

# Navigating Usability Challenges in Bus Applications: A Case Study of myStop

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## Abstract

This study explores the usability challenges of the myStop app, a bus application who cooperated with CATA in State College, Pennsylvania, designed to enhance the efficiency of public transportation through digital solutions. Despite its capabilities in providing real-time bus information and route planning, the application is frequently criticized for its usability issues. By employing task-based evaluations and Verbal Protocol Analysis, this research analyzes interactions with the app among five Penn State University students to pinpoint these challenges. The results underscore the need for significant improvements, particularly in integrating external mapping services, enhancing in-app features such as ticket purchasing and bus delay notifications, offering a comprehensive timetable, and improving accessibility through better color coding. This study offers insights that could guide developers in avoiding common usability pitfalls and creating more user-friendly bus applications for smaller cities.

## Introduction

The evolution of ITS (intelligent transportation systems) has been significantly shaped by advancements in digital technology, particularly through the development of mobile applications designed to enhance the accessibility and efficiency of public transportation systems. These tools and applications integrate various modes of transport — from buses and trams to bike-sharing systems [Stopka, 2014]. They are designed to enhance user experience by offering real-time updates, route optimization, and comprehensive service information, facilitating efficient journey planning for users. Despite their potential, many transit applications face significant usability challenges that can impede their effectiveness and reduce user satisfaction [Korbel et al., 2013; Nuzzolo & Comi, 2016]. The integration of Information and Communication Technologies

(ICT) in transport has highly increased urban mobility, yet the adaptation to digital platforms comes with heightened user expectations for functionality and reliability [Strenitzerova & Stalmachová, 2021; Stopka, 2014].

This report focuses on the key factors for passengers to use the bus application — myStop app in State College, Pennsylvania, as an analysis case. MyStop, a bus app designed by Avail Technologies, offers real-time bus information, route planning, and the ability to find the nearest bus stop to help users use public transport more efficiently. Notably, Avail Technologies is currently partnering with 9 public transit systems, and has expanded the myStop service to 64 cities across 24 states.

In State College, the Pennsylvania State University cooperated with the Central Area Transportation Authority (CATA) to provide students and faculty with cost-effective alternative transportation solutions and partnered the myStop APP to track real-time arrival and departure times. In addition to mapping software like Google and Apple Maps, MyStop is the most popular public transportation app for users [Penn State Sustainability Institute, n.d.], which can be downloaded from App Store and Google Play.

Given its widespread use in diverse locations, the implementation and utilization of myStop in State College provides valuable insights that could inform similar initiatives in other cities: they all share the same interface, therefore the same challenges. Our analysis in State College likely reflects broader trends in bus application usage, suggesting that the issues and suggestions identified here can be adapted to enhance public transport efficiency in other small to medium-sized cities. To identify usability issues that the application is facing, we designed four tasks for our participants to perform, and we utilized Verbal Protocol Analysis (VPA) to capture users' immediate thinking and decision-making processes when using the app [Ericsson

& Simon, 1980]. We also conducted open-ended interviews to gain further insights. We expect the results of our study to reveal the current usability challenges faced by myStop users, which could also be issues that should be taken into consideration by other bus applications.

## **Method**

### **Subjects**

In this study, we recruited five volunteers from students at Penn State University. We used a targeted recruitment strategy to select participants directly from the university's information science programs. Volunteers are composed of 20% undergraduate students, 20% graduate students, and 60% doctoral students. All of them rely on the State College's local transportation system as primarily travel mode.

In the rest of the paper, we would use P1, P2, etc. to represent our participants.

### **Materials**

Participants used their personal smartphones with the myStop app installed from official platforms (App Store and Google Play) to replicate real-world usage scenarios.

### **Study Design and Procedure**

The participants were asked to perform a series of tasks (total of four) on myStop app. During the tasks, participants would follow the think-aloud protocol [Lewis & Rieman, 1993] and describe their thoughts in real-time, providing insight into the cognitive aspects of task performance.

The series of four tasks was designed to simulate the steps participants would take when using a bus application in real life, with specific task content shown in Table 1:

**Table 1 Lists the tasks and task description.**

Task Series	Description
Task 1: Locate yourself	Enter the app and use its built-in function to determine the participant's current location.
Task 2: Find the nearest bus stop	Locate the bus stop closest to the participant's current position.
Task 3: Find a bus route that could take the participant home	Search for a bus route from the participant's current location to their home address.
Task 4: Find the next bus that could take the participant home, along with your arrival time	Based on the results of task 3, find the departure time of the next bus, and the arrival time at the destination.

Based on the participants' performance, the researcher will pose targeted questions in subsequent interviews, and will also inquire about usability issues that did not appear in the task flow. The topics are shown in Table 2:

**Table 2 Lists topics covered in interviews.**

Topic	Questions
User Experience	As myStop uses Google Maps' services, what are the advantages and disadvantages of myStop compared to Google Maps?  How was your ticket purchasing experience?
Accuracy	Have you ever experienced inaccuracies with real-time information, and did this affect your travel plans?
Visual	What do you think of the color codes utilized by this app?

Participants were informed that their process of completing the tasks will be recorded on video, but only their smartphone screens, hand movements, and voices. The interview process were also audio-recorded. Video recording was done using the researcher's smartphone, while Zoom was used to concurrently obtain audio recording and generate audio transcript for both

experiment and interview. We then reviewed the original recordings and manually corrected the generated transcript.

## Results

All participants completed the task series within 11 minutes. Due to the adoption of the think-aloud protocol, participants needed to spend additional time verbally explaining their thoughts while performing the tasks. Therefore, this experiment does not consider the time taken to complete the tasks as a factor in determining the successful completion of the tasks. Based on the data we obtained, we summarized the usability challenges each participant encountered and their complaint in each task (if a participant is not mentioned in a task, it indicates that the participant completed the task without encountering any usability issues):

### **Task 1: Locate yourself on the map using the MyStop application**

P4: The location function did not work properly the first two times the location icon was clicked. It only worked smoothly after switching the map to satellite view and then back to the standard map.

P5: Encountered the same issue as P4. The location marker only appeared on the map after the button was clicked a second time.

### **Task 2: Find a nearest bus stop using the MyStop application**

None of the five participants knew that myStop had a function to find the nearest bus stop. All participants selected a bus route and determined the nearest stop by visually estimating or based on past riding experience when stops were displayed on the map.

Additional usability challenges included:

P2: Felt confused when trying to use the "get walking directions" feature which redirects them to Google Maps.

P4: Randomly chose a bus route, even one they had never taken before, then selected the nearest stop on that route as his answer.

### **Task 3: Find a route that can send you home using the MyStop application**

Out of the five participants, two of them did not tend to use the "trip planning" function in the first place. P4 was completely unaware of this feature until informed by the researcher and then began using it; P3 relied on their past public transport experience, and selected a bus route without help from this feature. Usability challenges encountered during the use of trip planning included:

P1: Felt confused about the redirection to Google Maps. Because of this redirection, P1 stated that they did not often use myStop's feature when Google Maps can fulfill their request.

P2: Thinks Google Maps has features that myStop lacks, such as providing specific bus stop information and the number of stops needed, and would normally continue using Google Maps rather than switching back to myStop.

P4: Felt confused after being redirected to Google Maps. They stated that if myStop is not able to perform certain tasks, the feature should not be included in the app.

P5: Only realized after clicking on the desired bus stop that they found the selected bus route did not provide service during that time. Consequently, they were forced to switch to a second route and then tried to click on bus stops to view timetables, but the app did not pop up the

corresponding window. They felt confused and attempted to click 27 times at three different stops until stopped by the researcher.

#### **Task 4: Identify the next available bus that can take you home**

P1: Encountered the same problem as P5 faced in Task 3; after viewing one stop's bus timetable, when trying to view others, the timetable would not display. However, they knew how to solve this issue. Nonetheless, P1 was still forced to restart the app to get the information they wanted.

P2: Because they did not select the route they wanted to take during Task 3, the bus stop they planned to use did not show up when switching back from Google Maps to myStop; they mistakenly thought there was a problem with the app. Thinks the app should not display bus departing time that they cannot catch.

P3: During this time period, multiple bus routes stopped by at the same station, so they calculated their arrival time based on the timetables from both the arrival station and the starting station.

P4: The first selected stop showed no result from the selected bus route during that time, so they had to try with another bus route which doesn't pass by their nearest bus station, and was forced to select a way further stop as their starting station and then obtained the departure time for the next bus.

P5: Believes they need to use Google Maps again to determine which stop to get off at.

According to these usability challenges encountered by participants across four tasks using the myStop app, we were able to identify related usability issues and potential improvement, which are further discussed in the following discussion section.

## Discussion

The results show that even users who are accustomed to using myStop and rely on it for their travels still encounter difficulties along the way. With the data obtained from VPA and interviews, we can analyze the usability challenges users face when using myStop (besides all the malfunctions and bugs), and thereby identify corresponding usability issues that are indicative of broader concerns which could also apply to similar bus applications.

Please note that slight grammar corrections have been applied to participants' quotations without changing their meaning.

### Issues with Google Maps

In consideration that Google Map Platform is one of the most widely used map platforms in the world — more than 5 million active apps and websites using their core products every week [Russell, 2019], it is understandable that other applications would like to retrieve up-to-date map data from Google Maps Platform instead of collecting data by themselves. However, if they go a step further, redirect their users to Google Maps, it might not seem quite appropriate: if Google Maps can perfectly perform the task while the bus application cannot, yet people are expecting the bus application to be capable of it, why would the bus application even exist? Not mentioning all participants were confused by the redirection, from users' perspective, the application has failed its job, just like P2 stated:

“It just redirects me to the Google map, so the information is provided by Google Map instead of myStop...It's not about if the information is accurate or not, it just didn't do its job.”

During task 4, P2 was also observed being distracted by the switch between two different applications, and they forgot to select the chosen bus route to display it on the map for further inspection.

Besides, all of our participants mentioned that Google Maps offers a better user experience, and P3 specifically stated that Google Maps “does quite a decent job at planning the trip”. In comparison, myStop's design leads to user attrition, as pointed out by P1:

“If I want to go from Westgate to the bus stop near the building, unless I know the routes already. It's hard for me to walk over there while being redirected to Google Maps. I think it is not a good way to encourage people to use that... They have to build this kind of feature instead of just navigating users to Google Maps.”

Undoubtedly, the act of redirecting means that users must either continue using Google Maps or switch back to myStop. The latter option is clearly more cumbersome and inevitably results in user frustration:

“I'd prefer the app to work independently and not rely on Google Maps. I don't want to switch between two apps when I'm only trying to find the bus to take...” — P4

“I would be redirected to Google Map, where I can check which route I can take, but then I have to go back to this app to find out the destination stop. If I don't know the precise location information, it's hard to find it on this app. I still need to locate an estimated area on Google Maps and switch back, and then find the exact bus stop... I hope that I will not be guided to Google Maps.” — P5

This illustrates that even though local bus applications may depend on large map platforms for data, users do not accept direct redirections. Users expect bus applications to offer comprehensive journey planning information beyond mere bus schedules — such as walking directions to the bus stop, which bus to take, where to get off, and directions from the bus stop to the final destination — rather than simply deferring to “please refer to Google Maps.”

## Issue with Ticket/Token Purchase Function

The lack of an integrated ticket purchasing feature was a significant gap mentioned by participants. When being asked about their experiences with purchasing tickets or tokens, except for two participants who were provided with transit cards by their apartments (P2 and P5), the remaining three all expressed their dissatisfaction with myStop's lack of an online ticketing feature. P3 even brought it up without being prompted that they wish for a feature within the bus application which allows them to purchase tickets online:

“My most wanted feature is a ticket purchasing feature in this app... We need to go to other places for the ticket, or specifically for the CATA bus system called the tokens. We need to go to either the HUB or CATA office downtown to buy that.”

At the same time, we observed an interesting phenomenon: the participants had varying levels of awareness about the available channels for purchasing tickets or tokens. Participants who received transit cards from their apartments had no knowledge of how to buy tickets, aware only of myStop's lack of this function. Among the other three participants, two knew about an app called "Token Transit" that was designed for ticket purchases, beyond the traditional method of buying tickets offline. The final participant, P3, who had proactively suggested adding a ticket purchasing feature, only knew about offline options and was unaware of any ticketing mobile applications. This highlights that myStop not only lacks a direct ticketing channel but also fails to adequately guide users on how to buy tickets, leaving them to seek information through other sources. Furthermore, the two participants who knew about the additional ticketing app, P1 and P4, expressed a wish for integration of the apps to improve the user experience:

“How I found out (that you can't purchase ticket via myStop) was that I would have to go to the HUB on campus to talk to the assistance, and (I was told) that you'll have to, I think, to

dial in an app called ‘token transit’, and on top of that, you can buy a bus pass. I feel like all of these apps can be lined into one app to make it less confusing and more accessible to everybody.” — P1

“The app itself does not offer any bus pass or ticket purchasing services, but I know there's another app where you can purchase a daily pass. If they can add this feature to this app (myStop), it will be great. So that we could have an all-in-one app that handles everything related to the bus.” — P4

This feedback shows that users are expecting a bus application to provide all information related to the bus, especially ticketing channels, which are particularly important. After all, knowing the bus routes and schedules is not enough if passengers don't know how to buy tickets or lack the exact change needed to purchase them on the spot. In such situations, they may have to rely on the goodwill of the bus driver to allow them to board without a ticket.

### **Issue with Bus Delay**

Three out of five participants mentioned that the app fails to notify users of bus delays accurately and promptly. In such cases, users may have to wait at the station longer than expected for their desired bus, and their trip plan may also be affected by unforeseen outdated delays. P1 stated that:

“Sometimes you check the bus schedule, and it says the bus will come at 4:54. However, myStop won't notify you if the bus is about to be delayed. Now it will come at, let's say, 5 o'clock instead, but you won't know till the scheduled time has passed.”

P2 also claimed that they would like the delay to be notified earlier, as they want to utilize their time efficiently rather than spending it on waiting for bus:

“Sometimes the bus would be delayed for a long time. That would have made me wait for

a longer time than I expected. Because I was thinking, like, oh, if you told me that the bus will be delayed for 15 or 30 minutes, maybe I can stay at home longer for a little bit more housework, rather than hurriedly rush to the bus stop."

The delayed updating of information regarding "bus delays" can also lead people to spend more effort before traveling to check and ensure that their journey will not be affected by these delays, as P5 mentioned:

"If you want to make sure there's no delay that affects your plan, you'll have to go into the app many times and check for updates of the traffic information."

Although it may not seem very severe, these details are equally important. One of the researchers was once affected by untimely delay information, ending up freezing for an extra half hour in the winter while carrying heavy shopping bags. This might be a usability issue that bus application developers want to avoid.

### **Issue with Comprehensive Timetable**

During the experiment, we noticed that P4 and P5 had trouble finding specific bus departure times. In Task 3, P5 initially chose a bus route that would take him home, but when he tried to view the bus schedule at a particular stop, he discovered the route had stopped running because the experiment was conducted too late in the day. Consequently, he had to opt for an alternative route. Similarly, P4 faced the same issue during Task 4. In Task 3, his choice between two potential routes was based on one route having a bus stop closer to him than the other. However, that route had already stopped operating, forcing him to settle for the further bus stop.

This observation illustrates the importance of bus applications offering a comprehensive bus schedule timetable. Without a comprehensive timetable, it becomes difficult for users to plan trips in advance. They can only rely on experience to guess when buses might pass by.

Forgetting specific details about a bus line's schedule can significantly impact travel plans, particularly in cases where local bus services change according to the day, such as reduced frequencies, routes, and operational hours on weekends compared to weekdays. Users might only find out that there are no buses available right before they need to leave. This might leave them with no choice but to opt for more expensive alternatives, such as taking a taxi.

### **Issue with Color Code Lawsuit**

Based on the feedback we collected from our interviews, all of our participants appreciated myStop's design of using different colors to distinguish between different bus routes, which was described as "easily distinguishable," "pretty intuitive," and "good design." However, after praising the design, P1 expressed a different point of view:

"You can't change the colors of the routes. So, let's say that your user is color blind. This could be really troublesome because they won't be able to tell what bus that they need to go on. For accessibility, I feel like they should work on color coding because I have several friends who are color blind, so I know that's an issue."

As awareness of accessibility continues to increase, so does the number of ADA lawsuits [Trichter, 2023]. It is vital for software developers to continually emphasize accessibility to avoid unnecessary lawsuits and potential fines. While users without disabilities might not notice these issues, they pose real and significant challenges for users with disabilities, leading to legitimate lawsuits.

## Conclusion

The usability study of the myStop app, serving as a case study in State College, Pennsylvania, has identified several key usability challenges that affect user satisfaction and operational efficiency. Potential solutions and suggestions are shown in Table 3.

The dependency on external mapping services like Google Maps for core functionalities significantly weakens the app's standalone utility, leading to user frustration due to the need to frequently switch between different applications. This issue, coupled with the lack of essential in-app features such as an integrated ticket purchasing system and timely bus delay notifications, suggests a gap between user expectations and the app's current capabilities.

Moreover, the study revealed a deficiency in providing a comprehensive bus timetable, which is crucial for effective trip planning, especially during off-peak hours or weekends when service changes are common. The participants' struggles with accessing accurate and timely information highlight the necessity for real-time updates within the app itself. Additionally, the accessibility issues raised regarding the app's color-coding system suggest that myStop needs to better accommodate users with visual impairments, ensuring that all potential riders can navigate the app effectively.

These findings from the myStop app shed light on broader implications for the development of bus applications in smaller cities. By addressing these usability challenges, developers can enhance the overall user experience, increase app loyalty, and meet the evolving needs of urban transit riders. This case study not only points out specific areas for improvement for the mobile public transit service in State College, but also applies to other agencies and cities who utilize myStop app service. It can serve as a foundational analysis from which to generalize results to other similar applications as well.

**Table 3 Lists potential solutions to key usability challenges.**

Topics	Improvement Suggestions
Feature of “Get Direction”	<ol style="list-style-type: none"> <li>1. Develop features accordingly rather than redirect users to Google Map.</li> <li>2. Notify users which station they should get off the bus at.</li> <li>3. Notify users when their destination is approaching.</li> </ol>
Ticket Purchasing	<ol style="list-style-type: none"> <li>4. Allow online ticket/token purchasing.</li> <li>5. Provide instruction on offline ticket/token purchasing.</li> </ol>
Time Schedule	<ol style="list-style-type: none"> <li>6. Send delay notice.</li> <li>7. Provide complete time schedule.</li> </ol>
Color Code	<ol style="list-style-type: none"> <li>8. Allow users to customize the colors of different routes to improved accessibility</li> </ol>



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more

## Appendix A: Task Transcripts

### P1

#### **Task 1:**

Researcher: Okay, so now I'm gonna ask you to use the thinking allowed protocol, which is, let you to speak out what your thinking process doing like whole test.

P1: Okay.

Researcher: And then Right now is test one. Test one is the locate yourself. It's like describe how you find or use the location feature.

Researcher: You could tell me like how you feel about the location accuracy provide by app or any kind of difficulty or confusion when you are using.

P1: Okay. First, I am going to open myStop.

P1: And as it's loading. I already have. Like my bus that I normally take selected, but I'm first now going to locate where I exactly am.

P1: I usually try to like, See where the blue dot is? And right here, it says I'm at Westgate.

Researcher: So that is your location.

P1: Correct. This is my location. Yep.

P1: And so far this is. Since like I normally take, I'm like normally in this area, I usually know where I am.

P1: However, let's say if I am. At like the giant grocery stores downtown or somewhere else it might be hard sometimes for me to locate exactly where I am or where the near the closest bus stop is.

Researcher: Alright, here's a so test one is completed.

#### **Task 2:**

Researcher: Now it's test two. Test two is that find the nearest bus stop.

Researcher: It's you could describe how to research the nearest bus stop. Whether the app visually show the distance or direction to this bus stop. Or whether like the process of finding the nearest stop

P1: So what I usually do to find the nearest bus stop is I would open the app and then I will look for my current location, and then I would look for the closest dot to me.

P1: So in this instance, right here, this dot near North Arthurton is the closest one to my location.

P1: So then I would press on it. And then I would check the bus routes.

Researcher: Okay. So task 2 is completed.

#### **Task 3:**

Researcher: And then task 3 is find a route that can send you home.

Researcher: You could explain like how to find the destination for example like your home address. Okay. How the app respond to the request like including the root option provided and their satisfaction with the route provided.

P1: Okay, so since I already know exactly where I live, I will usually just press on, let's say like, the bus I wanna take home.

P1: So in this case, a library. Which is now check the library to find my bus which is here WE to go back to my place, which is at the heights in this location.

P1: However, sometimes if I'm not sure which route to take, I will click on trip planning. And I'll insert my location.

P1: And then I would let say pick where I want to go. So I can say it's, the heights at State College. I will then get directions. Now, this can be a little confusing at first because it takes me out of the app.

P1: In this sense, I kind of feel like the app. Becomes redundant, because I'm trying to use my stop here so I'm not sure why it would take me out. So, this feature I generally speaking don't use and I feel like at least for me, I know a lot of my friends don't use this part of the feature as well.

Researcher: Okay.

**Task 4:**

Researcher: Now is task 4. Pass 4 is that identified the next available desktop that can take you.

Researcher: And describe how use this app to find the arrival time for the bus, whether they could easily identify which bus is the best suit for you need and then, yeah.

P1: Okay, well to the first identify, the next available bus time, we just pick a bus stop.

P1: So let's say. At the library again. And here's a quick small bug where it's like when you press a new bus stop. It will move the location over, but it would not pull up the bus...times.

P1: So in this sense, I'm kind of forced to. Reset the app, reopen it.

P1: And let's say I want to take the bus at the library. So I would go to...the library press on the bus stop.

P1: And then it would show me all of the upcoming bus times and their next departures.

P1: And then in this instance, when you choose your select routes, you can also seek kind of on an estimation on where the buses exactly are.

P1: Now to find which bus best suits you. Again, usually you have to click trip planning. And find your location so let's go back here in my location and let's say I'm trying to go back to the heights.

P1: Yep It's going to use Google Maps to take me. And tell usually tell me, oh, let's say I want to start the route.

P1: This is, so let's say we're going to click on the bless route here.

P1: It will tell me. Oh, the best way back is let's say the RC or WE or W.

P1: Now again, this is kinda can be confusing because...

Researcher: jumping out for the Google Map.

P1: Yeah, it jumping out to the Google Map and if the user is not familiar with Google Maps or let's say they normally use Apple Maps, this can be kind of bit confusing at first.

P1: And in a sense here, it's kind of like a.. Let's say why should the user download Mystop when It Mystop relies heavily on another third party like map or their feature.

P1: So I think that can be a problem. And in a sense here also...Google Maps or Apple Maps also sometimes tells you like delays, which myStop does not add.

Researcher: I see, yes. Okay, alright. Here's All the task I need you to do it. Alright, thank you.

P1: Yep

**P2**

**Task 1 :**

Researcher: OK, let's get start it. So the first task is the locate yourself. Describe how to find and use the location feature. How feel about the location accuracy provide by app? And any difficulty or confusion they encounter along the way.

P2: Okay, so my first task is to locate myself.

P2: So I just opened the app. And, let me check. So, I guess should be this button is usually for location.

P2: Locating myself. Okay, I see the..(location). Now is I am assuming the area that... which is my location and let me check if it is accurate...Westgate building, I think it's correct and quite accurate. Because I think now I'm located in..just like, near the road.

P2: Yeah, if I have any difficulty, I think I don't have any difficulty because I just can't see this button and just tap on it.

P2: And....Yeah, no problem at all.

Researcher: Okay, here's task one

**Task 2:**

Researcher: Right now, I'm giving you the test 2 scenario and then describing it.

Researcher: Task two is that find the nearest bus stop. Describe how to search for the near site. Whether the app visually show the distance. And direction of the site. And where the process of finding the nearest site. In smooth.

P2: Okay, then find the newest bus stop.

P2: So I know I now I'm here in the Westgate. I guess it should be this great dot(location dot)..like I'm now with the Pink link (pink bus route) and I know it should be this one, the nearest bus stop.

P2: Let me click on it. Okay, it's called. Stop to 285 Walker building(bus stop name).

P2: And I need to know about how the distance....distance it didn't show the distance. Should I just tap walking, and get walking directions to see?

P2: Okay, direct me to another....(app) is it Google app? And the distance, oh here, show is 0.3 miles.

P2: And the time is around 5 min walking time. Hmm...I think Yeah, I think I can get the, get the working direction, but it seems wired?

P2: because the route is suggest to me it's like, why is I need to work like this?

P2: because I remember that I can simply just walk down here(another road) and then I can just walk to this green line and then just get down to the to the slope.

P2: So I feel the suggestion is gift is not very correct and I feel weird that it brings me. Is this brings me from is myStop to another Google Map app.

P2: So I feel it's like...the interface change a lot and. Yeah, it should bring open another Google Maps.

P2: So I wonder. Why this app doesn't have such feature, and I need to like go back forward these two apps to find the nearest bus stop.

P2: Yeah, oops, let me go back(to the last page).

P2: Yeah, I feel it's kind of weird for me in this case, but.I think I find that I finish these tasks and find the new response talk. Yeah.

**Task 3:**

Researcher: Okay, now I'm gonna give you the task three.

Researcher: Task three is that find the route that can send you home. And Explain how to find the destination, which is your home address.How the app responded request like including the rules option provided. Your there is satisfaction with the rules, provide and why.

P2: Okay, Let me find the place that I can type my address.

P2: I guess should be this button, Trip planning. From(the search box name)... let me tab here(the from the search box)... now I'm in Westgate or maybe just tap my location.

P2: And to my home is like type the address first.

P2: I saw my address. So, okay, from my location to my home and I just tap(the home address).

P2: Tab direction(button), Oh,it brings me to the Google Maps. And...let me check. It give me just 6 min, and I feel like it's. It just bring me out from the myStop app.

P2: So, The route I can go back home right now is using, I think is NV and N.

P2: But this is the information from the google map instead of myStop app. And I feel like that if I'm using myStop, I would prefer see this information(estimate time) in there(myStop).

P2: But let me going back to see if we can help. Let me check. If I hear...I don't know if I do the same thing... trying to find NV and N. I guess and... I just unchecked the irrelevant. And okay.

P2: Yeah. If I going back to myStop app by the information, like Google, I can't just find it.

Because by this time I can go back home using N an NV.

P2: Yeah, For my satisfaction, I have no option to select the best route for the bus service.

P2: Because I also try to take both route previously by N and NV. So because now it's already quite late, so I assume that I can only get by home by NV which takes a little bit longer time to get to home.

P2: I need to go from here(the nearest bus stop from the location) to my home is around here(home address stop). So... I think but the process I think is kind of weird also similar as task two because I was directed to another app, the Google Map, and then I need to manually check the route.

P2: And then I just get it back to myStop app and select the route one more time. And it didn't provide me how long to go back home. It just shows me the route, but maybe I still need to find my home in the myStop app. So it is not very satisfying.

P2: Yeah. That's my sharing for task 3.

#### Task 4:

Researcher: Okay. Now is task 4 Identify the next available bus that can take you. And, describe how to use the app to find a rival times, whether they could be easily identified with bus and best suit you need. And, any expectations change along the way.

P2: I think now as I know already know that I need to take NV. So, Let me chat whether the nearest bus stop here may take me home.

P2: Let me check. Oops, like they didn't show the bus stop. It's kind of weird.

P2: Oh, I need to select the route first.

P2: Is something get wrong? Because when I tap the bus, it does not show anything.

P2: Oh, it's showing

P2: Okay, tap here. The next bus would be coming around 11:53 AM. Yeah, now the current time is already 11:53. So, I will probably miss this bus, and maybe the next one I can take would be 12:31 AM.

P2: Because I feel if I'm now at Westgate building, I need to take some walking time, maybe around. 5 min. So I think I will miss this bus. Then the next bus should be 12:31 AM. Yeah.

P2: I think I finished this task. I think now it does not kind of fit my needs because it showed me the bus that I cannot catch up. If the app can understand that my walking distance is 5 min, I may assume that it will show me some more feasible options.

P2: Because now is already 11:54, so yeah, let me refresh to see the difference but I think it would just show me something...But anyway, it just show me 11:53, which I is not make sense. At this stage, yeah.

P2: You should know my needs because if I need to go back home, maybe you should show me the bus schedule at 12:31.

P2: For the expectation, I don't know why now I tapped the bus stop it seems like didn't show up. Yeah... Originally I would like to find the closest first stop.

P2: But it just doesn't show, and I just tap on the next one because I know that NV is in this route. so I know it will still operate at night but for N should be off. During this time, right, at midnight. So yeah, I think that's all of my sharing for task four. Yeah, Thank you.

### P3

#### Task 1:

Researcher: Okay, alright. We will ask you like to use the think aloud protocol, which is let you to speak out the thinking process when you are using this app, and during the whole process in 4 task.

Researcher: So task one is, locate yourself. You could describe how to find or use the location feature.

Researcher: And also you could talk about like how you feel about the location accuracy.

Provide by app or any kind of difficulty or confusion. When you are using it. So let's go.

P3: Okay, so to locate myself, I can basically directly look at this...big blue dot and to zoom out to see myself and that's it.

Researcher: Okay, there's a task one.

#### Task 2:

Researcher: I'm gonna give you the test two. Test two is find the nearest bus stop. You could describe how to search the newest bus stop whether the app visually shows the distance and the direction to this stop.

Researcher: You could just tell us the the process of the finding. All right.

P3: Okay, so actually first before doing that, I need to select the route that I intend to take. So let's. take... I already selected two(routes). Usually, sometimes I might consider multiple routes because, multiple rooms can..Go to the place I wish to go and sometimes there's only one so it depends on the situation.

P3: So let's say right now I intend to just to take the blue loop to somewhere. And now I can take a look at this map and see all those gray dots; those are the bus stops, and then basically to find the nearest one.

P3: I don't think there is this feature in this app. So what I usually do is to just estimate the distance by myself and to find it. To basically zoom up and see how I can go to that nearest bus stop for example in By case here, the nearest stop, I believe, is this one(bus stop).. near this. 411.

P3: So. Then. I just Go there based on my knowledge of this place. Basically, I going itselfs and so on. Okay, alright.

#### Task 3:

Researcher: Now I'm gonna give you the task 3. Task 3 is the final route that can send you to home. For you, you don't have to be home. You could be anywhere for you because you live in a campus.

Researcher: So. You, you could just find a destination that you wanna go and then. Describe how app respond the request that you wanted to do and yeah that's it

P3: So technically, to find a place, I would like to go. I will say that since I'm quite familiar with the campus and usually the place I would like to go. In the state college area in general.

P3: So. What I would do is to follow the past experience and do that. And, for example, you find that let's say I want to go to the IM building.

Researcher: Okay.

P3: So, For that, I would say. There are 2 options. I think from my knowledge. Obviously the for the loops(name of route) I think pose a blue loop(name of route) and Red Link(name of route) can take me there.

P3: So here, I would probably just consider the blue loop since the nearest bus station of the blue loop is closer than the nearest bus station of Red Link.

P3: Well, I guess the one close to close to the West parking deck and the one, but the Pattee library. is kind of similar distance. But still. Both of them are further than this. For 11 Blue loop bus station. So I would just take the blue loop, go to this bus station.

P3: And then...Let it take me to the IM building, which I believe I should...Simply just...Get off at this station(the station near the IM building).

P3: And. Yeah, that's it.

#### Task 4:

Researcher: Okay. So now, now I'm gonna give you the task four. Task four is that identified the next available bus that can take you.

Researcher: For the last task you say you are going to the IM building right?

P3: Yes!

Researcher: So you could describe how to use the app to find a rival time. Or whether you could be like easily identified of the like the which bus can be best suited for your need.

Researcher: And yeah, yep, there we go.

P3: Okay, so. I will follow the same bus route that I mentioned earlier, which is this the blue loop. So the bus stop that I will get on should be this one(the bus station near the IM building) so I can click on this bus stop on this, gray dot and then I can see a lot of the times that different Bus will stop at that bus station.

P3: So I would find the one that I'm looking for which is Blue Loop, and I can see the next available blue loop should arrive at 6:19, and then to find out the approximate time that I will get off to the bus station year that I am building. I will Basically click on that bus station. And do the similar thing.

P3: Although we can see right now actually. There is the blue loop, it said one blue loop will stop there at 6:12.

P3: Obviously, this is not going to be, technically, my bus because the blue loop I'm looking for... is expected to stop at the 411(the bus station number), bus stop at 6:19. That means this one is actually this 6:12 one shown here is actually just the previous one.

P3: So, then I'm just going to. Scroll down to see the one That's after 6:19 which in this case it's shown as 6:27.

P3: Oh, it change to 26 right now. So this should be the one I'm looking for.

P3: So that gives me the information that my Blue Loop is expected to stop at the IM building at 6:26. So. That's called I identify the next available bus and the bus arrival time and the time I will get off the bus.

Researcher: Okay, alright. Thank you.

#### P4

##### Task 1:

Researcher: Okay, right now we gonna do the first task is that locate yourself. Disquire how you'll find the location feature, and during the task, you could say how you feel about the location accuracy in this app or any kind of difficulty or confusion.

Researcher: Alright, let's do the first task, location yourself.

P4: Okay, so, first let's start the app.

P4: That start the app, and here I can find in the bottom of the app they are like a locate buttonm, so I just I click that and it doesn't work. I'm not sure why. This button(satellite function) is used to like change the map view. Yeah, this time it works.

P4: I'm confused about the design things. Sometimes it can work, but sometimes it cannot.

Researcher: Okay, so test one is done

**Task 2:**

Researcher: Then let's do the task 2 is that to find the nearest bus stop? You could describe how to search for the nearest bus stop and whether the app visually shows the distance or direction to the stop. And then the process of the finding the nearest nearest stop. Okay. So let's do it.

P4: Okay, so for find the next best stop, I think first I need to zoom the view and see..

Researcher: Do you want to remove this(tip for the first time user) first?

P4: Yeah.

Researcher: It says to select the route below the real time.

P4: Yeah, Maybe let us just randomly select a road.

Researcher: Okay.

P4: Okay, yeah, and then. Since we have route here(the main page of the map), we can see some stops for this road.

P4: Hmm, so here, we see a dot which represents a stop. And it's worker building(bus stop name). So that provides a button for get to walking directions. And then, it will take me to the Google Map.

P4: So I can know how to walk to the bus stop. But I don't think that is very convenient since we already have a Google Map. Why we cannot just get a walking direction from this app(myStop app).

Researcher: Okay, I see. Alright, That's test two.

**Task 3:**

Researcher: Let's do the task 3. Task 3 is find a route that can send you a home. You could explain that how to find the destination to your home address. And we will see the app like how to respond this request.

Researcher: And, during the task, you can say like how your satisfaction with the route provide. Alright, let's go.

P4: Okay, so, we can see this app does not have a search box.

P4: So I cannot just type in my home address and search for that.

Researcher: I think there have the trip planning(app feature), right?

P4: Yeah.

Researcher: And you could directly type your home address.

P4: Yeah, maybe we can try that. I don't think this is very convenient, and I think we don't have some infomation from our current location.

P4: So...Oh yeah, my location is he didn't hide inside of the text box, which is not very convenient.

Researcher: There we go.

P4: Then it will take me to Google Map again. So why I need to use myStop to perform this task?

P4: Yeah, so, in this case, I know I can take the bus through NV(route name). And probably NE can through my home too.

Researcher: Okay.

P4: So, let me just select this(bus route). Maybe 3 lines.

Researcher: So, is that 3 lines can reach to your home address?

P4: Yeah, I think so, I need to check. The bus stop near my home address.

P4: I think it should be...

Researcher: So you need to search the map, like drag the map and then try to find your home.

P4: Yeah...

Researcher: Okay.

P4: Or, I need to go back to Google Maps to see which bus stop is close to my home address.

Researcher: Okay, it's fine because we mainly like just use this app.

Researcher: So Yeah, you'll probably like done with this task.

**Task 4:**

Researcher: right now is task 4. Task 4 is that identify the next available bus that can take you. And describe how to use the bus to find arrival time. Whether they could be like easily identified like which bus is the best suit for you and the best arrival time?

P4: Yes, so since we have these 3 lines available. I think we can just go to our nearest bus stop and see when will the next bus arrive.

P4: Yeah, it turns out since it might be late night and There isn't, there is not any bus available.

P4: But in the like in the map, it shows that there some bus still available. Yeah, and NV(bus route) it's on the map, but, I, don't get any like estimated time for this stop.

P4: Oh, I think NV is not available at this stop, so maybe I should check this stop(another stop).

P4: Hmm...

Researcher: Like every time you wanna click it(the bus stop), they will just zoom out.

P4: Yeah.

P4: And I find it difficult to click on stop. But not that bus label.

Researcher: Okay.

P4: Yeah, so, from this stop I can see every the next available NV starts at 1 AM. And I will not have enough time to work to that bus stop.

Researcher: So you need to wait for the next next bus, right?

Researcher: So the next bus is start with 1:30AM.

P4: Yes!

Researcher: OK, All right, thank you.

**P5**

**Task 1:**

Researcher: Okay, I will ask you to use the think aloud protocol, which lets participate to speak out what you're thinking process during the test.

Researcher: Okay. So right now, here's a task one. Locate yourself. You could describe how you find or use the location feature. And how you feel when you're using the location. Is it accuracy or any kind of different difficulty or confusion?

Researcher: You can just talk aloud to speak with that. Okay, right now, let's do it.

P5: Okay, so let's first tab the mtStop app. Open(the app)... And then in the main interface, we can find a GPS icon We just click that.

P5: Just like click that(GPS icon). After(click) multiple times.

P5: Again, my position and then it disappeared. That's a weird.

Researcher: I think maybe she just needs some time to process this.

P5: Okay, its appeared. So, this is my current location near the CSE department.

P5: Yeah, it's like pretty accurate.

Researcher: Okay, so. Test one is done.

**Task 2:**

Researcher: And right now I'm giving you the task 2. Task 2 is find the nearest bus stop. You could describe find the nearest bus stop. How to reach the nearest bus stop? and then show the distance and the direction of that bus stop.

Researcher: And, yeah, let's do it.

P5: Okay, So basically I need to, first, see that a route.

P5: And for example, there is NV. I also see the NE here, And...

Researcher: Is this 2 rules are direct to your home?

P5: Yes! Yes! And then I just click this okay. And now I can see some buttons and lines of gray lines was for the NV, and the blue lines one is for the an NE.

P5: And then I just zoom in.

P5: So I think the nearest bus stop is right here. I click this button(bus stop). So, it shows that this is called College Ave at N Barnard Street(the name of bus stop). So if we want to get the... distance.

Researcher: Distance.

P5: Yeah, I have to click just "get the walking direction"(button).

P5: Then I was guide to the Google Map. And she said I have to walk about 8 min to get there.

Researcher: Alright, that's pretty much the task 2.

### Task 3:

Researcher: Let's do the test 3. So the task 3 is that find a route that can send you to home. And then you could describe how to find the destination, which is your home address. And then, we will see how this app can respond.

Researcher: Okay, let's do it.

P5: Okay, so to go to my home. I think I need to.. there's a trip planning. I think I need to click that.

P5: And filling the address now.

P5: Okay, so there's a my location that I can use I want to go to 1, 0, 0, 3, Aaron Drive, and click the get directions.

P5: Okay, so I was guide you to Google Map. According to Google Map. And there's a 2 stop that I can choose which is NV an N. So I think I will choose this one(the bus stop) because it's pretty close, so I have to walk 6 min...to this 30 Steam Drive.

P5: So I need to zoom in a little bit to see the information.

P5: Okay. Then I have to go back to this app to find or see that route. N(the bus route), I guess, is it N?

P5: Okay, (click)N. and let's cancel the NE(the bus route). Okay, so there's Blue button, I guess this is my target stop called Walker building.

Researcher: It's okay. You just find the route that can send you to home.

P5: Yeah.

P5: Departure... By time, so there's no bus here.

Researcher: So which mean this route is...

P5: Yeah..

Researcher: not available at this time.

P5: Yes, maybe I can choose the...I have other choose. For the NV. So let's go to the NV, it is a gray line. So I think I can select this line. Yeah, this is the nearest but stop.

P5: No response, click(but stop) that again

P5: No response. Why? Why I click that there's no response.

Researcher: You can try to select another route.

P5: Let's try another one.

P5: No response, no response.

Researcher: It's okay. We could treat this task is fail.

P5: Okay, yeah, let's try select this icon again?

P5: Nope. Every time I select that icon.

Researcher: Yeah, that's fine. Cause this task is just find the route that can send you to home instead of find the bus stop. And you succeed.

**Task4:**

Researcher: So, right now task 4 is that identified the next available bus that can take you. So which means like. You already find the rules, right?

Researcher: So which means that you should find that the available bus can take you home. And describe how you could start describing the app like finding the next available bus time that could easily identify. To like which bus is the best to suit your needs.

P5: Okay, so since we just searched the rules that I can go to my home so basically for now, it's only have the NV line that I can choose. So. Maybe I have to take this point(bus stop). Let me first cancel this N line and click OK. And there are 2 buses running.

P5: Okay, so now I can click that(bus station). So let's grow down a little bit. It says that on 1:31 AM. And there's an incoming bus.

P5: And.... Okay, so means that now I have to walk here(the nearest bus stop),and the bus will come I guess is maybe this one(pointing the incoming bus of this rout in the map) will come at 1:31 AM.

P5: Then, I follow this route to go to my home, I guess...

P5: Maybe this point(the nearest bus stop from home)? I don't know, I have to check Google map which is close to my home.

Researcher: Okay. Oh, all right. Thank you so much.

## Appendix B: Interview Transcripts

### P1

Researcher: Alright, now we are going to the interview section. And whenever you're ready, just tell me let me know.

P1: Okay, I'm ready.

Researcher: Alright, so first question. If you are using this app for the first time, do you feel that the research result are accurate or timely accurate, I'll create when you are looking for the bus route.

P1: Okay, so for me, I feel like the results are mostly accurate. I think that the short falling comes in the sense that myStop doesn't account for delays as much.

P1: So sometimes I say you check the bus and it says the bus will come at 4:54. However, myStop won't like notify you, or like there will be, let's say, no notifications saying, oh, the bus is delayed. So now it will come at let's say 5 o'clock instead.

P1: And another sense. I believe that first time users, It can be hard to navigate or like figure out exactly which bus is which, cause I remember when you first installed the app it shows every single bus route and it can be very busy.

P1: So if you don't really know which bus you're taking, I think that can be overwhelming for new users.

Researcher: Oh, you still need to like take time to get familiar with it, right?

P1: Correct, yes. I would say that I don't recall that the app had a tutorial or an introduction to its features. So a user would have to play around an experiment in order for them to really get to know the app.

P1: But in this case, it can be an inconvenience and turn off.

Researcher: So, compared to the Google Maps, what's the unique advantage or feature of this app? In providing local bus route information?

P1: I think really the soul feature about this app. Well, maybe two is that it has real time bus tracking.

P1: So it shows you exactly like where the each bus is going. So you can kind of in a sense predict maybe like oh like a visual representation of like where the bus is. Now we can maybe get there ahead of time.

P1: Another thing is I would say that the main bus stops are a lot more visible and it shows you exactly like which bus, or which routes the bus may take.

P1: Cause in the sense like Google Maps, unless it's a major populated city. They usually don't show you the bus lines. They just show you the bus stop itself.

P1: Also, because the app like myStop already uses so much of Google Maps features.

P1: I feel like those are really the only things that it has that is an advantage.

Researcher: So have you ever experienced any situation where the app crashed or doesn't work properly?

P1: Yeah, actually. While we were experimenting earlier, we visually saw like how the app glitches out, and I'm forced to restart it where like if I click on one bus stop. I can just pull up the information. However, if I want to change the location, what would happen is that The red pointer will move to the new bus stop.

P1: However, the bus information for that stuck would not appear, and this will continue going no matter which bus stop I press, including the original one until I exit the app and restart it.

P1: This can be very annoying, especially if let's say you're in a time crunch where you need to catch the bus quickly.

Researcher: Oh, when viewing the bus route detail, do you think the information provided by the app is? Like easy to understand. Are there any suggestions for improvement for that?

P1: I think overall the information provided by the app is simple. However, I do think that it is again clutter.

P1: In a sense here, let's say like you click on a bus route. I don't need to like scroll through multiple bus like bus lines to figure out which bus I need to take.

P1: I would like it more where it's like if you can filter out exactly what buses you wanna take.

P1: For example, let's say I only want to take the W and WE lines. When I filter it to be only those, I shouldn't see routes for an NE or VE.

P1: In terms of another improvement, I would say is to add possible delays, that way people can know let's say like, when they should like say go to the bus stop and in the sense let's say winter.

P1: People don't want to wait at the bus stop for a long time. So I think that's something that will be a lot better.

Researcher: I see. Have you used any like, real time bus truck featuring this app. The point is that like how accurate for the practical in this feature.

P1: I had used it intensely. I would say it's just a rough estimation. So sometimes I'm like, I can see, let's say like if the bus is close to me, which means it's like without even opening, let's say the interface showing like all the incoming buses. I can already see my buses nearby, but it doesn't exactly tell me when.

P1: But I would say like it's a good way of like, just give you a general idea of like where the bus is.

Researcher: So, Let's go for deeper, if you rate this feature, how are you gonna rate like one to 10? The score.

P1: I also live a live tracking. I would say it's like a 7 or 6 or 7 out of 10.

P1: Another thing that the buses don't the bus app doesn't tell you is that route like the buses they can change to a different route.

P1: So for example, let's say you're tracking a bus that is WE. At a certain point, the WE line turns into an RC bus.

P1: And if you don't know that, let's say, like, I didn't know that until a bus driver told me.

P1: It can be very confusing to see, like, oh, why is my bus suddenly going off routes or why did my bus disappear from the live tracking?

Researcher: So have you noticed any missing bus routes or incorrect information where you're using this app? Or how has this will affect your travel plans?

P1: I would say I haven't had a time where it's like I saw a bus like actually just like disappear from the app.

P1: But it can be very confusing and frustrating, I would say, for the user to see, let's say...Like a bus is stopping on a location for a long time or like if the bus does go off route again here like, I remember my friend was using an app and he was trying to take the WE back, but then he would realize like, oh the WE is taking in an off course, calling some of their completely different.

P1: Could the bus have been converted to RC and he just wasn't updated about it, that could be the case.

P1: So that did also kind of like make him had to stay in 2 extra hours at school at the bus stop, which was really frustrating.

Researcher: Oh, so We don't even know that the bus had any like accident for that. Right?

P1: Yeah, I believe that during that day there was also the homecoming parade, but there was no notification about that on the app.

P1: So. People who rely on the same like myStop or they don't actively check their Penn State emails, they wouldn't know about the bus delays.

P1: And I think that's something that My stuff doesn't like fall short of that. myStop doesn't help you.

P1: Like, no.

Researcher: Yes. So. What additional feature do you want to add to this app to enhance your experience I could give you some examples.

Researcher: For example, like, personalized route recommendations or ride reminders, line collection, etc.

Researcher: You could just have some examples for us.

P1: I would say some examples I would have are like notifications of delays. So for example, notification that your bus is, let's say, 2 min behind.

P1: That way I can know or without let's say opening the app. That will be really nice. Another thing that I would recommend is that It's maybe synced with let's say Penn State Department of Transportation emails or let's say that like, oh, certain black bus routes may be closed due to a parade or an event.

P1: Because not everybody has, I say like every single app, not everybody checks their outlook every minute. And sometimes people just want to just open myStop and like get on the bus. So it'll be nice for them to know that let's say like a bus is going to be delayed or they're gonna take a different bus back.

Researcher: I see. I thought there was kind of hard to execute it because, as far as I know, CATA bus is like cooperating with the PSU, right? But they don't really cooperate that kind of like further.

Researcher: Right? So yeah. Yeah, that's a good idea. Yeah.

P1: I think like that, yeah, cause I think, CATA bus and Penn State should work on that together because I was like, yeah, CATA bus is like a private company that's not actually owned by Penn State, but Penn State is like heavily relying on CATA bus for like let students get around so this could affect people a lot.

Researcher: And for the user interface design of the app. What do you think about the good parts or the bad part that need to approve?

Researcher: Could you specify a good part or a bad part?

P1: I think... Let me, if I reopen the app real quick. I think the good part is that It shows you like a color code all of the bus route?

Researcher: Route. Huh.

P1: Yeah, the route. And then it shows you a like flat rendering of like... Let's say like Google Map, which is nice.

P1: Now some criticisms I do have are that You can't change the colors of the routes. So let's say that your user is color blind.

P1: This could be really troublesome because then they won't be able to tell what bus that they need to go on.

Researcher: That's right.

P1: Another thing is I would say is that You can't, let's say, pin locations. On you can't pin or like edit any locations on to the bus routes.

P1: So unless you scroll in or you already know. The surrounding area and the bus stop that you want to go to, it can be hard to navigate to that area.

P1 :If I want to let's say go from Westgate to the bus stop near the I am building unless I know the routes already it's hard for me to like walk over there and to like redirect to Google Maps, I think is not a good way to encourage people to use that. I think it's kind of lazy.

Researcher: Yeah, that's right. Cause I don't think they could, they have do this kind of feature and instead of like just navigate to the Google Google Map.

P1: Yeah, I think another thing is to add satellite view. So like you can have that got 3D real rendering of the locations because again like to show a flat Map with no coloring, it can be hard to like for people to identify, let's say where exactly things are.

Researcher: I think they do have this feature, right? Like the Earth icon.

P1: Oh, right, sorry. Okay, I saw that. Yep. Okay.

Hao; It's okay, it's okay. And then, oh, so. We'll move to the next question.

P1: Okay.

Researcher: What's the process is smooth when you're using the app to purchase the bus pass or ticket.

P1: The, the process was not smooth as my as, I recall my stop does not allow you to purchase bus passes or tokens.

P1: How I found out was that I would have to go to the hub at on campus to talk to the assistance and you'll turn that you'll have to I think dial in an app called token transit.

P1: And on top of that, you can buy a bus pass. To then use for let's say like the cat buses.

P1: I feel like all of these apps can be lined into one app. To make it less confusing and more accessible to everybody.

Researcher: Okay, so, Are you using the bus pass or just use token? To take the bus.

P1: So for me, it's like. You had to physically buy the tokens and I I'm not sure about any other location, but I know that you can buy the tokens at the hub or you can like pay exactly, I think it's like \$1 and 10 cents one way.

Researcher: Okay.

P1: So to carry on change. I feel like it's also because not everybody knows the pricing and most people don't have exact change. Because CATA bus do like, like they don't give you change back. And another issue I have is that the token transit app, it does not let you buy, let's say one way passes or like, it only lets you buy. Like a daily pass which is in a 24h interval.

P1: So let's say like you buy a pass at 12 like at 12 and you need to take another ride at 6 a. M.

P1: And Yeah, so you buy a bus pass at 12 am and you need to another ride at 6 am. You would technically have to buy the bus pass twice because the bus pass ends at 4 am every 24 h.

Researcher: Oh, okay. So you're personally using the pass? Right.

P1: Yeah.

P1: Well, I have like a like a bus card that's provided to me by my My living area but It's like if I don't have this, like I forget my bus card, I'm forced to use, I'm forced to spend more money on a day pass than rather than just a token.

Researcher: So where did you get your bus passed?

P1: Most bus passes are provided by like residential areas. Otherwise they do collaborations with CATA bus. Heights will provide you a card if you live at heights.

P1: I believe the state collective, the alights, a lot of like. Off campus areas that are not immediately in downtown will provide you a bus pass.

Researcher: So for that pass is they do have the like some kind of transportation fee right? when you like moving in your living area so Did they actually pay you or just give you a free bus pass?

P1: I believe it's different for It's different for every residential area some of them it's like it's included in your lease so it's like you paid for it but they'll give it to you for free.

P1: Sometimes it's like you have to buy it yourself. So it's like, if you don't, if you don't buy it, they won't give you the bus pass.

P1: And it's not included in your fee at all.

Researcher: Okay. I see. So here's the last question. Just please share like how you think about this app to be better meet the user need in the future.

Researcher: Just give me some any kind of suggestion for that. Yeah.

P1: I stated earlier, I feel like the app can be streamlined. I feel like the app relies too much on other apps like token transit and Google Maps in order to run efficiently.

P1: I think that The app also has like the glaring bug of, again, when you change bus routes, it doesn't pull up a new interface, they just moves around the icon. If I recall correctly, that feature or that bug has been.

P1: In my stop for at least over a year or 2 now because it was happening my freshman year as well.

Researcher: Okay, so the never fix it.

P1: So yeah, they I don't think they regularly fix the app. Let me check the last time that this app was updated.

P1: Yeah, so the last bug fix was about 2 years ago and from the data it looks like they usually fix the app only 2 or 3 times a year, which I feel like is not very common and they don't address exactly what They fixed.

Researcher: I see.

P1: And another thing is I think accessibility. So. Usually people who take the buses sometime they might not have a car or like yeah good like... huh sorry, let me reword. For accessibility, I feel like they should work on color coding because, I have several friends who are color blind.

Researcher: Okay.

P1: And when I see, let's say like my route for W and WE, it's like pink, and like slightly darker pink. I can see that, but I know for sure that my friend cannot tell the difference between the two.

P1: So when they use they might step out. It's hard for them to like. Figure out which route is which.

Researcher: Yeah, that's the problem too.

P1: Yes.

Researcher: And that's all, right?

P1: Yes, I'll say that's all for you.

Researcher: Alright, thank you, I would be close it.

## P2

Researcher: Can you hear me?

Researcher: Okay. Here right now I'm gonna give you some interview question. About the task you just did it

P2: Yes.

Researcher: Okay, here's the question one. If you are using the app for the first time. Do you feel that the search result are accurate or timely when you are looking the past route.

P2: The bus wrote, I think if you asked me where the acro I think is still okay.

P2: But it really depends because when I just searching my like...the last task which I'm asked to search for my home, how to go back to my home I feel like is a little bit inconvenience.

P2: I think also not timely because it's just direct me to another app through the Google Map.

P2: And then, and then it just waste some of my time to check or which route is it, and then I need to go back to the myStop app to check this route, like N and NV. And it also didn't tell me about how long I need to go back home.

P2: Yeah. So I think it's not very good, especially if now is nighttime. I know that N is not available for me to go home because I think it just operate until to 9 something.

P2: But it still showed me so I feel like It's kind of not that accurate.

P2: Okay, I see. And compared to the Google Map. What's the unique advantage for the feature of this app in providing local bus route information.

P2: I think the unique thing is that when i select the route, it just shows me all the available route in around in State College, and I think it's better than Google map.

P2: Google map, we cannot find based on the bus route, but you can just find where am I and the way I want to go and it will just show the suggestion to me so that I will not know all the available in the Google map.

P2: Unless I just search all the possible places I want to go, but you know my bus stop I think...This is better in my bus stop to show the route that I may check into it, and I feel also like when It gives me different option to choose. When I check the route I want to see, it will show the route with different color, color lines.

P2: I feel this is quite nice for me to understand. If I want to take this bus, show how far and where I can go by taking this bus.

P2: Yeah. And more you need... I think it allows me to try to explore more about this place compared to Google Map.

P2: There is more about exploration in a small town's city. If I use my bus stop.

Researcher: I see. Alright, have you have ever experienced in any situation where that the app crashed or doesn't work properly. If so, please describe in detail.

P2: I think just right now in the task I did, I already experienced a few times that the app seems not working for me, like if I tapped the bus stop.

P2: It should show something, like showing the where is bus stop and what will be the available bus coming? But, you also see that after I tap the first one and then I tap another one bus stop, and it just not working again.

P2: And in my own experience I'm also trying to do some setting stuff in my phone. Through the myStop app. But it would just suddenly crash, and freeze. And then I cannot do anything but I just close the app and relaunch it, and to try again, yeah.

Researcher: So the app will be crashed very frequently and I understand for that way.

P2: Hum...I feel it's quite often but not that really frequent. To be honest, I'm not using that much but I can feel like maybe sometimes, yeah.

P2: Maybe half? I don't know. We have half of the chance that it will crash when I use.

Researcher: Okay, I see. So what is your phone? The I mean is there is your phone is Android or on iPhone

P2: My phone is Android, I'm using like Google Pixel 7. Yeah.

Researcher: So we'll move to the next question. When viewing the bus route detail. Do you think the information provide by apps is easy to understand?

P2: I think if from the myStop app. When I check the available bus I feel is Okay, because it is just try to show order of the coming bus, and what the best schedule of that bus stop. I think Google might not be able to do this sometime.

Researcher: Oh no, Google should be able to do this, but I feel just like when I wanna check the bus schedule for myStop might be better.

P2: But also, In the task, I forget 2 or 3. At that time I was asked to do finding the nearest bus stop and see how far is it. I think my bus stop cannot do it because it just direct me to Google Map.

P2: It is supposed to be the feature of myStop. But, It just directs me to the Google map, so for the information is for provided by Google Map instead of myStop.

P2: So if you ask me whether it's accurate or not, I just feel like It is not providing information about the walking distance in this case. It's not about the accuracy problem, but it just didn't do this job.

Researcher: Oh.

P2: Yeah, you understand what I mean.

Researcher: I mean, is the information provided by app is easy to understand.

P2: Based on the What information you provide, like based on the information I can see from myStop app, like the name of the bus stop or the available schedule of the coming bus.

P2: In this case, I feel is is quite clear. Yeah... it's just I prefer the task one that when I locate myself It did great job like it show me where I am. I remember there was a circle around like my location, but I don't quite understand what it means.

P2: Like is a 5-minute walking distance or what? I remember there's a blue circle. Might be something like, oh, approximately the location?

Researcher: Yeah, yeah. That is the approximate location by your location.

P2: Okay, I see. So I think that is working nice. That information and... Yeah, the nearest bus stop.

P2: But I feel like if you ask me for the nearest bus, so I can only do this by manually because I think there's no such function call "find my nearest bus stop", but at that time I just try to use my own judgment just look at the dot on the map, and see, oh, this one should be the close one so I just tap on it. I think discount information might not be provided by myStop app.

Researcher: Is there any like suggestion for improvement?

P2: I think one thing is why like doing the ask for about find the next available bus. I was thinking that it would be better if it provided some like doing some calculation about some walking distance if you know that...

P2: I from my current location, if I need to walk to the bus stop like taking 5 or 10 this time, then I think it should just show me the next bus instead of the bus coming in one or two minute. I think that does not work for me, and it would be like rushing from one place to the bus stop, and I definitely will miss that bus. So I think it will be better for me like just show me the next available bus that I can catch it. So that I will know the next bus will coming about 12:30 something.

P2: Yeah. And another thing is about the crash problem. Like if I tap the bus stop, it just don't show...information, and just no response or I mean it's some critical problem that is to solve because it is not about good or not, but it just cannot use. In that case.

Researcher: Okay.

P2: I think you should fix all those basic problems first, and other things should be fine for me.

Researcher: Okay.

Researcher: And have you used the real time bus tracking feature in the app? And how accurate practical in this feature.

P2: Oh, I forget this feature. If you tell me about this feature, yeah, I remember that when I checked the route over there is like tracking the real bus like this two bus icon that showing that where is the current bus

P2: Oh, actually, I think is good, yeah.

P2: But because in the previous task, it isn't covered, so I forget this feature. Yeah, I remember in the real time bus feature it will show something like how full the bus is.

P2: Although I didn't verify whether it's really accurate to reflect this situation in the app, but I feel this feature is kinda interesting for me.

P2: And whether it's accurate?... I think I didn't have a very strong impression. Yeah, because i am really rare to use this actually, but I feel it's give me some more information about the current bus information.

P2: Yeah...because the schedule stuff is always not accurate. And it's not about the app problem, but more about the bus operation service because sometimes will show us how delay.

P2: But I think you have the real time tracking feature of the real-time location of the bus. It's still offering something like, oh, I know it's delayed, but at least I know where is it.

P2: I think this cannot be done in Google map because Google map always just show me how long for the delay time.

P2: But sometimes you postpone even more, maybe it's telling me that it will be on time, but after one or two minute it would tell me the delay will be the three minute.

P2: And then maybe after few more minute, you'll just have it all delayed, 10,15 min, especially on Sunday or during some holiday, game day.

P2: Because traffic congestion is serious, and the traffic condition is not good during those day.

P2: So I feel like the real time tracking feature might help me to do. So offer me the sence safety to me that at least I know where the bus is.

P2: But I also remember this sometimes you would just not show anything. I'm not sure that it's the personal operating or It's just lost the track?

P2: Yeah I remember few times I experience this like... Nothing show on the map also.

Researcher: So this suppose they have that have a pass in this room and just suddenly like miss out like missing.

P2: Yeah, yeah I don't know why, but I remember also, something like game day or holiday.

Researcher: Okay. Have you noticed any missing bus route or incorrect information while using this app like how this will affect your travel plan.

P2: Currently I don't think it got incorrect information. As I mentioned, just about the time I think...

P2: It's sometimes the bus is delayed. Maybe I will just like... If delay is fine, like, it arrived the bus stop a bit earlier.

P2: At least I will know. Sometimes we just delay for a long time. Then that make me wait for like longer time than I expected.

P2: Because I was thinking like, oh, if you told me that the bus will be like for 15 or 30 min, maybe I can like stay at home maybe for a little bit more housework. Like washing clothes or someelse, just I was trying to fold my clothes before I go out. Rather than just like rush to the bus stop. Yeah.

Hao; Okay, I see. So what additional feature do you want to add? To your app to enhance your experience.

Researcher: Let me give you some example. Personalized rule recommendation. Maybe write a reminder or line collection.

P2: What you mean by line collection?

P2: Connection? Oh, connection. I know it's just like when I take one bus and to get off from some bus station and to take on another bus ride.

Researcher: Or selection. That could be, yeah.

P2: I think it really depends on experience, what I usually do is that from home to school or school to home.

P2: I am really rare to take other route and also because like our bus passes is restricted in some route only. So for me, I think that this kind of feature. It is useful, but I may not in the very fit needs about this. But I was thinking like some feature, let me take a second to think.

P2: Hmm.

Researcher: Yeah, just think some like if there any additional feature you want to add in this app. Like the..

P2: Might be I would like to know about. The update a time schedule. Like myStop app.

Currently it offer like a fixed schedule I assume... when the bus supposed to come.

P2: But it didn't show if any other delay happens and it will not update. All the information is not update instantly.

P2: So it will make me like. For example, if I, if you know that the bus will be delayed for 15 min maybe. If the next best stop should also postpone the time for All the subsequent bus stop.

Researcher: Oh, I see.

P2: Yeah, it's not like it's still showing the on time. Schedule on time but actually it is not.

P2: The most updated information should be shown in the app which helped me to like estimate the time more accurately... Yeah.

Researcher: Okay, for this app. The user interface design. What do you think is good? Or what need to improve.

P2: Hmm, I think for the user interface, I like the way that you showed the route. Because it used different color code.

P2: And even though if I select multiple route, for example 3 or 4 bus route maybe across each other.

P2: So I think with the this kind of color line design. It can still help me to distinguish between the route.

P2: And Yeah, I remember when I click the select route, it would just show not only the The name, like, N, NV, bluh, bluh, bluh, it also like showing the color.

P2: So it helped me to quickly identify the route I need. Because if I know that I usually N and, and which is in blue color, and like NV is more like a little bit grey or dark blue.

P2: Yeah, I think it's kind of thing help me to do quicker identification if I want to select something.

P2: So I think this good. For the improve of the interface, I think it's nothing really special.

P2: I think it's more about the functionality that if I tap the bus stop, it just don't show me anything.

P2: And you use some dot to represent the bus stops I think. This design is fine and shows me the background location with some estimation in the map .

P2: I feel is... yeah, I don't think the interface got much problem indeed.

Researcher: Okay, I see. So, was the process smooth when you're using the app to purchase the bus pass or ticket?

P2: I never tried to use the app to purchase or bus pass. I'm not sure about this.

Researcher: How did you get the pass?

P2: It's from my... when I rent the house and it's from the like the estate management company.

Researcher: Oh, leasing office. Okay.

P2: Yeah, the leasing office.

Researcher: Okay, so please share how you think about this app should involve the in the feature to better meet the user need.

P2: What do you mean by involve the feature.

Researcher: Let me just use another word. Like. What do you think about this app?

Researcher: Should be... Have the better meet the user need like in the future.

P2: I feel like it's just What I have answered previously, like it can provide some up to date information.

P2: And fix those crash problem ,or sometime not no response problem by tapping some bus stop, and I think it should be fine, yeah.

P2: Like just fixing all this problem. Yeah.

Researcher: Okay, alright, thank you, Sam. Thank you today for interview with us.

P2: Yeah. You're welcome. See you.

### P3

Researcher: Okay. Right now I'm gonna doing the interview section. Like the total interview will be covered by 10 question.

P3: Sure.

Researcher: And then you would just answer it, and just feel free to talk if you still have any kind of idea during the question I asked.

P3: Sure.

Researcher: Okay, so there we go. If you are using the app for the fiest time. Do you feel that the research result are accurate? Or a timely accurate when you look in the bus, looking for the bus road.

P3: I will say that the search results are usually very accurate. In terms of timely... I guess I will say that it is also quite timely. But that's under the case that I'm looking for, the specific routes or the specific particular bus.

P3: In another case, I would say like, for example, if I'm not quite familiar with this State College area or the CATA bus available here.

P3: And I would like to mass search the available bus, and to see the available routes. I would probably say that I will prefer the Google Map over the myStop apps.

P3: Because Google Apps is can show the a lot of different bus routes, and they are listed to each other. It is kind of easy to read maner.

P3: But, Mystop app is... arguably to myself, if I'm familiar with this state college area and, have some basic idea about the route or the bus that I will take.

Researcher: Okay, so you are saying that this app It's not the kind of like comprehensive information you wanna get, right?

Researcher: Instead of using the Google Map.

P3: If I'm looking for some kind of massive amount of information and, to read through them and choose the one I want.

P3: For this kind of purpose, it's probably better to use Google Maps. Because this, myStop app is having a very difficult time doing that.

Researcher: I see. So compared to the Google Map, what's the unique advantage or feature of this app in providing local bus route information?

P3: So I would say that myStop app can show the real time location of the bus. And that's advantages points that also kind of the reason I'm using this myStop app. And also myStop app is like the time the buses arrive at a particular stop.

P3: This information is updated in real time as well. So the this kind of information is usually a little bit more accurate than Google Maps. So that's another reason that I'm using this Mystop app.

P3: So yeah, this is the unique advantages of myStop.

Researcher: Okay, I see.

Researcher: So have you ever experienced any situation where the app crashed or doesn't work properly?

P3: I can't think of one on top of my head, to be honest.

P3: But maybe...there is this kind of situation in my past...

Researcher: Okay.

P3: But I'm not quite sure.

Researcher: So whether the app crashed or does the function doesn't work with this kind of problem is pretty less happen, right?

Researcher: That's what it's like trying to say.

P3: Yeah, yeah, it's even if there is some kind of this situation it's very very rare.

Researcher: Okay. I see. So when you are viewing bus route detail, do you think the information provide by app is easy to understand it. Or are there any kind of suggestions for improvement?

P3: I think Overall, it's relatively easy to understand.

P3: One suggestion I might have some a little bit more detailed description on the direction of the bus.

P3: Especially the bathrooms that go from on campus locations to off campus locations. There are two directions.

P3: And these two directions have corresponding names. But, especially for the people who are less familiar with the State College area. It might be relatively difficult for them to understand clearly. The correspondence between the direction name and what it actually referred to.

P3: For example, whether it is from off campus to the on campus or on campus to off campus. So maybe to provide some further information like, just, off campus to on campus or on campus to off campus to provide this kind of name.

P3: Although they are not as precise as formal direction names, but they are much easier to understand.

Researcher: Okay, I see. So let's move to the next question. Right.

Researcher: Have you used the real time bus tracking featuring this app. Like how it accurate in this feature.

P3: Yeah, so, yeah, I definitely use this feature in the myStop. As I said earlier, this is probably the biggest reason I'm using this app.

P3: And in terms of the accuracy. I would say that there can be times when this is not as accurate.

P3: For example, when use let's say a situation where you are waiting at a bus stop, and then you see the bus coming to that bus stop.

P3: But on the myAtop app, the bus icon of that bus might be a little bit further than it actually is.

P3: But, for me, I would say that since I use this app for many times. So I kind of will take this accuracy into my consideration, and also when I say inaccuracy this is also not that much inaccurate. So overall, it's still. I think it's acceptable in terms of this in accuracy.

P3: I guess it's probably a much, much harder to make it a hundred percent accurate.

Researcher: Okay, so if I give you one to ten score, how would you rate this? This feature like real-time tracking.

P3: I will rate it as at nine I would say.

Researcher: Okay, out of ten of the nine. Okay.

Researcher: Alright, I will move to the next question. Like, have you noticed any missing bus route or incorrect information where we're using this app. If so, how will you, how would that affect your travel plans?

P3: Yes, Sometimes notice some missing bus route. For example, let's say saturday. When I opened up an app, and you see the information about the running red links. But actually, no red link is showing in the in the app.

Researcher: Okay.

P3: But actually red link does running on that day. So that's kind of the miss bus route case for me.

P3: And in terms of how this affected my travel plan.

P3: I would say that for example, since the bus information, the Red Link information is miss from the app, that means I cannot check the red link arrive times of each bus stop.

Researcher: Okay.

P3: But still... at that time I knew that there were red link buses ongoing in on the campus. So I can just waited at the bus stop I was at, and just wait for the next red link coming to that bus stop. And if I feel that I don't necessarily need to go to the place on that specific day.

P3: I will do it a few days later. I will probably, incline to postpone it and do it later when the bus route information is back on the app again.

Researcher: Okay, it really depends how was your travel plan, right?

Researcher: If if that is not non necessary so you won't even go right? you won't even plan to do.

P3: Right.

Researcher: I see. So let's move to the next question. Like. What's additional feature do you want to add to this app to enhance your user experience.

Researcher: I I could give you some example like personalized route to recommendation. ride reminder or line correction etc. It could be any.

P3: Let me see, so I think. Probably the, the most I want is to make this like add buying tickets feature to this app. And also to allow us to show the digital tickets to the bus drivers, and also can be bought it on the app.

Researcher: I see. So just maybe they could add it to the Apple wallet any kind of that or using some kind of QR code to as a ticket, is that what you're saying?

P3: I would say, yes. Yeah, that can that can work. Although, yeah, what I saw earlier was actually probably like, support a bit more abstract what you recommended like earlier that gives more details or at least some like, potentially viable details on how it can be achieved.

P3: Yes. But I do agree, yeah.

Researcher: Yep, I think I got you. Yeah. So let's move to the next question.

Researcher: For the user interface design part of this app, what do you think the good part or bad part. What kind of things you want to make?

P3: Okay

P3: So, You user interface I Hmm. Let me see...

P3: Good parts are is probably like. Hmm.

Researcher: Yeah, it's okay that you feel don't know the good part. Yeah, you would just say like whatever you want for the interface.

P3: I think. It's a good part is probably just find more information about things we would like to look at, for example, a bus stop or the real-time location of the bus by itself.

P3: We can just like click on that, click on the icon and then the information. It will be shown.

P3: So that's kind of like intuitive interface.

P3: Or pretty intuitive way to look at the information. The good part is that the different routes are assigned by different colors.

P3: So, We can see even we select multiply routes in the app, we can distinguish them by their colors. So that we can look at multiple routes at the same time if that's needed.

Researcher: Okay.

P3: And in terms of the bad parts of the interface. I might Say that I am not sure if I should call it as a bad part but... It has the feature of planning the trip that this planning is not good or not as good as the Google Maps.

Researcher: Okay.

P3: But the things is.. since I would say that the Google Maps does quite decent job at this planning the trip.

P3: So I guess maybe for the myStop app. It just doesn't need to care too much about this. If people need to do something like that. They just use... Although not their app, but in another app, but still people can find a way to do that.

Researcher: Okay, so let me rephrase a little bit of your answer that you are saying this planning feature is too easy, right?

Researcher: Cause you mentioned that the Google Map is kind of pretty decent design. So can I understand that like the myStop app for the planning feature is kind of too easy?

P3: I would say, Probably. Yes, and more specifically, it's like a choosing call, and that sometimes does not provide the information that I'm actually looking for.

Researcher: I see. Okay, let's move to the next question.

P3: Yeah.

Researcher: Like. Was the process smooth when you like using the app to purchase the bus pass or ticket?

P3: No. As I mentioned, when answering a previous question, so. Yeah, we are not even able to do that within this myStop app to buy either bus pass or tickets. We need to go to other places for the ticket or specifically for the CATA bus system called the tokens.

P3: We need to go to either hub or CATA office in downtown to buy that.

P3: And for the bus pass, we also need to go to CATA bus office in downtown to buy that or be provided at some through some other places like as part of the housing contract from some residence options.

Researcher: Okay. So here's the last question. Please share how you think the apps to better meet the user need in the future.

Researcher: You got any idea for that?

P3: So yeah, so first to incorporate the digital ticket or digital bus pass in the app. And also in the CATA bus system.

P3: And then also probably to improve the app in terms of their missing bus route information. As pure case of this as possible.

P3: But I would suggest adding the features that are unique to this app.

P3: Especially for example compared to other similar apps, let's say Google Maps. So I know that last one adding additional unique features is probably the most abstract and the most challenging one but yeah, that's overall.

P3: That's a direction. Nonetheless, in the future, so yeah.

Researcher: Yeah, they make sense because we are saying previously like Google Map is kind of pretty decent app.

Researcher: Whatever the design part or user experience part.

Researcher: And that is the goal that Why are we gonna do the interview for this? So, and yeah. Thank you for participating.

P3: Okay. Thank you.

#### P4

Researcher: Okay. Let's start the interview question.

Researcher: So, If you are using this app at the first time, do you feel the search result, arcade or timely when looking the bus route.

Researcher: YiLu.

P4: Mmm, yeah, I think that results are okay since the bus routes are not usually like changed very often, and actually, I know the bus route, and I think the app shows the like exactly the app shows the like exactly the same route as I understand.

Researcher: So typically, you know what's what kind of road you could take you to the home right

P4: Yeah.

Researcher: But do you think the search results are accurate that the timely is accurate?

P4: Yes, if I want to search a route, basically, the app just takes the addresses and goes to the Google Map.

P4: So, I don't think it's the search function makes too much sense.

P4: Because I can just search that on Google Maps by myself, and I think Google Maps have a better user experience.

Researcher: I see. So. Okay, so compared to the Google Map. What's the unique advantage of this app in providing the local bus route information? What's the unique advantage?

P4: Yes, so the unique advantage of this app should be... we can see the real time location of the bus.

P4: But in Google Map, I think we only get like predefined schedule. So the timing information in the myStop app should be more accurate.

P4: I know that when you click a stop, you can see how many times you the next pass will arrive?

P4: But in Google Map. This timing information and not like updated frequently.

Researcher: So it's not accurate. Right?

P4: Yes.

Researcher: Okay, I see.

Researcher: So, have you ever experienced any situations where the APP crashes or doesn't work properly? If so, please describe it in detail.

P4: Yeah, I don't see the app crushed, but the one thing I'm complaining about is that they, like the locate button works very slowly.

P4: So when I'm trying to locate myself on Google Maps, the map reacts instantly. But in the myStop app, I need to click the locate button multiple times. Eventually it will work, but sometimes it works sometimes it is not.

Researcher: Oh, okay, so what you mean is that the location feature is still need to time to process it, right?

P4: Yeah, and I'm not sure why the result is inconsistent. And sometimes, I click the locate button, and the map zooms in, but I don't find the dot that represents myself.

Researcher: Okay, I see. When viewing bus route details, do you think the information provided by the app is easy to understand?

P4: I think the route itself is easy to understand. But, I...

Researcher: So you have to do you have any suggestions for improvement?

P4: Yeah, I believe the bus stop can be preventing a different way maybe the dots with like high contrast color. And when I try to touch the bus stop to get the stopping information, many times I miss clicking on the It's a living bus icon, so It is not easy for me to tap the screen and click on the correct bus station I want to go.

Researcher: Okay. So have you noticed any missing bus routes? Or incorrect information when you're using the app like how this will affect your travel plan.

P4: Hmm..I didn't notice any missing bus roads, but I think, like the estimated time of the bus, sometimes it is not very accurate. I think it is more accurate than Google Maps, but sometimes the bus arrives like longer than expected.

Researcher: Oh, that's the last question. Okay.

Researcher: It's okay.

Researcher: Have you used the real time bus tracking feature in this app.

P4: Yeah, I have used the real-time bus tracking feature.

Researcher: So how was the accurate?

P4: So I think the bus location is accurate, but it the estimated waiting time is not...Sometimes it's not very accurate.

Researcher: Okay, I see. So what additional feature do you want to add to this app? To enhance your user experience, I can give you some example.

Researcher: For example, like personal personalized route recommendations or ride reminder, or line collection.

Researcher: It could be anything.

P4: Yeah, I think if the app can work independently the app will not rely on Google Maps to provide features like route search or bus stop search. I don't want to like jump between two apps when I'm trying to like find the bus. Or if they can integrate the Google Maps function in the app itself. It should be better.

Researcher: Hmm, okay

Researcher: For this app, the user interface design. What do you think is which kind of design is good, or which kind of design needs to be improved?

P4: Yeah, I think the use like different colors to separate between the routes. That is Good. So I can easily find which route I'm going to take. And also, the button in the app is pretty straightforward.

P4: So I can easily understand what and which button means.

P4: But I do think there are some things that they can do better for this app. For example, in my Android phone, the app does not comply with the current Android design recommendations. The app didn't fit the top part of my screen. And also some buttons may be a little bit small.

P4: Hmm. In the app, I cannot even use the back button provided by the system.

Researcher: Okay. That's right. Was the process going on very smoothly when you were using the app to purchase the bus pass or any kind of ticket?

P4: I think the app itself does not provide any bus pass or ticket purchasing, But I know they're there's another app for it can purchase a daily pass.

P4: So if they can like add this functionality into this app, it will be great. So that we will have all in one app that can do everything related to the bus.

Researcher: So, what is your like primary use? Like, are you using the bus pass?

P4: Yeah, usually I have a bus pass.

P4: So the bus pass is provided by my apartment, or I purchase the best pass from CATA directly.

Researcher: Oh, okay. So basically, your apartment leasing office will provide you the bus pass, and did you did you pay the bus pass fee? Or they will give you for free?

P4: I think, it is included in my rent.

Researcher: Oh, okay. All right, this is the last question. Please share how you think about this app to meet better the users need in the future.

P4: So, I think firstly need to keep the, this app updated. I can see there some issues when the app running.

P4: Like on my Android 14 phones. So this should keep the app updated, and use the latest Android APIs to avoid any potential issues.

P4: And also, some functionality is related to the Google Maps. And I think Google Maps has a way better user experience. So why do I need this app? Or if we can like just add the real time bus tracking feature to Google Maps. It will be better.

Researcher: Okay.

P4: Yeah, also as I mentioned before, I think selecting the bus stops are not very easy and straightforward.

Researcher: Okay. Alright. Thank you for your today.

P4: Yeah, thank you.

## P5

Researcher: Okay, Let's start with the interview. Here's the question one.

Researcher: If you are using the app for the first time, do you feel that the research result are accurate and timely accurate when you're looking for the bus route? Yeah.

P5: Oh, so actually this is not the first time that I use this app. So for this search result...

P5: Actually if you want to find a specific route that for this app, it will like first we type the information on the search box, and then we jump to the Google map.

P5: So basically it's based on the Google Map. So the only the build-in features is for that we can check, for example, where there's a bus station. And we can see. The routes lines in this app.

Researcher: Oh, I see. So, avoid the Google map. So do you feel that the research results are accurate?

P5: Kind of the accurate...

Researcher: Okay, so how about the time? The time is accurate, right?

P5: Yes, yes, yes.

Researcher: Okay. Compared to the Google Map. What's the unique advantage feature for this app?

Researcher: Like by providing the local bus route information.

P5: So, one of the unique features is that we can see that all the available blue route, and it will be shown in different colors, so which will let us easily to find out which route I currently want to search. The second point is that, for example, if I search one of the bus routes so it will show every bus stop in a circle icon.

P5: And then the third feature is that, there's just a, like, it will show a bus icon in real time.

P5: So in this case, you can see now, like for example, how many bus are running for this route and where is the current location of that bus. So you can get a estimated timing something like that.

Researcher: Okay, I see. Have you ever experienced any situation where the app crashed?

Researcher: Maybe they doesn't work probably.

P5: Yes. So, for example, the last time I used it when I clicked the local location, there was no response, so then I just clicked several times. Then the app just crashed.

P5: So then I do an update of the app version. So I updated to the latest version, then seems like this file has been fixed, but the location feature is still kind of not good to use.

P5: So, for example, if I click it. Most of the time, there's no response. You have to wait several seconds. And then, there's a point of your location. So this feature is not that good.

Researcher: Okay. So when you view the bus route detail, do you think the information provided by the app is easy to understand it? Or do you have any suggestions for improvement?

P5: Yeah, I think it still needs to be improved. For example, if I want to so there's a place I want to go and I want to find the route.

P5: So basically, I would be guided to the Google Map. And I can know which route I can take, but then I have to go back to this app to find out which stop I will go to, and that's for the destination stop. If I don't know the precise location information, it's hard to find that point on this app.

P5: I still have to find an estimated location on Google Map and switch back and then find that points.

Researcher: So. Have you used the real time bus track feature in this app? And how were they accurate in this feature.

P5: I think this feature is pretty accurate. For example, there's no like delay or something like that. For example, if there are some traffic issues that cause a delay. I can see it on the app. And also I can see the current traffic and information inside the bus. For example, is the empty or it's crowded or something like that.

P5: I think for this feature is useful and accurate.

Researcher: Okay, so have you noticed any missing bus? In the route or incorrect information, we're using the app? How has this will affect to your travel plan?

P5: Mmm, not that usually? So, usually when there's some special event, and there is notes here, like a red box called the Service Alert on the top of the interface. So, but it will not automatically pop up.

P5: If you want to make sure there's no delay or some issues that affect your plan. You have to every time you go into the app and click that service alert box to check whether just an update of the traffic information.

Researcher: Okay. So what is additional feature do you want to add to your app to enhance the your experience.

Researcher: I could give you some example. For example, personalized route recommendations or ride reminder or line correction etc.

P5: Yeah, so the reminder and the recommendation would be great. And also, I hope that I will not be guided to the Google Map.

P5: If I will guide it to Google Map, why should I need this app?

Researcher: That's right.

P5: Yeah.

Researcher: And how about the user interface? What do you think whether it's good feature or the bad feature you want to improve?

P5: So the good feature is that there is a bus icon being showed in the real time, and also for the bus stop you can see a circle, and for the different route will be showed in different colors.

P5: But there's some like weird design. So first, the search box. I don't know why it's in the bottom. Usually this box was appeared on the top of the app. And, there's a service alert on the top, maybe their consideration is that, this is more important. So they put this alert on the top. In that case, the search post had to be put into pattern? I don't know.

P5: And also, like for example for the icon, if you observe it, the icon of the trip planning. And the select that route, the distance to the edge is different. So it's the kind of weird.

P5: So maybe if you let me make a suggestion, and I would suggest moving the icon of the trip planning to the right a little bit. Because it's too close to the edge.

Researcher: Okay, I see. So. The UI design is not well, right?

P5: Yeah

Researcher: So what's the process smooth when you're using the app to purchase the bus app or ticket?

P5: I don't think this App can purchase a ticket or bus pass.

Researcher: Oh, so how did you get your bus pass or ticket like?

P5: So I get it from my apartment. So it is free.

Researcher: Oh, It is free. Okay, this is the last question.

Researcher: Please share how you think the app to be better meet the user need in the future?

P5: Maybe, first fix all the bugs. There's make sure there's no crash, no weird issues, no delays when use user interact with this app.

P5: And then the second is that.. Oh, so there's sometimes where I click the the stop the the information cannot show up.

P5: I don't know why it might because maybe I see like 2 routes. Because then they all might be the reason.

P5: But this feature is really not good to use. Like click it and there's no response. You will just like zooming. It will not show the information I want. So I hope they can fix this problem.

P5: And also, for example, even now I click the bus icon. The information will be shown like after several clicks, I don't know. Why?

P5: So I hope this problem can be fixed, and also maybe they introduce more features to this app. For example the where I type the location information you can do directly shows on this app rather than jump to Google Map and find a place and switch back again.

P5: This it very hard to use.

Researcher: Ok. That's all. Thank you.

P5: Thank you.