CMU Sponsored Airport Transportation

Dean Dijour, Alia Friedman, John Han, Bruce Liu, Kathryn Phelps

Problem

The goal for the project was to understand and improve transportation to and from CMU. Specifically, to better understand how CMU students experience airport transportation, and what hurdles they face.

Evidence

*"I choose the Uber because it's **faster** than the 28x, and **I know exactly when I'll arrive**"*

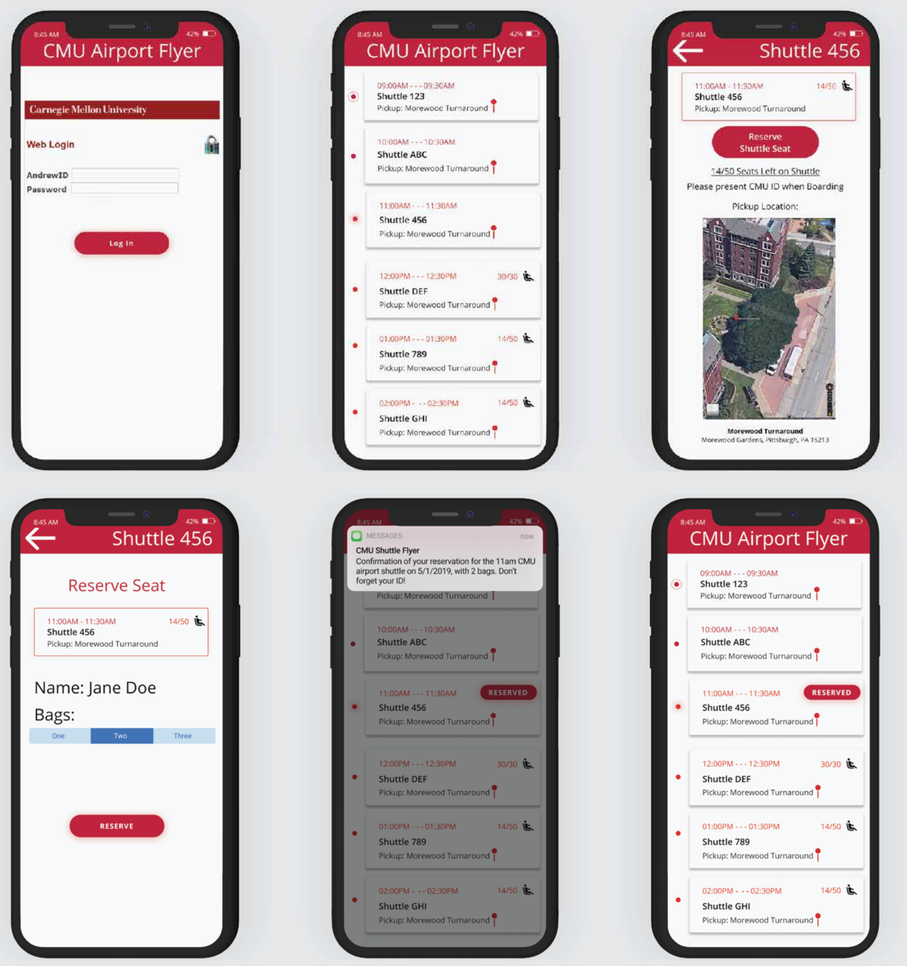
Methods

To understand our problem space, we used contextual inquiries and surveys to better narrow our focus area. Once a focus was chosen, we used speed dating exercises to choose a focus for the lo-fi prototype. To test the prototype, we used the five-second test and experience prototyping in order to evaluate how users responded to our lo-fi prototype.

Insights

Through conducting 5 second tests, it was clear that students seem unfamiliar with a bus reservation system and seem to more readily associate the concept with air travel. Additionally, we observed potential users seemed to be confused about our reservation model in the context of CMU busing. We corrected our lo-fi prototypes and this informed our experience prototyping sessions, where we gained further insights through scenario-specific user tests. It became apparent that users wanted more salient information hierarchies, as well as log in features and ways to reserve room for luggage in advance. We used these insights to iterate our prototype into what it is now, as seen in the bottom left corner of this poster.

Solution



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Elevator Pitch: Going to the airport via rideshare is too expensive, and the 28x is inconvenient and unreliable. Based on our 10 weeks of research regarding CMU student transportation, we've observed that getting to the airport is stressful and expensive. In order to best serve the CMU community, we are proposing a CMU sponsored shuttle flyer, exclusive to CMU students. With an easy-to-use application, you can quickly get to the airport for free using our direct shuttle that departs from the Morewood Turn Around and goes straight to the airport. Simply log in to the app, reserve your seat on a bus, choose how many bags you'll be bringing, and you'll be able to track your bus ahead of time, ensuring you always know where it is, and when to get on. With dedicated luggage space and a set schedule, traveling to the airport is no longer a hassle.

Poster summary:

- Title and Team Members- "CMU sponsored airport transportation" Dean Dijour, Alia Friedman, John Han, Bruce Liu, and Kathryn Phelps
- Problem - Better understand how CMU student's experience airport transportation, and what hurdles they face.
- Methods - We used the walk the wall technique, affinity diagramming, the 5 second test, and experience prototyping techniques.
- Evidence - After interviewing over a dozen CMU students, we are confident that we have identified a serious problem, requiring a solution markedly better than the status quo.
- Insights - Our research led us to generate numerous insights about the cost, time-sensitivity, and stress levels of airport transportation from CMU, leading us to ideate a more intuitive solution to the problems our participants described.
- Solution - A dedicated airport shuttle and companion application, exclusively for CMU students, which is fast, reliable, and spacious allows students to have a quick and comfortable ride.

CMU Sponsored Airport Transportation Research Report

Dean Dijour, Alia Friedman, John Han, Bruce Liu, and Kathryn Phelps

Executive Summary:

The UCRE teams were tasked with redefining the scope of the original problem, and exploring other potential avenues to bring change to the CMU transportation system. After broadening our scope and using an affinity diagram to lay out our general understandings, we were able to narrow down on the airport transportation network more specifically. We conducted contextual interviews with 5 CMU students, and launched a survey with nearly 30 responses, to better gauge how students viewed the transportation situation to the Pittsburgh International Airport.

Based on our findings in an affinity diagramming exercise, it was clear that transportation to the airport was stressful and expensive, and existing solutions left much to be desired, either from a cost or time factor. We iterated upon these known solutions and conducted Speed Dating, an evaluation method that also helps generate additional insights about users and the area of focus. We were able to narrow down our focus to a shuttle that could take students directly to the airport. After agreeing on this solution, we continued to produce a low fidelity prototype of an application that would enable such a shuttle to operate.

Our findings continued to expand and improve as we were able test test our low-fidelity prototypes in 5 second tests, quickly gauging sentiment on our proposed solution, and how best to iterate upon it. We made gradual changes, and re-tested our prototype in an experience prototyping session, where users were able to interact with linked screens and give us feedback in regards to real world, functional scenarios. We iterated once more, creating a solution with much more salient indications, more features, a login page, and vastly better tracking of the shuttle system.

In summation, through a meticulous series of interviews and tests, we were able to quantitatively and qualitatively identify a problem, dig deeper into it, solve it, and refine our solution with a human centered design philosophy.

Problem:

From our previous background research, we identified various problems concerning the ridership of the shuttle system in and around CMN.

As we 'Walked through the Wall', we noticed that users experienced several different problems regarding the shuttle/escort system of CMU:

- The schedule is not updated in real time - the driver must radio in to update the dispatcher about critical delays.
    - Most riders are making decisions about CMU transportation with *incomplete* shuttle/escort stop ETA data, and are likely to face unexpected problems when the data is inaccurate
- The shuttles stops are also no longer catered to where CMU students live, since the data hasn't been updated in over 10 years
    - The driver himself stated that the stops have been consistent, with few changes. This could mean that the feedback from the students is either not passed on to the Parking & Transportation Department or the implementation of the solution lacks progress.
- Students feel uncomfortable during the ride due to the bus conditions and inconsistent schedule
    - Yet they still choose to ride the shuttle and escort because the shuttle/escort gets them to their destination directly
    - For students whose location is not covered by the shuttle service, they wish the shuttles do cover their area because the shuttle would get them to CMU on time and their morning transit would be less stressful.
- The onboarding and offloading experiences are very confusing for new riders. Riders are not sure what they should do to indicate their stop
    - The onboarding/offloading information cannot be found anywhere on the CMU transportation website. At the same time, drivers expect the riders to know the procedure, and they feel frustrated if the riders do not follow to protocol. The needs and expectations of the riders and the drivers could be better communicated to alleviate the tension and make the ride experience smoother for both parties.

We proceeded to conduct a "reframing activity" of our problems by using the reverse brainstorming method by first writing down our assumptions. These assumptions came from information that both of our past groups collected, and from personal experience as UCRE students. We noticed that a majority of the assumptions challenged in the reframing activity revolve around *why* people choose to use CMU transportation

service in the first place. From the reframing exercise, it was clear that the availability and accessibility of stops was objectively sub-par.

Thus, based on the insights and takeaways generated from the reframing exercise, we set our primary focus area to study novice shuttle users' experience and to focus on the struggles that they face from the point of getting on to the point of getting off the CMU shuttle.

However, as we kept reflecting on our focus with the TA, we decided rather than trying to improve on a system with multiple destinations, why not focus on one destination where students often go? Thus, we began to think outside the box, looking into areas where transportation can be improved outside of the campus for CMU students. We realized that Carnegie Mellon University has a lot of international students who live outside of the Pittsburgh area, and redefined our focus to study and improvement of transportation links between Carnegie Mellon University and the Pittsburgh International Airport.

Furthermore, because this project was funded by the GSA, whose goal is the improvement of transportation for *CMU affiliates*, we decided to set our target users to exclusively CMU affiliates.

Methods:

The methods that we used were Contextual Inquiry (n = 5), Speed Dating (n = 5), Surveys (n = 28), 5 Second Tests (n = 5) and Experience Prototyping (n = 5).

The first method that we used was contextual inquiry. We were attempting to understand how CMU students weigh factors when choosing their transportation method in getting to the airport. We recruited five CMU undergraduates who were frequent users on the airport and asked them our prepared interview questions. After we had collected all the responses we created an affinity diagram in order to better understands the trends in the data. Asking CMU undergraduates about how they weigh different factors is ideal for contextual inquiry (as opposed to say a survey) because the data is qualitative. Thus from our contextual interview + affinity diagramming we were able to get a screen shot about the various thought process CMU students engage in when going to the airport.

The second method we used was surveying. In our survey we were attempting to understand what current transportation options exist to get to the airport and what percentage of CMU's student population uses what option. We created a survey using google forms and then heavily recruited both CMU undergraduates and graduates for our survey. Once we had the requisite number of takers, we analyzed the data by looking at the distribution of responses. This method was appropriate for finding out the information we were looking for because surveys are designed to collect large quantitative data from a representative population. Because our goal was to collect quantitative data about the percentage of CMU students using what transportation options, using a survey was ideal.

The third method we used was speed dating. By speed dating we were trying to rapidly evaluate concepts which were designed to address the CMU transportation problem from campus to the airport. Each team member designed three story boards, the first a rather bland solution to the problem, the second designed to challenge the user a little, and the last to make the user uncomfortable and to record their reactions to our proposed solutions. We had one note taker and one interviewer. The interviewer then asked a leading question designed to engage the user. We then recorded their feedback. After the session was complete our team analyzed the data and made a summary of our results. Speeding data was an appropriate method for trying to rapidly evaluate concepts about how we could solve the airport problem. The process was cheap and fast and did not require too much lost investment on our part if the participant strongly disliked our idea.

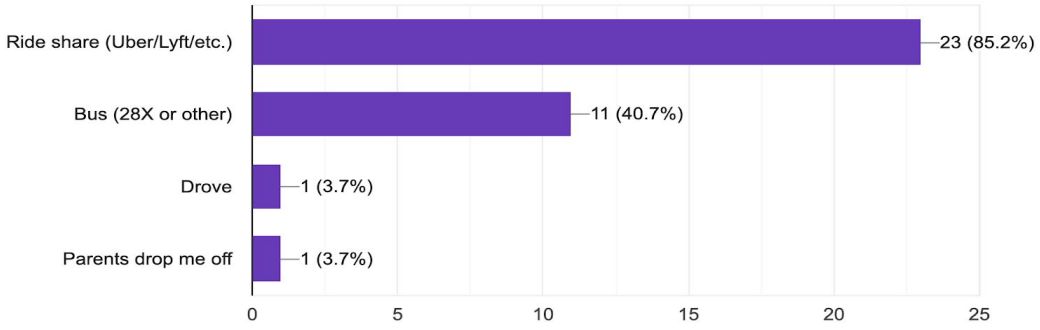
The fourth method we used was five second tests. The five second tests were designed to evaluate our lo-fi prototype. We presented five participants several screens and allowed them to look at the screen for five seconds. We then asked them a series of questions designed to tell whether the purpose of the application had been clear and that the most important information was visually salient. We then pooled all our information together and began to look for common issues across participants. This method was appropriate for our purposes because we want to quickly gather general feedback about our prototype, while still in the early stages of development.

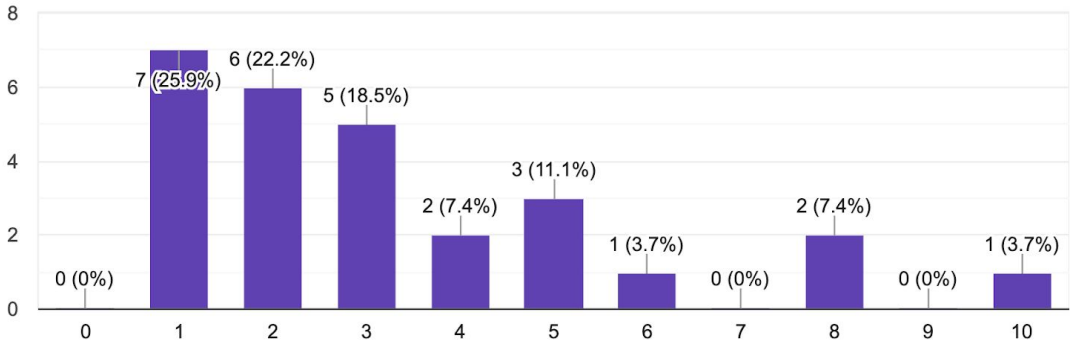
The last method which we used was experience prototyping. Experience prototyping is the process of gaining feedback on realistic scenarios. Each team member was asked to recruit a participant and ask them about a variety of situations in order to gauge their responses and to see how they would interact with out prototype. All three situations centered around how they would get to airport and were also designed to see how our prototype would fit into their existing cognitive schemas about where to go and what to do if you are late. After the experience prototyping was complete we then pooled all of our data in order to find trends and insights. This method was suited for our purposes because it allowed feedback on our low-fidelity mobile app prototype's flow and total functionality, and to gauge the interest and feasibility of our proposed solution to the airport transportation issue. We were able to accomplish that using this method.

Survey:

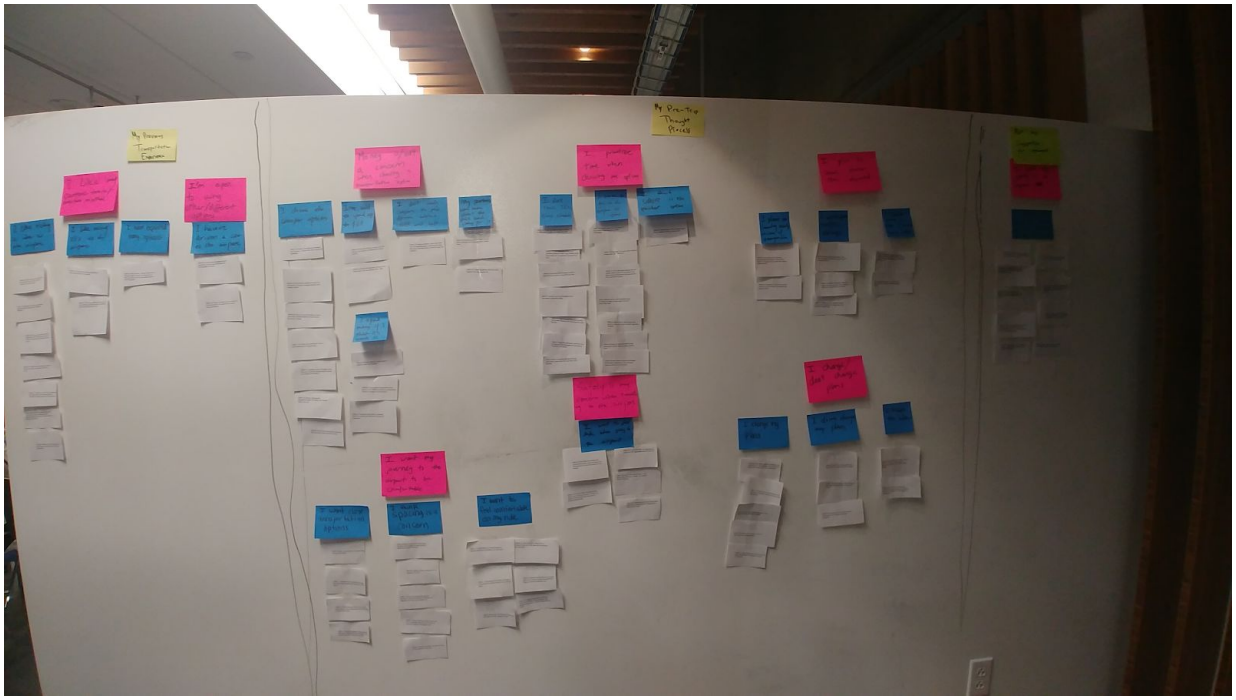
What transportation options have you used to get to the airport?

27 responses



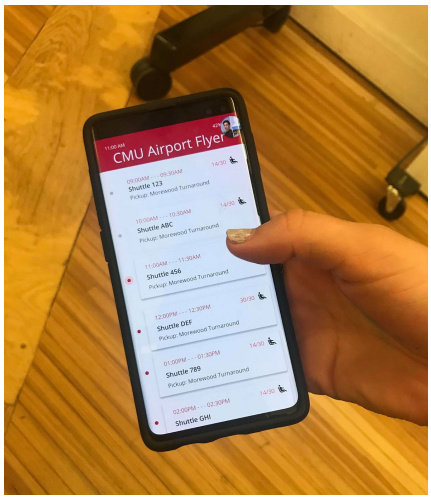


Affinity diagramming:

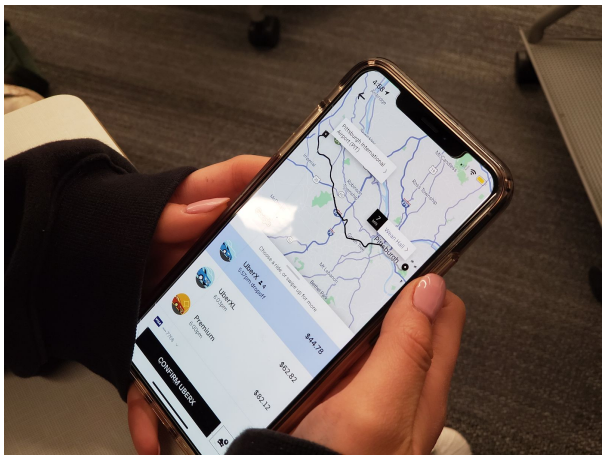


Speed dating (5 participants, 5 storyboards):

5 Second Test (5 participants, all CMU students):



Experience Prototyping (5 participants, all CMU students):



Evidence:

In order to determine our focus area we first brainstormed areas of interest pertaining to transportation. We wrote out ideas on a whiteboard. Once we decided on our initial focus we asked other students in our recitation if they thought studying how students go from CMU to the airport was a worthwhile focus area. We received a lot of positive feedback and decided to focus on that problem.

Through our contextual inquiry we discovered that the two most important factors people weighed when choosing their transportation method was time and speed. We found that people were willing to spend upwards of $60 on Ubers in order not to miss their flights. However, our results indicated that people valued the cheapness of the 28X and, if they had the time, were willing to wait on the 28X if it meant they did not have to pay for an Uber. Another finding from our contextual inquiry was that people did not like the that the 28X did not have room for luggage.

From our speed dating sessions, we identified a scenario which users found favorable. Users would love to have a dedicated shuttle from CMU to the airport, just for CMU students, with luggage space. Anecdotal evidence for that was that our user liked a CMU exclusive shuttle option only if it was completely free, has luggage space, and is not far from his home. Since he lives off campus, this would be annoying if he has to walk all the way to the stop. He wanted a solution where he knows exactly when and where the shuttle will be. We also found that by designing a shuttle system we were able to address the two main concerns CMU students said they had in our contextual inquiries.

We found that overall our app was successful in terms of having a usable interface, however, a lot of our feedback signaled that users wanted (and needed) a responsive interface that allowed them to gain feedback from the app. Specifically, users had a hard time knowing when tasks were successfully completed, checking real time and interactive data, and having information that is consistent (schedules, bus stop locations, etc.) outside of the real-time data boxes.

The detailed findings and corresponding notes are below:

Finding - When users are experiencing a new app and are unsure of their actions, it's hard for them to know when they've accomplished a task (i.e reserving a seat).
Evidence -

1. After reserving, she checked with me to see if she reserved the shuttle, unsure that she had saved her sport.
2. User appeared hesitant to click on the buttons and was not sure if she had reserved or not until she returned to the home screen and the saw the reserved icon. User suggested that she receive an email confirmation of her reservation.

Finding -

1. Users are concerned about spacing on the shuttle, and think there won't be room for luggage.
2. Users are confused by the previous, unclickable shuttle trips, and if it is currently a time that is in-between two trips, users try to click the earlier trip, even if it has already departed.

Evidence - The user first tried to click the 10:00am shuttle, but then realized that the shuttle already departed. The user then clicked on the 11:00am-12:00pm, saying "oh the red dot next to it must mean it's happening now". The user proceeded to click on the "reserve button," trying to first play around with the map (it does not work). The user was then redirected to the reservation confirmation page, and said they successfully accomplished the task. The user mentioned that she did not know if there would be luggage allowed, and how many bags she would be allowed to bring.

Finding - Users are concerned with waiting for a shuttle or queuing up to a publicly available option. Users have time-sensitive travel plans and need to get to their destination ASAP.
Evidence - User commented on she knows that the bus stop is at the morewood turnaround due to the small text on top of the card which has the details about the shuttle. She would leave her dorm room at 12:40, in order to be at the bus stop 10 minutes before schedule. User assumed there would be a check in process at the bus and wanted to leave enough time for that also. User also wanted to make sure she would get on the right bus.

Finding - The user expects the app to be automatically logged in with their student account.
Evidence - On the next page she finds the student ID number and the name, so the user assumes that the app needs logging in beforehand.

Finding - Users can be easily thrown off by a lack of accurate visual indications for geo-location, and must be guided explicitly to where we want them to go.
Evidence -

1. User commented on she knows that the bus stop is at the morewood turnaround due to the small text on top of the card which has the details about the shuttle.
2. The user struggled with the map, as it is a picture and is not interactable. The user said "I would just go to the 28X stop in front of Morewood, not noticing the text on the home page that says the shuttle stop was at the Morewood turnaround.
3. She then opened Google Map and searched "morewood turnaround", and found directions to it.
4. The user thinks that this is located at the morewood bus stop, since most CMU shuttle buses come through the Morewood Gardens. However, she has a hard time finding it.

Finding - Users tend to ignore the information given in the box because they think it is the same information within the box.
Evidence -

1. The user said "I would just go to the 28X stop in front of Morewood, not noticing the text on the home page that says the shuttle stop was at the Morewood turnaround.
2. She first clicked the shuttle option she reserved and clicked the map, while totally ignoring the morewood turnaround text.

Finding - Users feel more reliable when there is real time and interactable information on the screen.
Evidence -

1. The user struggled with the map, as it is a picture and is not interactable.
2. She first clicked the shuttle option she reserved and clicked the map, while totally ignoring the morewood turnaround text. She then found out that the map is not working and noticed the "morewood turnaround" text, so she decided to walk there.

Insights:

Our group expected price and timing to be the two biggest drivers in terms of deciding airport transportation, which turned out to be true. (HW 3.5 "The main factor that students consider when choosing a transportation option to the airport is time - how much time do they have to get to the airport with a safe margin for error that makes them feel comfortable about making their flight?" and "Most participants prefer to choose cheaper transportation options when possible, because they are still students on a budget.") The "ah ha" moment came from discovering how these were not just two of the biggest but two of the only drivers for students decision making, with luggage space being a minor third (HW 3.5 "The spacing in the 28X bus is not designed comfortably for most students going to the airport".). This helped us in determining our final solution— a CMU Shuttle Flyer that would be reliably on time, fully funded by the school's transportation fee, and have reservable luggage space.

Students demonstrated their need to get to the airport and justified it again and again throughout our study. Prior to interviewing students, we did not ask their airport experiences but found that every student interviewed (around 15 for this study) had gone to the airport within the last year.

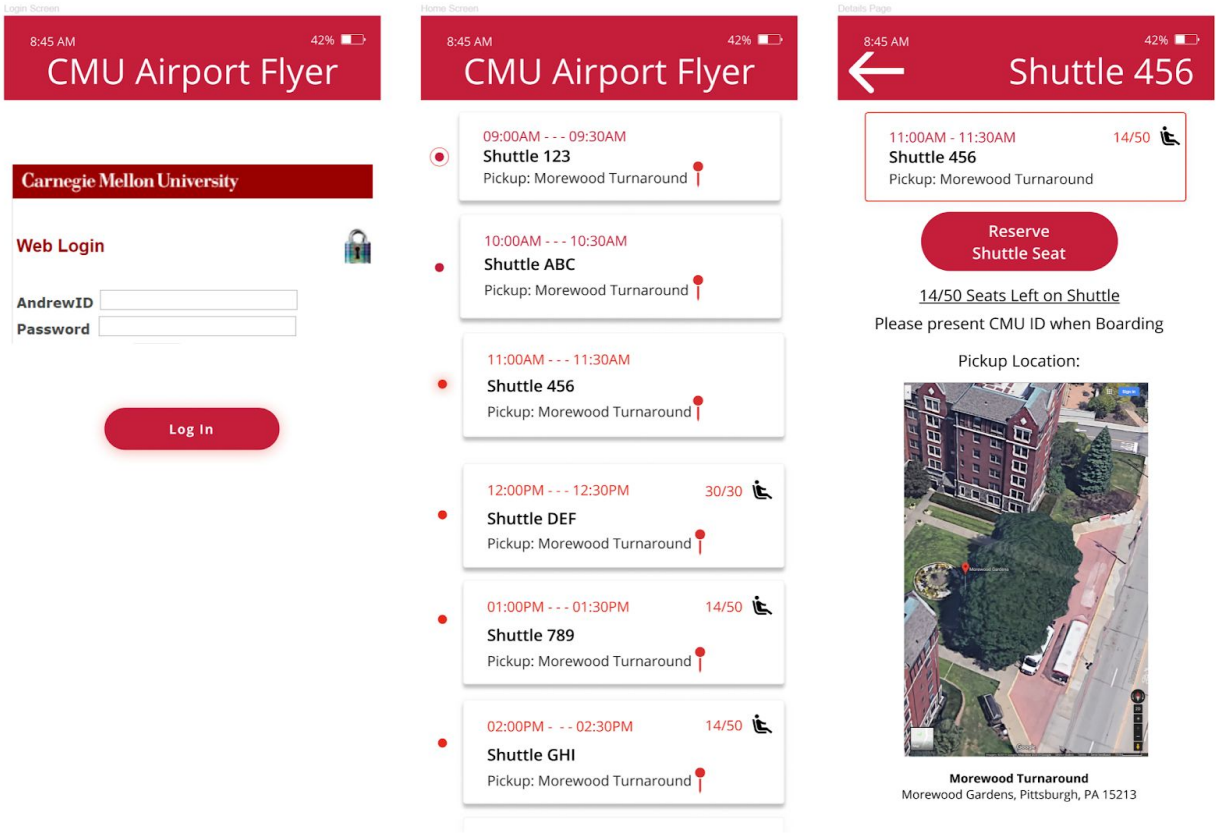
Within our study we learned students' wants, needs, and concerns in terms of getting to and from the airport and their home. CMU students wanted close, reliable options that they could get for cheap or free. We suspected that most students used Uber/Lyft or the 28X and we were right (HW 3.5 "Most students do not live close to the airport bus stops, and prefer to choose rideshare transportation options"); additionally, we explored why students don't carpool which seemed connected to our earlier findings regarding the rarity of CMU parking for undergraduate students. Because student options were limited, creating an option for them that combined what we found were their most pertinent needs helped to determine what our CMU Shuttle Flyer would look like. This is designed to be an attractive alternative to their current options that helps to ensure the timeliness of the shuttle while remaining free, safe, and comfortable.

We reasoned that since students were very interested in a CMU shuttle to take them directly to the airport from campus, and since coach/shuttle buses already exist, we should focus on the digital interactions more than the physical shuttle. We had more expertise and available resources to prototype and test a digital application for viewing information on and reserving seats on the shuttle, so we decided to create a mobile application as our low-fidelity prototype.

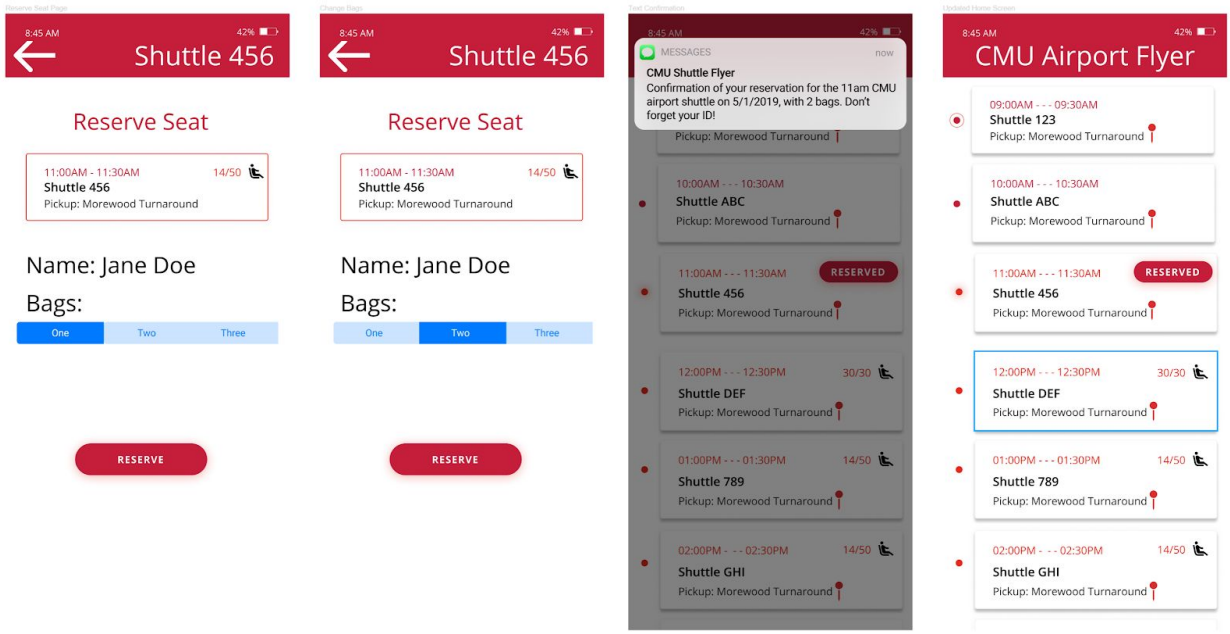
Moving onto our solution's insights, we used an agile approach to iterate over our mobile prototype. Working with the data from our 5 second test as well as experience prototyping (as evidenced above) we observed the following.

1. Users wanted feedback from the app to let them know when they accomplished tasks since they were unfamiliar with our specific interface. In response we created a text message confirmation that reminded the user about the details of the trip (time, luggage, location, etc.)
2. Likewise users wanted interactive content and real time data to make sure the app was accurate and up to date. When dealing with an unfamiliar interface they needed specific feedback to make sure they were understanding what they were seeing. In order to increase this we would have made motion feedback when buttons were pressed, confirmed, etc.
3. The reserve baggage system and schedule was unclear to users as they saw already departed shuttles, in order to mitigate this we removed the already departed shuttles from the schedule and instead worked on a schedule tab that would show schedules even farther into the future.
4. Our overall architecture was confusing as consistent information (the location of the shuttle stop) was in an individual shuttles information box (as in where they would click on to reserve. We moved this outside of the box to increase clarity. Additionally, the location itself was confusing so we added a birds eye view so users could visually see where they should arrive.

Solution (Visual of Low-Fi Prototype):



The above screens demonstrate how users can simply log in to the application with their Andrew ID login, and see all available shuttles for the day. Availabilities are listed, with the number of seats currently reserved, out of the total available. If a user clicks on a specific card for more information, they are presented with sufficient logistical information to on boarding the shuttle, where to go, and how to reserve a seat.



The above screens demonstrate the process for reserving a seat on the shuttle. With just a few clicks, users can select a specific shuttle, how many bags they'd like to bring, and then simply reserve their spot. Instant text alerts are part of this prototype, giving users confidence that their reservations are confirmed. Finally, the scheduling screen is updated to reflect the reservation, with a "Reserved" stamp next to the time slot the user reserved.

Users appeared to understand the application quite easily, with users understanding the visual indication especially well:

Evidence - The user first tried to click the 10:00am shuttle, but then realized that the shuttle already departed. The user then clicked on the 11:00am-12:00pm, saying "oh the red dot next to it must mean it's happening now".

Evidence - User commented that she knows that the bus stop is at the morewood turnaround due to the small text on top of the card which has the details about the shuttle.