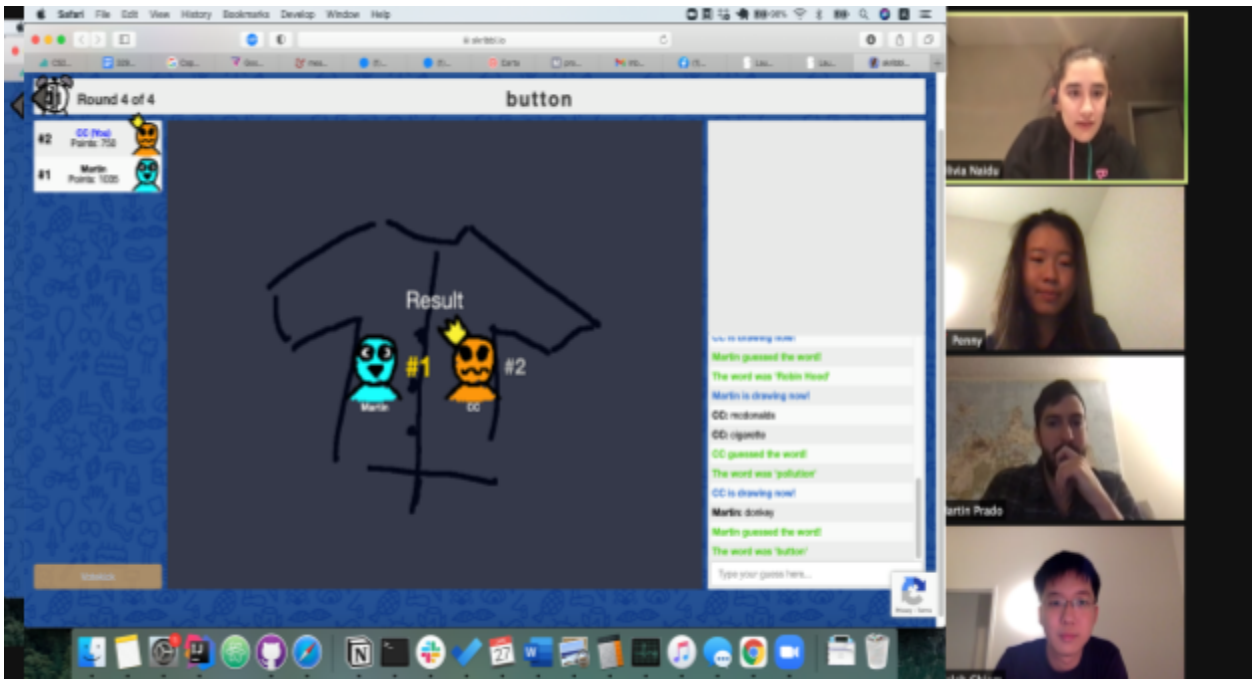


Figure 6: Experience Prototype 3 - Interactive Gaming Experience

Design Evolution

Final Solution

From the successful results of the 3 *experience prototypes*, all 3 assumptions supporting the solutions have proven to be valid.

However, our team concluded that *Solution #1: Travel Buddies* showed the greatest potential among all three. From the experience prototype tests, the surveyed students showed almost uniformly positive response to the proposed solution. This was a surprise to us as we initially expected college students to not be as open to taking the same public transportation as another student whom they might not know previously. This is a novel approach to safety that we see great potential in, as there are yet to be existing mobile apps that provide this service, as far as we know.

As we also saw potential in *Solution #3: Interactive Games*, we have decided to combine *Solutions #1 and #3* as we feel that allowing buddies to play games during the shared journey would be a good icebreaker activity and bonding experience that helps to make the ride more enjoyable.

Solution #2: Emergency Texts is not adopted as we discovered existing apps on the market that had served similar functionality, such as Silent Beacon.

Final Tasks

Task 1: Simple - Get Matched with a Travel Buddy!

Task 1 allows us to match student commuters with other student commuters sharing the same journey on public transit. This is the core functionality of our platform and allows us to achieve our central mission, which is to provide travel buddies for student commuters who would have otherwise taken solo rides.

Users are able to either request for a ride buddy immediately, or schedule a ride for some time in the future. They will be able to send in buddy requests through inputting their 'Start' and "Destination' stations, as well as date and time details if it is a scheduled ride. Tango will pair them with another user that has part or all of the journey in common. An algorithm is used to maximize the distance of the journey that the buddies will share. Tango also takes into account

the buddies' ratings, preferentially matching the user with buddies with positive feedback from previous journeys.

At the end of the ride, users can input ratings and feedback for their respective buddies. The ratings and feedback will be used to improve the buddies' pool and improve the matching algorithm for future matches. If the buddy has made the user feel uncomfortable, the user will also be able to report the buddy through the "Report Buddy" feature, allowing us to take action against such behavior by potentially taking the buddy off the platform.

Task 2: Moderate - Chatting with you Buddy

As we understand that it is likely challenging for users to locate their buddies in busy public transit stations, we have decided to implement a chat feature that allows buddies to chat with each other before the ride. This allows the buddies to get to know each other better, or to coordinate the details of the ride and/or meeting location.

The chat feature is accessible through the 'Scheduled Rides' screen (Figure X), or after the 'Buddy Confirmation' page for immediate rides.

Task 3: Complex - Play Games with Buddy During Ride

We anticipate that buddies may need a little icebreaker to start the conversation, or may feel bored by the long ride. Hence, we decided to implement a game feature that allows buddies to play pair games with each other.

Once the user sends the game request, the buddy has the choice whether to accept or decline the game request. If they accept the game request, the game begins! Either of the buddies can end the game at any point by pressing the option "End Game".

Currently, the only game supported is "20 Questions" due to the ease of implementation and the high interactivity, but more games are anticipated in the future.

Initial Sketches

During the stage of initial sketches, we brainstormed a few different design directions, including mobile applications, web applications, chat systems and wearable devices. (Figures X -

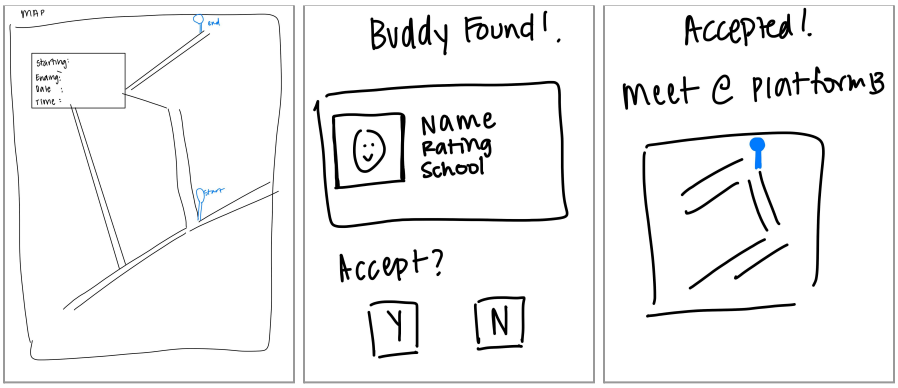


Figure 7. Mobile Application

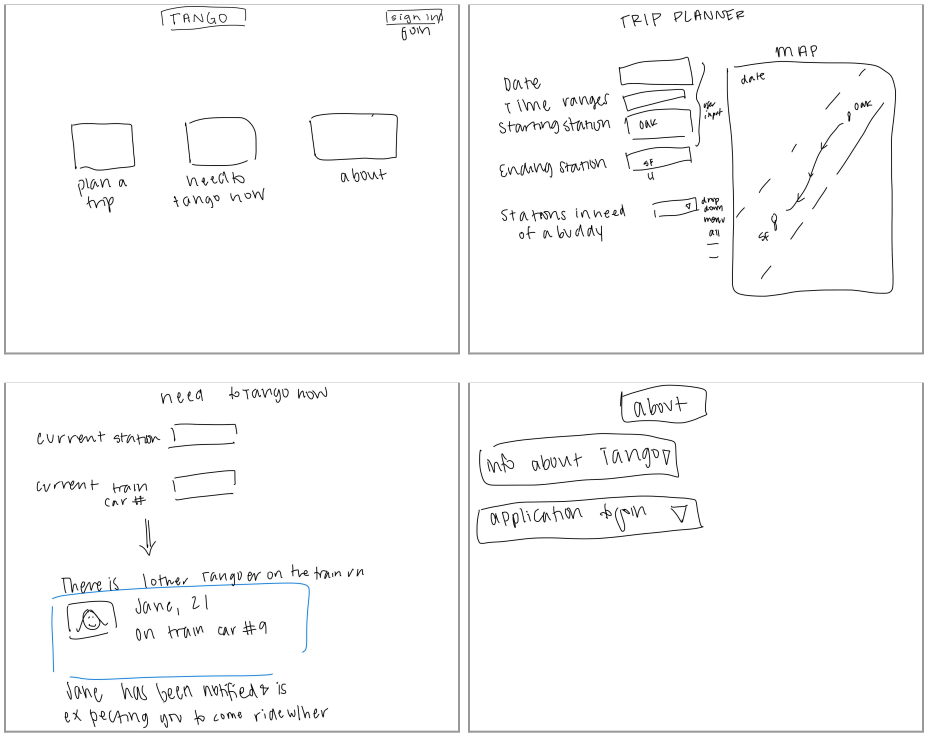


Figure 8. Web Application

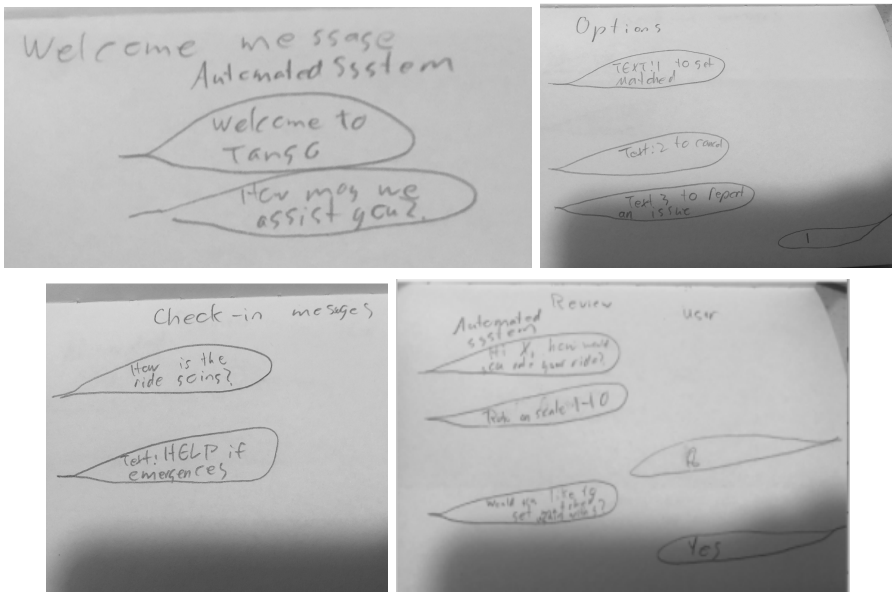


Figure 9. Chat System

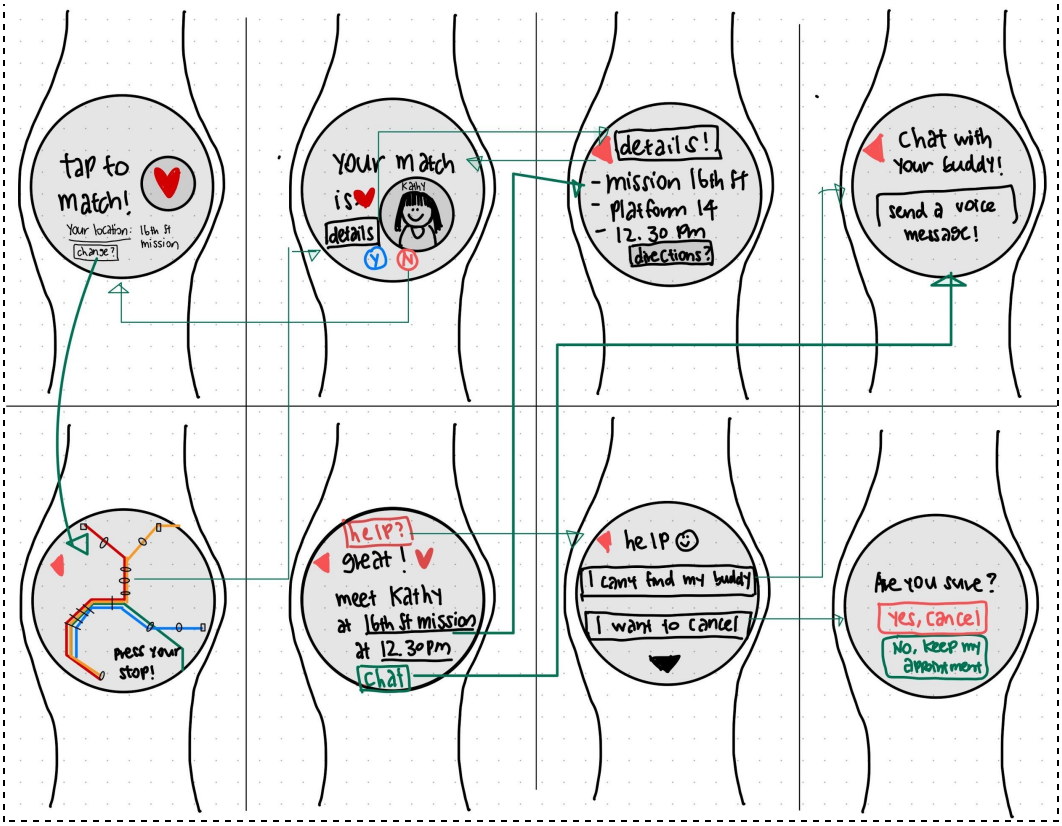
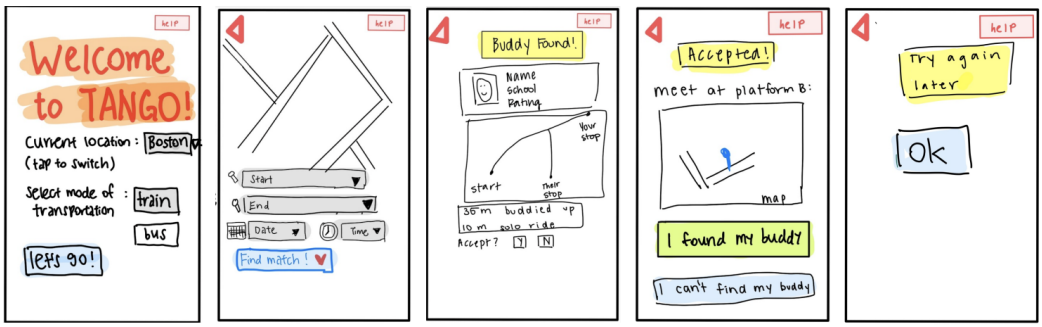


Figure 10. Wearable watch-based UI

Lo-fi Prototype

We created a clickable digital prototype on Marvel through uploading our digital sketches and adding interactive elements to allow users to navigate between screens of the same task, as well as between task flows.

All Screens Used



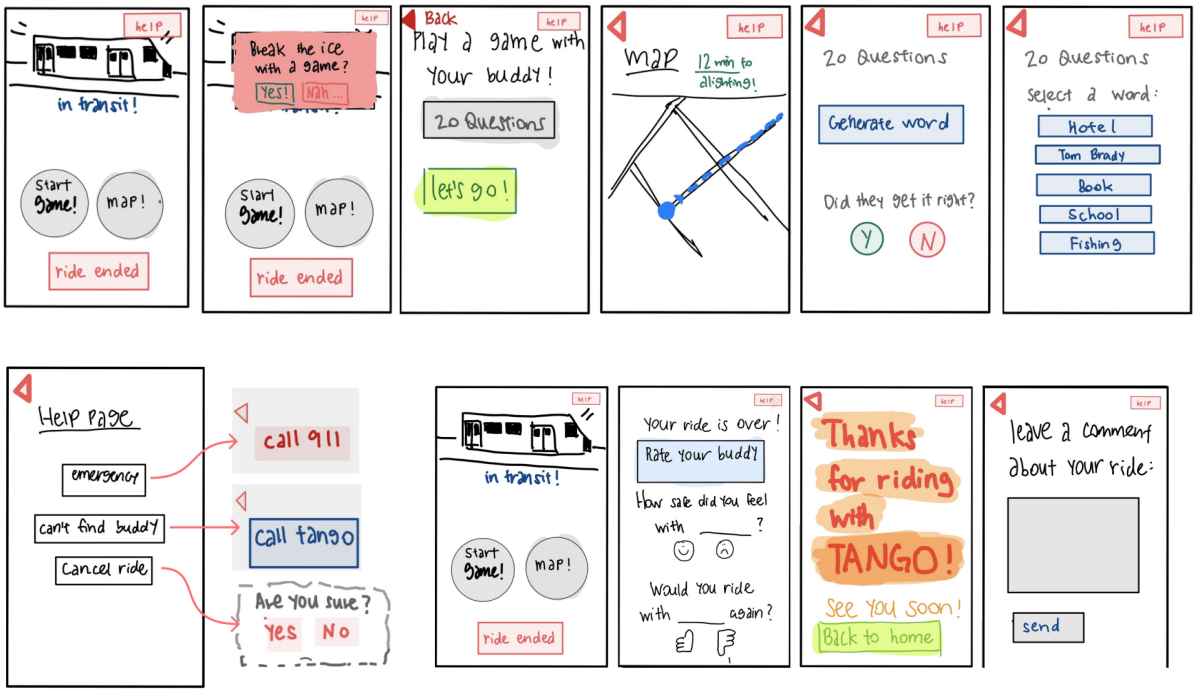


Figure 11. All screens used in Marvel Low-fi prototype

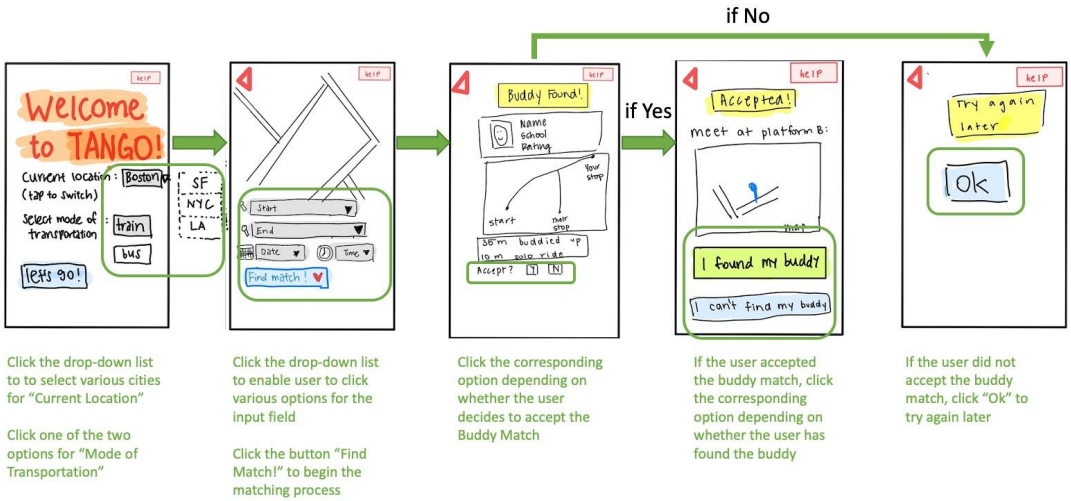


Figure 12. Simple Task: Find a Travel Buddy

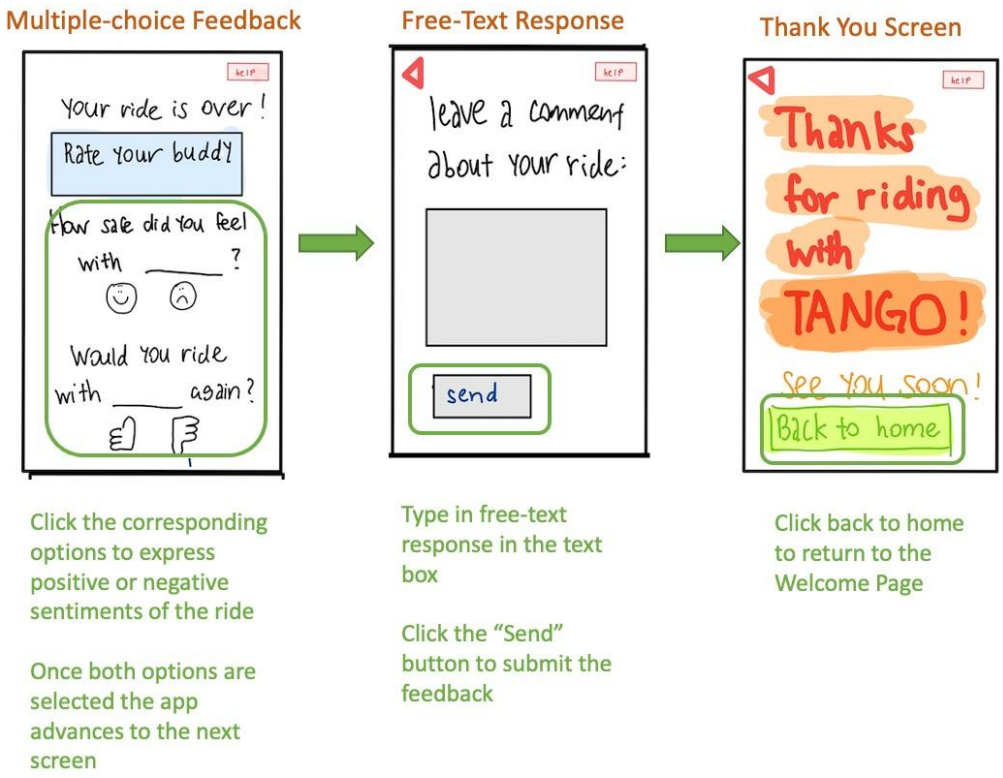


Figure 13. Medium Task: Rate your Travel Experience

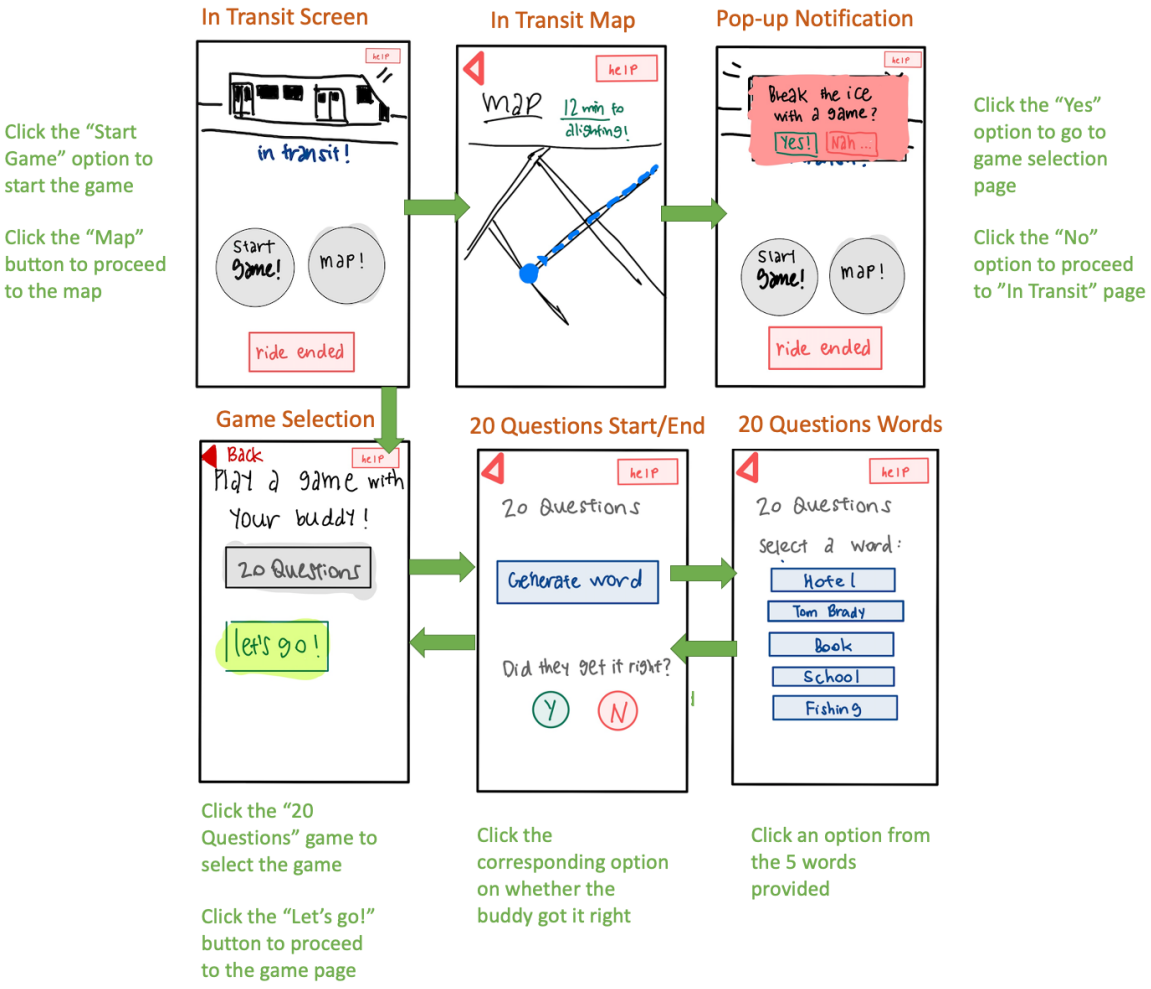


Figure 14. Complex Task: Play a Game with your Buddy

Lo-fi Prototype Usability Testing

Testing Method

We recruited 3 participants based on representativeness of our target audience, college students living in various major cities and who frequently make use of public transportation.

Participant #1 is 20 years old, a sophomore at University of Pennsylvania residing in San Francisco, and frequently takes the San Francisco public transport, specifically BART. Participant #2 is 20 years old, a junior studying in Boston, and frequently takes the Boston public transit. Participant #3 is 23 years old, an international student studying in Boston, and frequently takes the Boston public transit.

We used Zoom and Marvel as our environment for testing out participants. We had our participants open a link to our Marvel prototype while on a zoom call with them and then they shared their screens. In this way, we were able to see where they clicked and mis-clicked on our app prototype.

Test Results

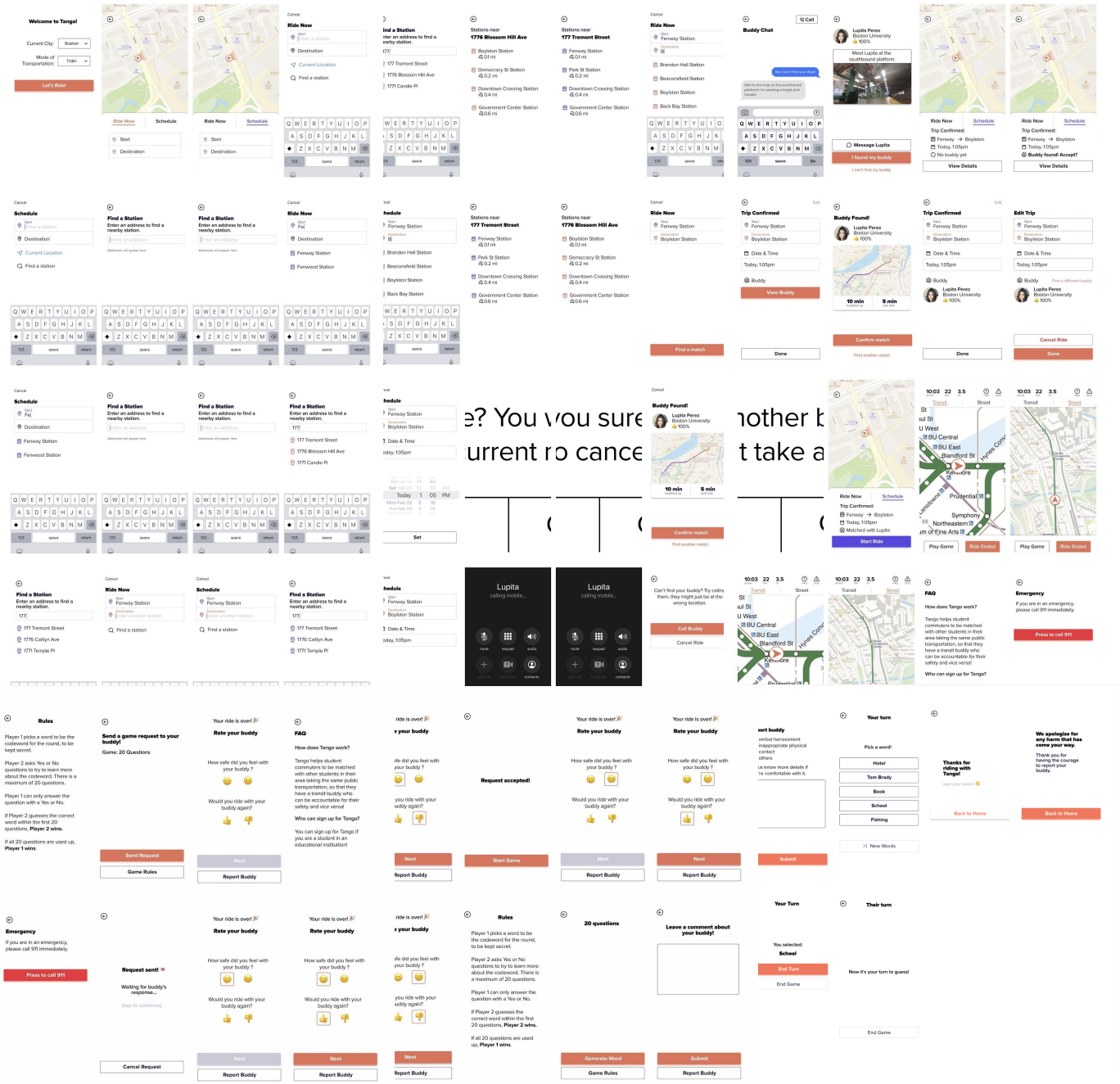
Our 3 participants demonstrated different strengths and weaknesses of our UI design.

- All three users made the appropriate choices and got through the simple task of getting matched with relative ease
    - However, all three did comment that it was unclear how they would communicate with their buddy if they could not find them
    - One user in particular mentioned it would be helpful to get more specific location information as to where to meet their buddy
- All three users clicked on the map and commented that they liked having a visual of where there buddy was and getting to track their transportation process
- All three users got through the user rating portion easily
- Two users commented that they like the information displayed about the buddies they matched with, and they particularly liked getting to see their buddies rating on the app
- All three users commented that the flow for the gaming task was confusing and they had a hard time understanding what they were supposed to be doing at each step

    - Although one user was very enthusiastic about game and commented that he liked that it was simple enough for two people to easily play
- Two users explored the help button after we asked them what they would do in case of an emergency
    - One user said that she saw no use for the help button and would just leave the train
    - Another user commented that it was not clear that the help button was for emergencies and that it did contain substantial safety resources

Med-fi Prototype

We used Figma for our medium-fidelity prototype and used iPhone X as our target platform.



Major Changes from Low-fi to Med-fi Prototype

Task Changes

In terms of tasks, we revised our tasks in our Med-fi prototype. Instead of having 'Rating buddy' as a Medium task, we added this feature to the Simple task as we received feedback that it is integrated with the matching process and does not stand as its own task.

Instead, we added the 'Chat' feature as the new Medium task.

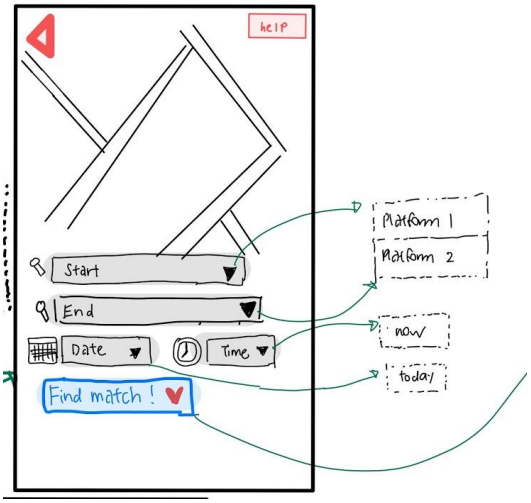
Design Changes

We implemented several major design changes from Lo-fi to Med-fi Prototype.

1. Revamping the Matching Process
2. Revamping the In-transit Screen
3. Separating 'Help' and 'Emergency' functions

Design Change 1: Revamping the Matching Process

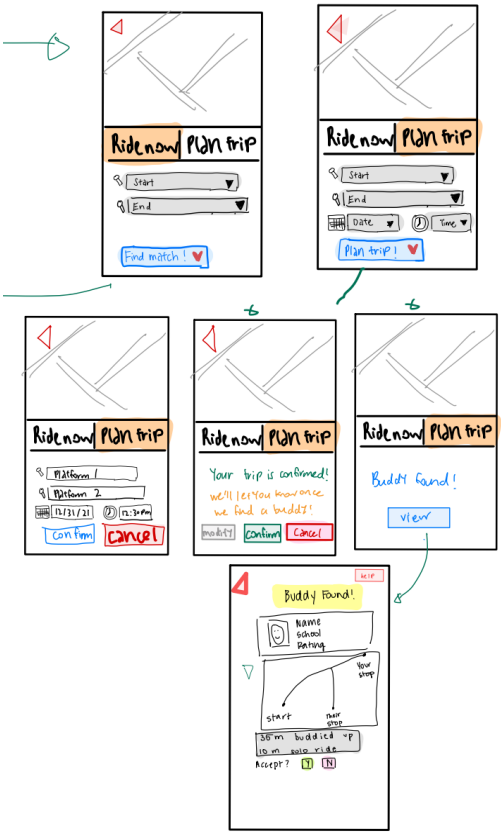
Before Changes



Problem:

- ❏ Did not differentiate between finding match now and planning a trip for later (boxed in red)
- ❏ Did not allow buddies to chat with each other

After Changes

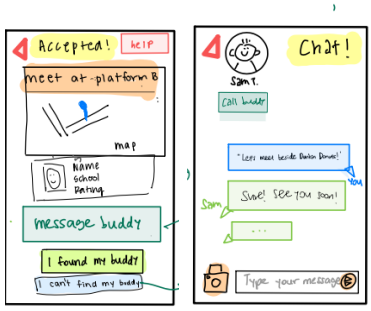


Design Change 1:

- ❏ Added feature that allow users to find buddy immediately ("Ride Now") or later ("Plan Trip")

Rationale:

- ❏ Feedback that some users would like the option to plan trips for later
- ❏ In immediate trips ("Ride Now"), the date and time options are redundant and hence removed



Design Change 2:

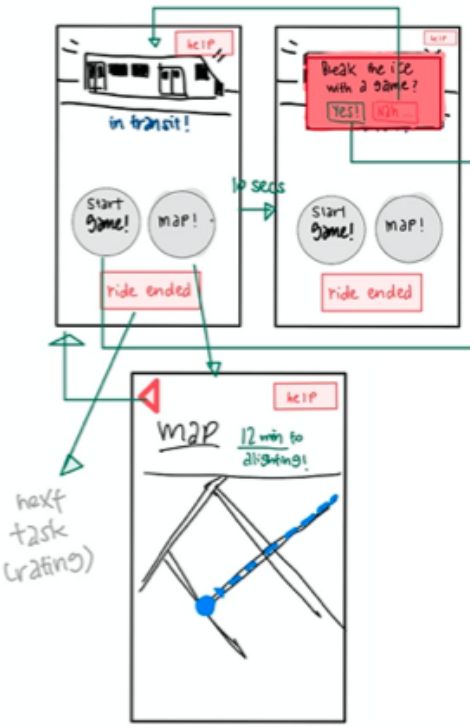
- ❏ Including chat feature between matched transit buddies

Rationale:

- ❏ Feedback from testing that this feature would be helpful for coordinating meet-up
- ❏ Allow buddies to proactively provide specific location information

Design Change 2: Revamping the In-transit Screen

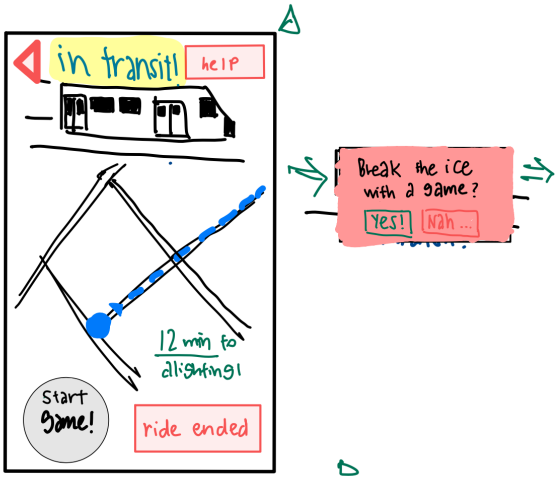
Before Change



Problem:

- ❏ Users have to click to access a separate tab showing the Map which provided details of surrounding location and remaining time on journey
- ❏ Tedious and not user-friendly

After Change



Design Change:

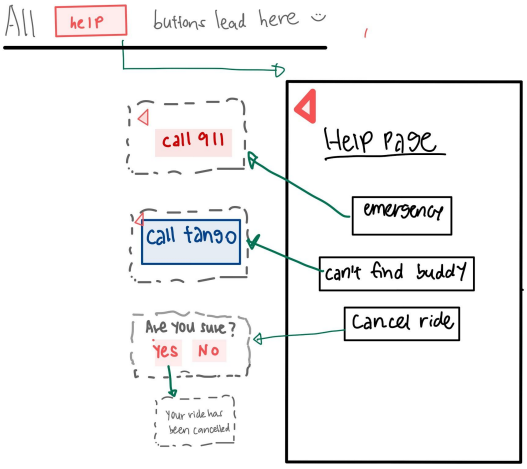
- ❏ Included location map as main component of in-transit screen

Rationale:

- ❏ Feedback that it would be useful to have the map automatically in view while users are in transit
- ❏ Remaining time on journey is easily viewable

Design Change 3: Separating 'Help' and 'Emergency' functions

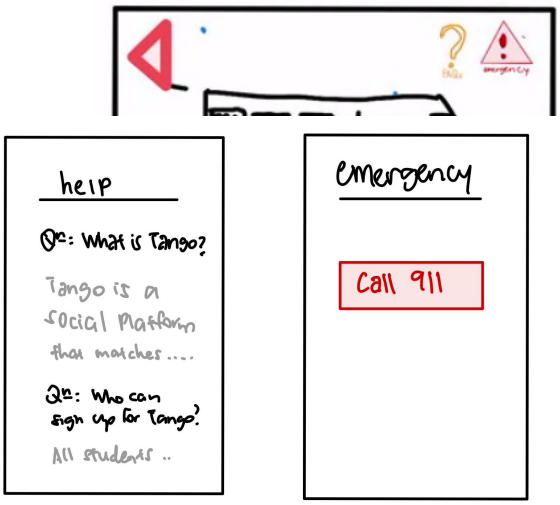
Before Change



Problem:

- ❏ User feedback that "Help" button is ambiguous in its functionality
- ❏ Unsure whether it was an FAQ, or used in emergency situations'
- ❏ Some testers were even reluctant to explore the functionality

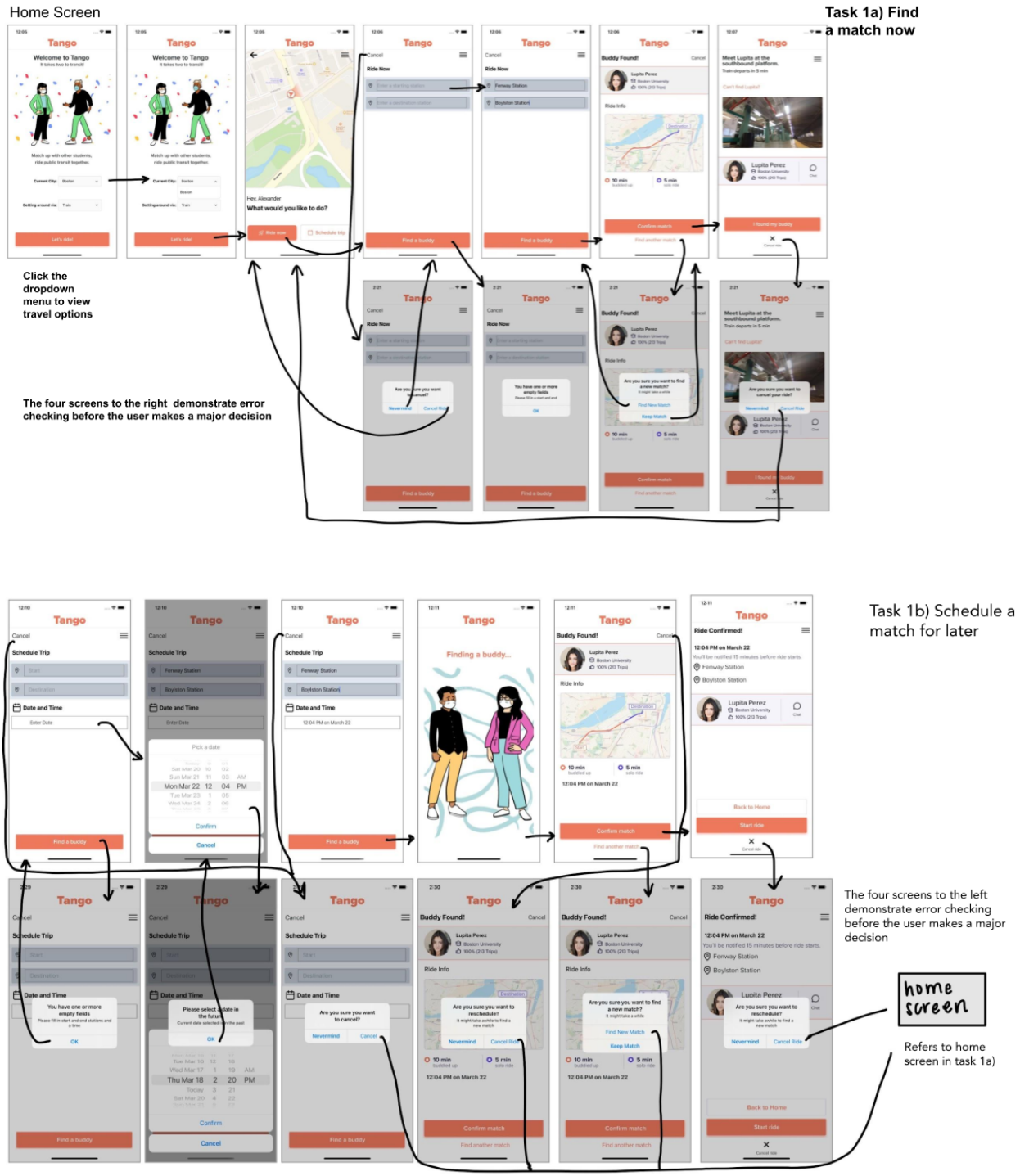
After Change

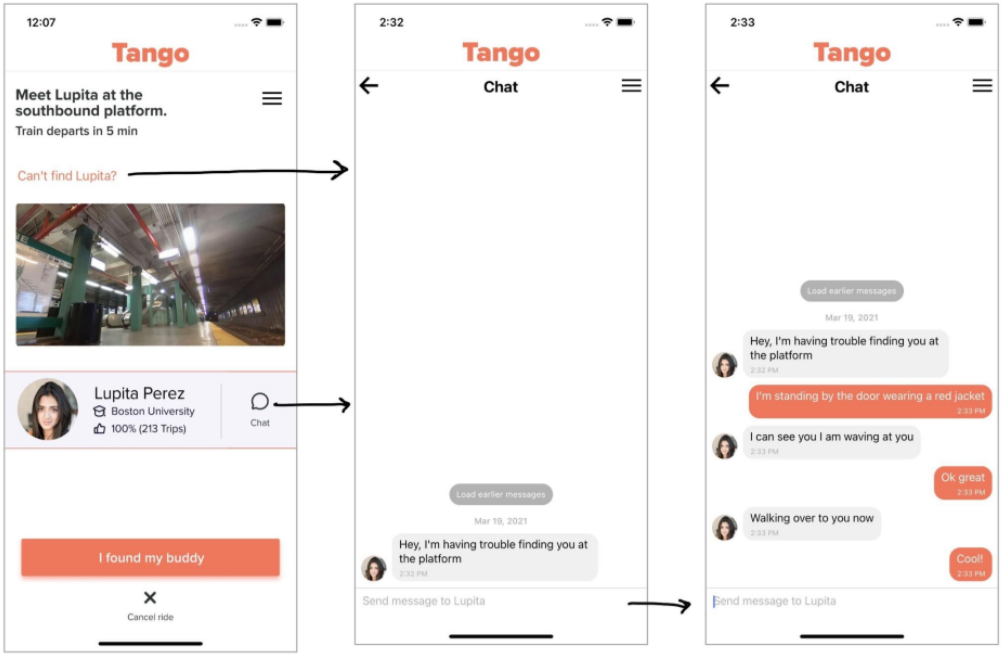


Design Change::

- ❏ Placing two additional icons ("FAQs" and "Emergency") on the top of each screen
- ❏ Separating Help/FAQs and Emergency functions for better user experience

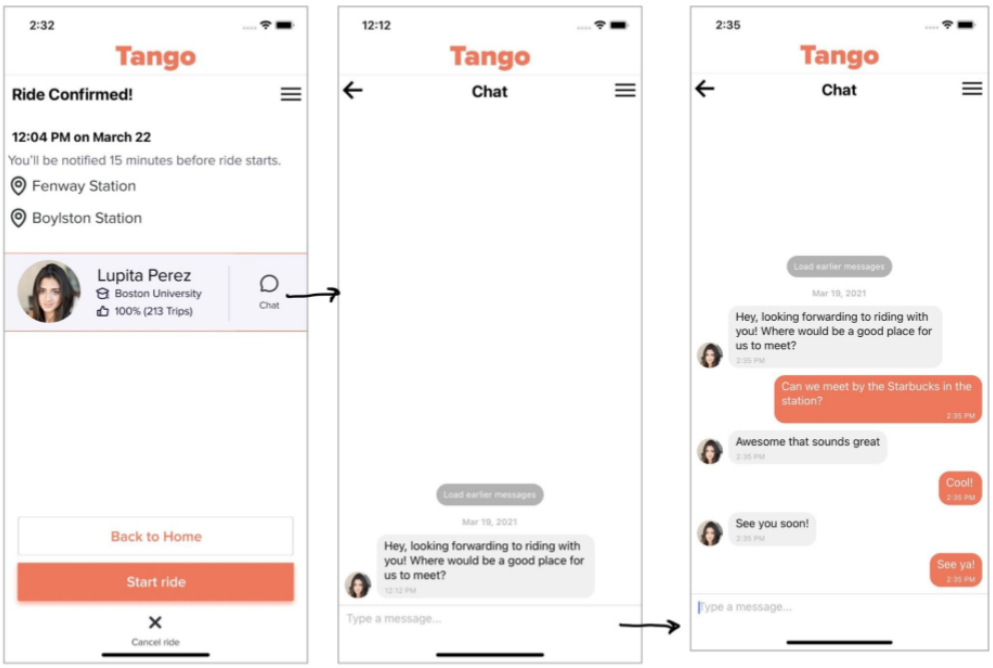
Hi-fi Prototype Storyboard





Task 2) Chat with your buddy if you can't find them

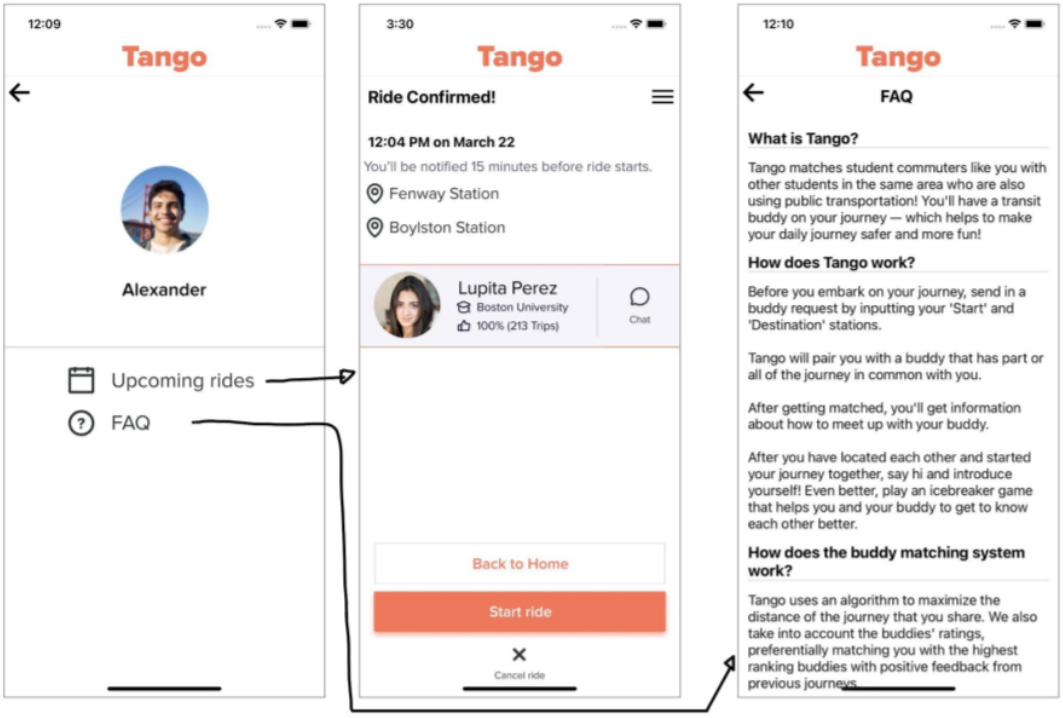
Series of auto reply messages to user input.



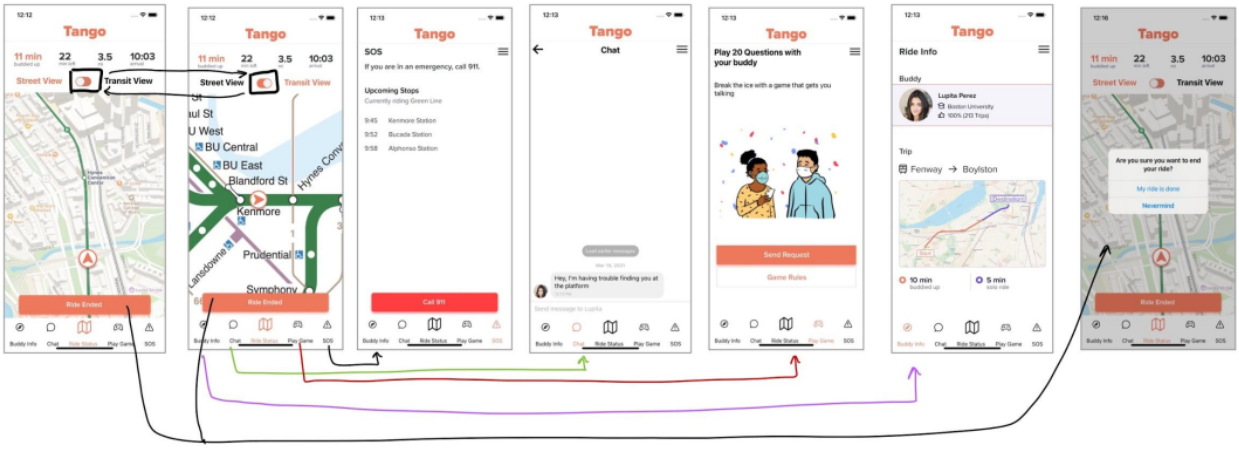
Task 2) Chat with your buddy to coordinate a specific meetup location

Series of auto reply messages to user input.

The hamburger bar in the top right corner of the pages always leets to this menu that lets you view upcoming rides and our FAQ

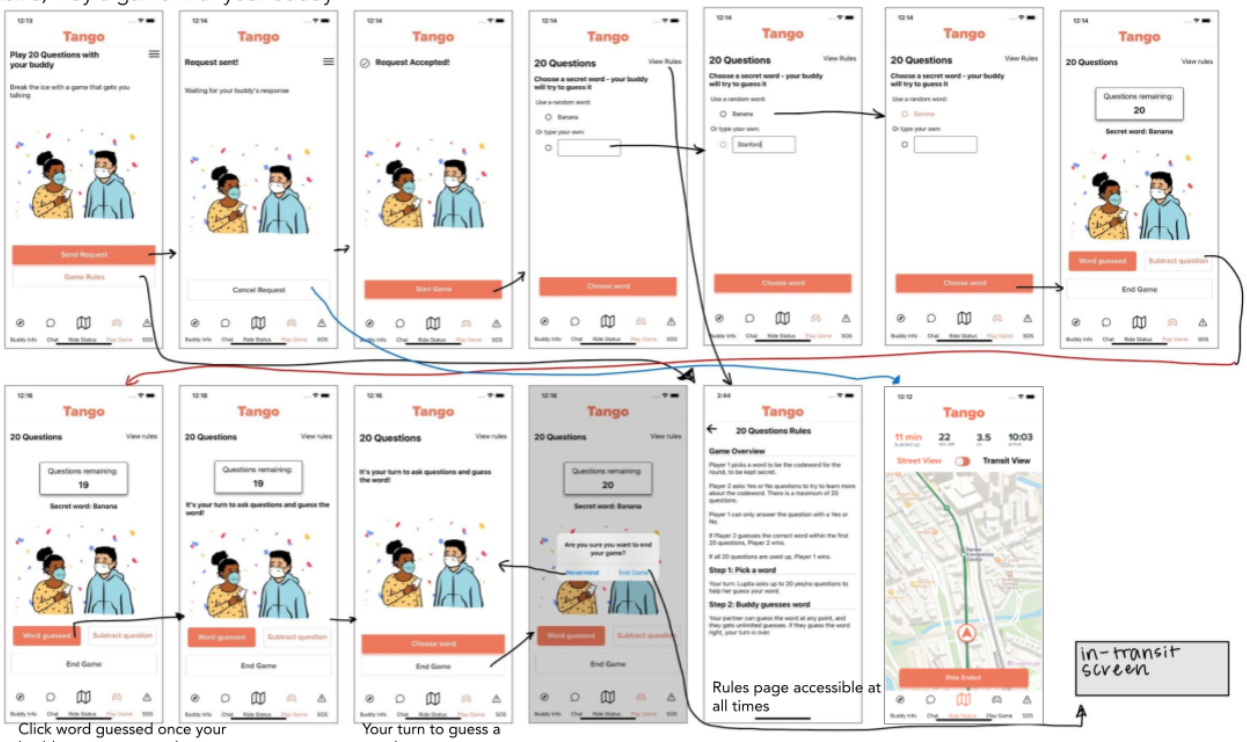


Task 3) Play a game with your buddy



Use toggle bar to switch between street view and transit view
Click the bottom navigation bar to move between different screens

Task 3) Play a game with your buddy



Task 1b) Rate how safe you felt with your buddy

Med-fi to Hi-fi Prototype: Major Heuristic Violations Addressed

In terms of major heuristic violations, we have 7 severity 3 and 0 severity 4 violations. We also have 45 severity 0-2 violations in total.

Across all severity levels, the most violated heuristics are:

- ❏ H7: Efficiency of Use (10)
- ❏ H4: Consistency & Standards (9)
- ❏ H8: Minimalistic Design (9)

Problem 1: Error Prevention for Major Actions

Issue: The "Cancel Ride", "Ride Ended" and "End Game" buttons, when pressed, immediately carry out the action, with no confirmation needed or back button for recourse if the button was pressed by accident. These were listed as separate violations.

- ❏ Type: H3 User Control & Freedom
- ❏ Severity: 3
- ❏ Fix: For every major decision (eg. cancelling ride, ending a ride, ending game) give the user a second prompt to confirm this is the action they want to take.

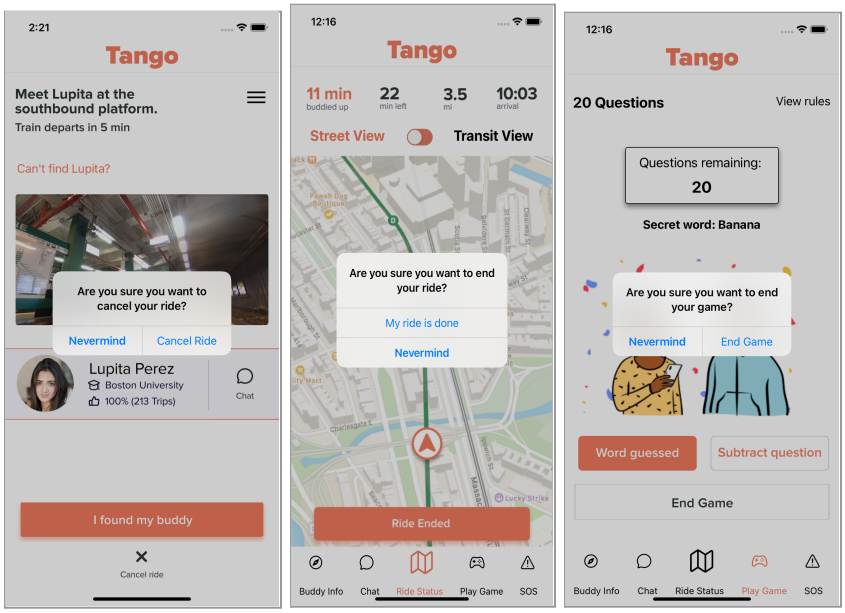


Figure 15: Cancellation confirmation screens

Problem 2: Cancellation of Rides

Issue: The only way to cancel a ride is when you can't find your buddy, no emergency option is available.

- ❏ Type: H3 User Control & Freedom
- ❏ Severity: 3
- ❏ Fix: Add a cancel button that can be accessed easily any time before the ride for any reason

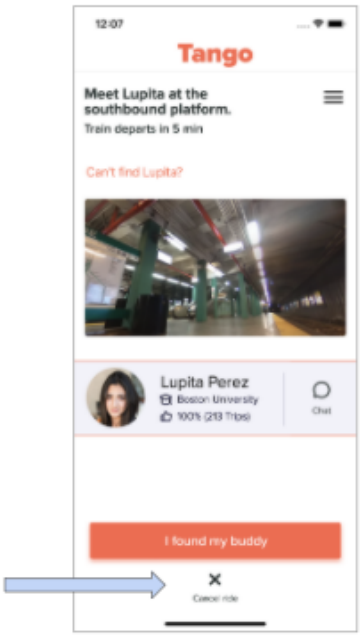


Figure 16: Ride Cancellation button

Problem 3: Ride Scheduling

There are several errors concerning the ride scheduling functionality. Our evaluators reported 3 different concerns.

- ❏ Type: H2: Match between system and the real world / H7: Flexibility and efficiency of use
- ❏ Severity: 3
- ❏ Issue: Unable to check rides that are scheduled for the future
    - ❏ Fix: Consolidate all scheduled rides into one menu screen accessible from the side bar

- Issue: The chat feature with buddy is only available if the user cannot locate them, and it is only available if the user chooses the “Ride Now” option. When the user schedules a ride in advance, they do not have access to the chat functionality.
    - Fix: Add the chat function with buddy before ride starts, that is accessible from the "Scheduled RIde" section
- Issue: When a user sets a time for their scheduled trip, Tango doesn’t tell them whether it is an appropriate time. More specifically, train rides often have set schedules (every 20 min, etc.) so the app should prevent the error where the user sets a time right after the train leaves and they end up waiting a long time
    - We have decided not to fix this, as we think that it is redundant most of the time due to the frequency of the trains -- it comes frequently, i.e. around every 5 minutes, for the majority of the time in the cities that we are operating in. Additionally, it will add unnecessary complexity to the flow of the app

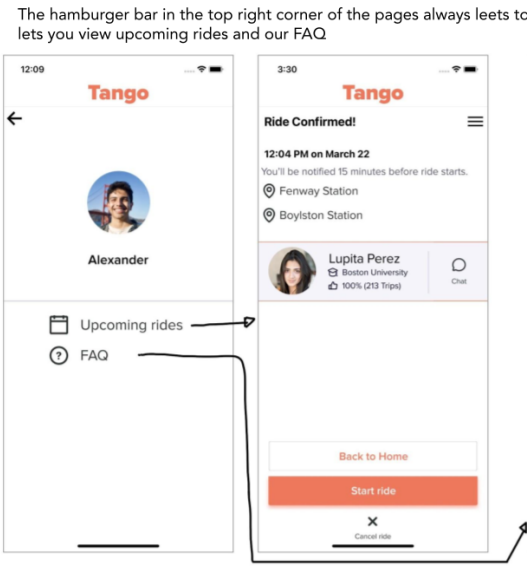


Figure 17: Checking scheduled rides from the side bar

Problem 4: Buddy Rating in Buddy Found & Ride Confirmed Screens

Issue: When a buddy is found, the name, college, and thumbs-up percentage is shown. The thumbs-up metric is a bit unclear: usually ratings are in no. of stars out of five and with the number of people who rated them.

- ❏ Type: H2: Match between system and the real world
- ❏ Severity: 3
- ❏ Fix: We decided to keep the thumbs-up metric instead of stars, but added the number of people who rated them to improve the clarity of the metric.

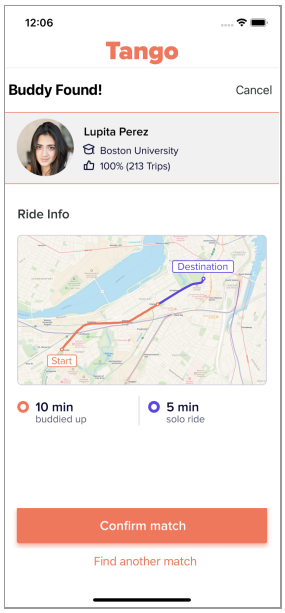


Figure 18: Updated buddy info to show the number of trips your buddy has taken

Final Prototype Implementation

Tools/Limitations

For our application framework we used React Native and Visual Studio as our IDE. We also used Expo to build and simulate the app running. We also used many of our design components from our Figma medium fi prototype. React Native was very useful because it has a huge open source library and made the coding process very efficient as there were few custom elements that we had to make. However, some of the standard library components were deprecated and we had to resort to using community made elements which normally worked well but could also be subject to error. Expo made the process of building and simulating our app very efficient. It also allowed us to easily access and test code snippets through a feature called Snacks that lets make and test light weight programs. However, publishing our app through Expo, while a very easy process, does not necessarily provide an easy way for non-Expo users to test the app. In order to run our app, you must download the Expo app on your phone and log into the Expo account that we used to publish our app and run it from there.

Wizard of Oz / Hard-coded Data

Our main Wizard of Oz component is for the matching process. While we present it to the user as a system that matches the user with the most optimal buddy from a pool of available riding buddies, we have coded it so that the user isn't actually accessing a pool of other users but they are always being matched to the same buddy. The messaging system is also a Wizard of Oz technique because we have created a pre-set list of responses from your fake buddy that are used to facilitate a basic conversation about trying to locate your buddy. For our hardcoded features, we have the same starting and ending location for every single ride. The user can start typing a station but it autofills to the same station every time and we have static images of maps that correspond to the route. We also have the same hardcoded buddy that a user will always get matched with both for the immediate ride and for scheduling a ride. The messaging system we have is also partially hardcoded. It starts off with a message from your buddy and has a pre set list of responses that are triggered when the user responds. Once the user is in-transit, the progress maps and information are static images that stay the

same every time, and the user must click ride-ended in order to trigger the end of the ride. The game data is also partially hard coded because we provide the same random word for the user to choose for their game of 20 questions but we do allow them to type in their own word to use.

Future Work

Before adding more feature additions, we would like to reduce the number of hard coded features before another iterative design process. For example, we would like to update the intransit screens to where they dynamically update during the duration of the ride as opposed to just have static images, and we would also like to build a more sophisticated chatting system that allows users to have a more in depth and interactive experience. We also want to provide more options for various interactive games the user can play with their buddy in order to foster a fun and social experience. Finally, we want to give users more freedom when scheduling futures rides. As of now they can only schedule one future ride at a time, but we would like to give them the option to schedule multiple rides or schedule recurring rides. We would also like to provide more options for the game portion.

Summary

The very broad parameters around our studio theme, health and wellness, allowed us to explore many areas in the sphere of health and wellness, and we found an interesting and pertinent problem regarding personal safety. Students want to feel safer on public transportation and feel security in numbers. Tango provides a way for students to never ride on the train/bus alone by matching them with other students in their area. Throughout the quarter, we learned about our users preferences through multiple rounds of needfinding interviews and low-fi prototype testing. Thorough feedback on our medium-fi allowed us to take major steps towards making our first hi-fi prototype. The biggest takeaway that our team had from this quarter was building empathy for our users and interviewees especially since we were trying to solve a very personal and sensitive problem. The empathy building process gave us a great sense of conviction when designing and building our app. We look forward to learning more about design in subsequent HCI classes and continue to improve and iterate on our Tango designs.