Design For Making the Wait-Time in Bus Transportation a Positive Experience

The experience of traveling from one place to another often evokes a range of emotions, particularly anxiety due to the uncertainty and waiting involved in transportation. Our goal is to transform this experience by designing a solution that turns the waiting time into a positive and enjoyable part of the journey.

Team 8

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T4 Final Report and Design

1. Introduction (revise from T2 and T3)

Transportation is an essential aspect of daily life, and public transportation has become an increasingly popular mode of commuting. However, waiting for public transportation can be a tedious and frustrating experience, particularly for individuals who are on a tight schedule. Even a slight delay can lead to feelings of anxiety or stress. Although we recognize that delays are inevitable, our project aims to enhance the waiting experience for public transportation users. Our focus group for this project is student commuters of Cornell University who use TCAT for their commuting purposes.

The objective of this project is to create a transportation system that prioritizes the needs and emotions of commuters, providing temporary relief from negative experiences, and ultimately making the entire commute a positive and enjoyable experience. To achieve this goal, we will employ ethnographic research and autoethnography methods, along with various literature reviews.

In our ethnographic research, we conducted interviews with seven Cornell students and observed their behaviors at selected hotspots. It provided us with insights into their experience, expectations, and emotions. Our autoethnographic study enabled us to understand the experience ourselves and enhance the design solution for this problem space, extending the scope of the project.

These studies allowed us to design a prototype bus station that enhances the user's experience. The station relieves users of some pain points, while making additions to the bus stop that create positive experiences.

We hope to provide an inclusive and positive experience for all public transportation users. By improving the waiting experience and prioritizing the needs and emotions of commuters, we hope to create a brighter future for all who need to travel from one place to another.

2. Background (revise from T2 and T3)

The project aims to design an interactive bus stop that enhances the waiting experience for passengers. The team will focus on the following design goals: providing real-time information about bus arrival and departure times, offering a variety of activities to pass the time, and creating a comfortable and safe environment. The literature on the psychology of waiting and designs that help people pass the time while waiting for public transportation was reviewed to support these goals.

Research has shown that waiting for public transportation can be stressful and frustrating, especially if there is uncertainty about when the bus will arrive [1][4][5]. Passengers may engage in various waiting strategies, such as pacing, checking their watch or phone frequently, and looking for signs of the approaching bus [1]. Providing real-time bus arrival and departure information can reduce the perceived wait time and improve the waiting experience [4]. Additionally, passengers may benefit from activities to pass the time while waiting, such as interactive games, music, or reading material [2][6][8]. Finally, a comfortable and safe environment can also contribute to a positive waiting experience [9].

To achieve these design goals, the team will use interactive surfaces and other digital technologies to provide real-time bus information and interactive activities [2][6][8]. The team will also consider the physical design of the bus stop, such as seating arrangements, lighting, and shelter from the weather, to create a comfortable and safe environment for passengers [9]. The team's design and research decisions are informed by empirical research, social science theory, and existing technologies [2][3][6][7][8][10].

In order to fully comprehend the practices, beliefs, and values of the culture or social group being researched, ethnography is a study method that entails complete immersion. Long durations of fieldwork are often required for ethnography, during which researchers take part in the group's daily activities and study their relationships and behavior.The goal of ethnography is to generate rich, descriptive data about the social world being studied and to gain insights into the meanings behind the behaviors and practices observed.

Autoethnography is a research method that combines elements of autobiography and ethnography. In autoethnography, researchers reflect on their own personal experiences and use them to explore larger cultural or social issues. Autoethnography is often used to explore topics related to identity, culture, and power, and it can be a powerful tool for generating new insights and challenging dominant narratives.

Overall, the team's methods are appropriate towards addressing the problem of improving the bus stop waiting experience. The team's focus on the user experience and the use of empirical research and social-science theory will contribute to developing evidence-based recommendations for improving the bus stop waiting experience.

3. Design Objectives and Research Questions

The design objectives for this project are as follows: we want to design a new bus station that addresses physical, emotional, and social factors contributing to the public transportation experience. Physical factors involve location, weather, safety, and more. Emotional factors relate to the emotions of the user, particularly boredom, stress, and anxiety. The way users interact with one another is covered in the social design component. These three factors are heavy contributors to the bus experience. There are both positive and negative experiences associated with them. We want to address the negative while enhancing the positive.

4. Process and Methods

Method I

We conducted a qualitative research technique called ethnography which includes witnessing and recording people's activities, interactions, and experiences as they go about their daily lives. Ethnographic research can offer important insights into the requirements, preferences, and difficulties faced by bus stop users in the context of understanding how they spend and experience their time at the bus stop.

Method: The ethnographic study was conducted at various bus stops in Cornell University with diverse demographics. The research team, composed of us three, began by selecting bus stops that represented different locations, such as busy commercial areas, residential neighborhoods, and transportation hubs, to capture a wide range of bus stop user experiences. The research team used a combination of participant observation, interviews, and field notes to collect data on the behaviors, activities, and perceptions of bus stop users. The participant observation method involved the ethnographers spending extensive time at the selected bus stops, carefully observing

the bus stop users' actions, interactions, and use of the bus stop amenities. They documented how long users spent at the bus stop, what they did while waiting, and how they utilized the available resources, such as seating, shelter, and information displays. The ethnographers also engaged in informal conversations with bus stop users to gain insights into their experiences, preferences, and suggestions. Additionally, the research team conducted semi-structured interviews with a diverse sample of bus stop users to gather more in-depth information about their perceptions and needs related to the bus stop environment. The interviews explored topics such as users' feelings about the bus stop amenities, their expectations, and suggestions for improvements. Field notes were taken during and after the observations and interviews to capture additional contextual information and reflections.

Process:

The ethnographic study followed a systematic process, which included several steps:

1. Site selection: The research team carefully selected a diverse sample of bus stops that represented diverse locations and demographics of students to capture a comprehensive understanding of bus stop user experience.
2. Data collection: In-depth participant observation was used by the study team, who spent 1-2 hours at the chosen bus stops observing and recording the actions and interactions of other passengers. Additionally, they conducted semi-structured interviews with a varied sample of people who frequent bus stops.
3. Data analysis: The research team transcribed and analyzed the data collected from observations, interviews, and field notes.

4. Interpretation and synthesis: The research team interpreted and synthesized the findings to identify common themes and trends related to the bus stop user experience, specifically focusing on the need for air conditioning and a display panel showing bus timing at the bus stop, as well as addressing the issue of bugs and delay in reaching a place on time.

Method II

The second method we employed is an auto ethnographic survey in order to gain a deeper understanding of the public transportation experience and connect it to the participants we interviewed in our first method.. Specifically, we incorporated the TCAT transit system into our daily lives for a week and a half and gathered personal experience and observations.

Participants:

The study involved the members of this group as participants. The TCAT transit system was utilized for commuting to class or other activities during a period of a week and a half. Each group member documented 3 to 5 instances of their bus usage throughout the study period, in order to contribute to the research conducted in the study.

Procedures:

The study was conducted over a period of one and a half weeks, encompassing both weekdays and weekends, to note potential differences in experiences. Each individual participant in the survey utilized the TCAT transit system 3 to 5 times within this timeframe, with varying usage methods. Specifically, some trials were "planned," where participants used use available resources to create a route and track buses using applications such as the TCAT app and Google Maps. Conversely, other trials were "unplanned," where participants attempted to reach a destination without any prior planning and by simply using available bus stops. Participants recorded their experiences in multiple ways, including a simple notebook to document their

thoughts and emotions, as well as other applications to provide supplementary information like audio recordings, snaps of them, markings on a Cornell map to see the bus stops they used in a repeated manner. These various probes were inspired from the cultural probes method and we hope that it will inspire our design solution in the future.

Materials:

We used Snapchat's filters to capture information about time and temperature during the auto-ethnographic survey. We documented our experience with photos and videos, focusing on waiting and transit times, temperature, and the overall user experience, not limited to ourselves. In addition to our personal observations, we also paid attention to conversations and emotions expressed by others regarding the transit system. Participants were allowed to use their phones and physical notebooks to record data.

Data Analysis:

We looked for patterns in this survey and the one previously conducted. This method allowed us to use our own experience in the design process with the various data that is collected in different forms.

5. Findings

Method I

The recordings and the transcripts of the nine interviews we conducted can be found in the drive link given below:

https://drive.google.com/drive/folders/1xvStmlz97aJBmKB41zrMMoH4p2VOmcux?usp=sharing

The ethnographic study yielded several key findings related to bus stop user experience:

- Need for air conditioning: The study revealed that bus stop users in Cornell University, particularly during the hot summer months, expressed a strong need for air conditioning at bus stops. Many users reported discomfort and inconvenience due to the lack of proper ventilation and cooling mechanisms at bus stops, leading to increased heat-related stress and discomfort while waiting for buses.
- Display panel showing bus timing: The study found that bus stop users highly valued accurate and up-to-date information about bus timings. Users reported that they often relied on the bus timing information provided at the bus stop to plan their travel and manage their time effectively. However, the study identified issues with the accuracy and visibility of the bus.
- Having to walk: If they miss the bus they are in a situation where they will have to walk uphill or downhill and Ithaca's demography makes even a 10 minute walk become longer and tedious which is the last thing you would want to do on a hot day after all your classes.
- Phones: Mostly all of the participants were on their phones listening to music or scrolling and the emotions they showed lie in the spectrum of calm to annoyed.
- Other issues: infrequency of the buses over the weekend, pests and rodents in the bus stop, safety while waiting in the bus stop at odd hours.

One thing that was constant was that the participants were on their phone, used google maps mostly identifying the bus timings and they found the unreliability frustrating.

Method II

Overall, our autoethnographic study of the public transportation system revealed a range of experiences and observations. While there were instances of delays, lack of shelter at bus stops, and frustrating timing inconsistencies, the system did demonstrate some efficiency in terms of short waiting periods for unplanned trips. These findings shed light on both the strengths and weaknesses of the public transportation system. During an unplanned trip, the bus can surprise you and get you to your location sooner than expected. However, when the trip is planned ahead, bus inconsistencies are extremely frustrating.

It is noteworthy to mention social behavior when traveling alone and in groups. When traveling alone, participants often found themselves engrossed in their phones, constantly checking the bus schedule. This habit stemmed from the desire to stay informed and ensure that we would not miss the intended bus. The reliance on phones and continuous monitoring of the schedule became a regular part of the individual travel routine.

Conversely, when accompanied by friends during our bus journeys, we noticed a shift in behavior. Instead of being preoccupied with phones, participants were more willing to actively engage in conversations and interactions with friends. The social setting created an environment conducive to bonding and sharing experiences, diverting attention away from the bus schedule and allowing one to fully immerse themselves in the present moment.

It is important to acknowledge these contrasting behaviors, as they highlight the impact of social context on individual behaviors and the role of technology in shaping our experiences. While alone, participants prioritized information-seeking and ensuring punctuality, whereas in the company of friends, the focus shifted towards social interaction and enjoying the shared journey. By considering these aspects of my behavior, the autoethnographic study gains further

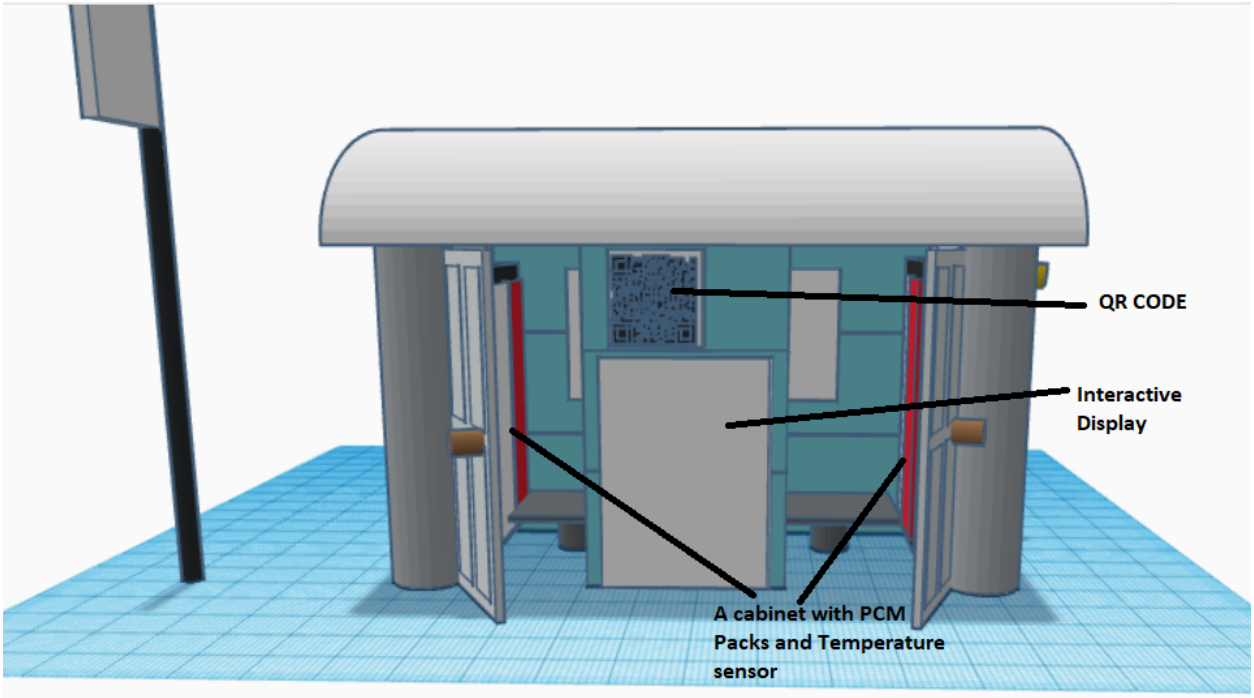
depth, illustrating the interplay between personal habits, social dynamics, and the influence of technology in the context of public transportation.

6. Design and Prototype

The video describing our design and prototype can be found here:

https://drive.google.com/file/d/1mo7EDNT007Sj4NPXJsy-DdTAtm-rNiB1/view?usp=share_link

Our design works in two parts. The first is a physical prototype of a bus stop, where we make improvements to physical bus locations. The second, is an app accessible through a QR code in each bus stop.



Above is the prototyped design for the physical bus stop. The main things to highlight are the interactive display along with the temperature controlling elements. The display gives real time updates for the bus schedule. The station is also equipped with heating and cooling packs depending on the season. The stop is designed to provide shelter and safety to passengers. There

could be some emergency button that alerts authorities of any dangers at the station. The large QR code links to the application below for users.

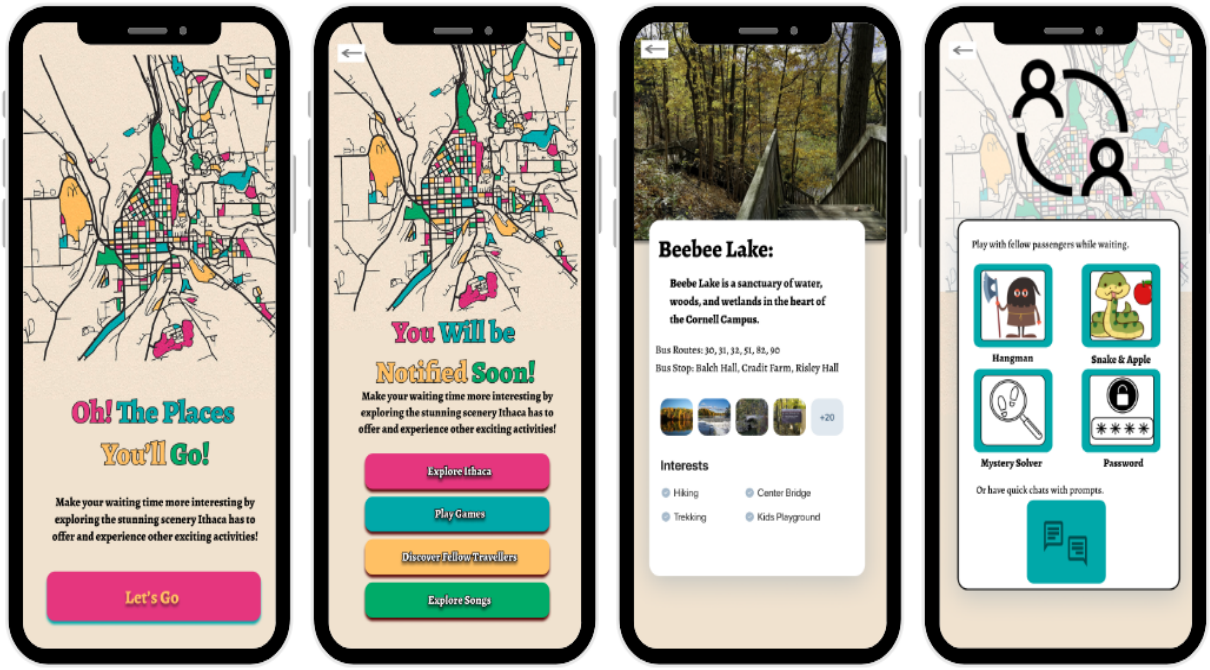


Figure 2: Application Screen of our prototype design

Prototype: [Figma Application Prototype]

Above are various screenshots from the application prototype. As you can see, the app looks to provide users with important bus information and give some entertainment features. The app gives real time updates for buses and will notify users when their bus is nearing the stop. The app also features various pages intended to provide entertainment for passengers. The discover page suggests different locations for passengers to visit in the Ithaca area. The page also gives information on the areas listed. There is also a game page that provides various games for passengers to play. This page allows you to play with other bus passengers, enhancing the social aspect of the bus stop. The final page gives music for passengers to listen to.

These two prototypes look to address both physical and social aspects of the bus stop. The physical prototype addresses shelter and safety concerns with waiting for the bus. The application looks to solve problems involving inconsistent buses and social interactions.

7. Discussion

Throughout our research and design process, we realized the main issue with public bus transit is inconsistency. Every bus stop is different, so as a result, they all contribute differently to the user experience. We wanted to create a standard bus experience that is positive to users. Everyone has a similar expectation of bus stops. We all expect to wait, with little stimulation and the chance of delays, at a bus stop and simply deal with anything coming our way. In our project we looked to create a standard enjoyable experience for users. This is difficult when realizing that there is very little in our control, including the weather, when the bus arrives, and more. Busses are inconsistent by nature, so it was difficult to design for such an experience.

8. Conclusion

Throughout this project, we have done two different studies (ethnographic and auto-ethnographic) in order to better understand the bus waiting experience. Through our research, we were able to determine the most important factors for design. Our design focuses on physical, emotional, and social aspects of the bus stop. The physical aspects are addressed with the physical bus stop prototype. The prototype gives shelter and safety for passengers, with heating and cooling devices depending on the weather. Emotional and social factors are addressed with the application associated with the bus stop. Real time bus updates and different entertainment helps to do this. Overall, we have created an experience for users that prioritizes enjoyment and reliability.

9. References

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8. Appendix

Method I Protocol:

We approached users of the bus stop and asked for their consent to record audio of our interaction. Participants were then interviewed. From these interviews, we took notes and analyzed the contents to find recurring positives and negatives with the bus. Along with the interviews, each member conducting the study spent 1-2 hours at the given bus stop. During this time, we observed bus users and took notes. The bus stops chosen came from various stops along TCAT bus routes. Bus stops were chosen to maximize diversity in location, physical bus stop conditions, user demographic and more.

Method II Protocol:

Method II took place over the course of 1-2 weeks, where participants (members of the groups) implemented the TCAT transit system into their lives. Participants were encouraged to use the bus as much as possible, with a minimum of 3-5 uses. While using the bus, participants were required to take notes on their experiences and use Snapchat to document photos and video. Snapchat was chosen as the photo/video application because it features various filters which provide data for time, temperature, and location. After the study was completed, the members of the group analyzed their experiences.