

Studio Assignment 1

Design Theme: Autonomous Vehicles

1. Description of Chosen Activity

We have chosen the daily activity of SIT Punggol students commuting via public bus services 84G/84W, identifying significant issues such as long waiting times, overcrowded buses, and the limited availability of transport options to SIT Punggol campus. These challenges often led to late attendance in classes and student frustration. Given the critical impact on student life and the potential for improvement, adopting autonomous vehicles could enhance efficiency and reliability.

2. Needfinding & Evaluation

To design an effective solution, we employed a comprehensive need-finding approach using direct observation, surveys, and interviews. This multi-method strategy enabled us to understand the broader context of the problem, uncover underlying needs, and directly gather insights from those most affected by the current system's inefficiencies while covering a broad user base.

2.1. Direct Observation

Observations were conducted at Punggol Interchange and the SIT Punggol campus bus stop, with detailed observations and photographic evidence provided in **Appendix 1-3** for further reference. This method allowed us to witness firsthand the pain points of commuters—long waiting times, overcrowding, and the inadequacy of current transport options. Field observations provided a real-time glimpse into how environmental and situational factors impact student commuting behaviors. This real-time data is invaluable because it captures authentic behaviors that commuters may not fully articulate during interviews or surveys.

2.2. Surveys

We gathered data from 60 respondents, detailed in **Appendix 4**, to obtain a broad quantitative perspective on issues like overcrowding and frequency of bus usage, providing invaluable insights that complement our observational data.

2.3. Interviews

Detailed discussions with three students offered deep qualitative insights and are transcribed in **Appendix 5-7**. These interviews are important as they allow us to explore the subjective experiences and emotional impacts of commuting challenges on students, revealing unspoken needs and potential solutions. It also allows flexibility, allowing us to probe deeper into interesting responses and explore commuters' suggestions for solutions.

2.4. Findings

2.4.1. Long Waiting Times and Overcrowding

- **Direct Observation:** Frequent observations during peak hours revealed students experiencing extended waiting periods, resulting in long queues at both the bus interchange and the SIT Punggol campus bus stop.
- **Surveys:** Data collected confirmed the trends noted during direct observations. Approximately 65% of participants reported experiencing wait times exceeding 15 minutes, while about 82% indicated that they were unable to board the bus sometimes due to overcrowding.
- **Interviews:** The interviews shed light on the significant stress and frustration students face due to prolonged wait times and the necessity of waiting for subsequent buses during peak periods. Many have to allocate extra commuting time due to bus availability uncertainties, which affects their punctuality and disrupts daily schedules, thereby increasing academic stress.

2.4.2. Alternative Commuting Behavior

- **Direct Observation:** A notable number of students were observed exploring alternative commuting options, such as walking to different bus stops or using other transportation means when buses were too crowded.
- **Surveys:** Reflecting this observation, 20% of respondents reported occasionally using alternative transportation methods to circumvent bus overcrowding.
- **Interviews:** Interviews revealed that students have altered their routines to cope with unreliable bus services, including waking up earlier to avoid peak times and using alternative transportation methods like private-hire vehicles.

2.4.3. Receptivity to Autonomous Shuttle Buses

- **Surveys:** Approximately 75% of respondents expressed openness to the introduction of autonomous shuttle buses, highlighting anticipated improvements in reliability and frequency. Nonetheless, concerns about safety, reliability, and the absence of human supervision were significant, with 40% preferring the presence of a human operator or attendant to enhance trust and safety.
- **Interviews:** In the interviews, students expressed enthusiasm about the potential introduction of autonomous shuttle buses, seeing them as a promising solution to enhance commuting efficiency and alleviate overcrowding. They appreciated the potential for consistent service without the limitations of human driver schedules.

2.4.4. Routing Preferences

- **Surveys:** A substantial majority of 88.3% prefer an autonomous shuttle that offers multiple drop-off points around the SIT Punggol campus and surrounding areas, rather than a single central location. This preference indicates a demand for flexibility and convenience in route planning.
- **Interviews:** During the interviews, students strongly favored dynamic routing for the proposed autonomous shuttle service. They suggested implementing

selectable pickup points at various bus interchanges across different MRT lines to enhance accessibility for students commuting from across Singapore. Additionally, they expressed a desire for multiple stops within the SIT Punggol campus to minimize walking distances, especially for those with classes in dispersed buildings. This flexibility in routing was seen as a vital improvement that would significantly enhance their daily commuting experience and convenience.

2.4.5. Desired Features in Autonomous Shuttle Buses

- **Surveys:** Key features desired by students include:
 - **Real-Time Information:** 90% of respondents emphasized the importance of real-time updates on bus capacity and arrival times for effective commute planning.
 - **On-Demand Stops:** 90% appreciated the option to request stops, indicating a preference for personalization and control over their commuting experience.
- **Interviews:** During the interviews, a key feature strongly desired by students is:
 - **Real-Time Tracking and Route Optimization:** Students expressed a strong desire for a real-time tracking system accessible via an app, which would provide immediate updates on the shuttle's location and estimated arrival times. They also advocated for a flexible routing system within the app that allows them to choose pick-up points and preferred travel times. This feature would enable the shuttle service to optimize routes dynamically, skipping stops without waiting passengers to enhance overall efficiency and reduce travel times.

3. Task Analysis & Evaluation

3.1. Task Analysis

The process of taking the bus service 84G/84W can be broken down into the following tasks and subtasks with the goal to commute to and from Punggol Interchange and SIT Punggol campus:

Wait for bus

- 1.1. Go to the bus stop.
- 1.2. Check the bus schedule or app for bus arrival time.
- 1.3. Wait at the bus stop.

Bus arrives

- 2.1. Check if the bus is full.
 - 2.1.1. If the bus is full, return to step 1.3 and wait for the next bus.
 - 2.1.2. If the bus is not full, proceed to board the bus.

Board the bus

- 3.1. Tap the fare card on the reader.
- 3.2. Find an available seat or stand if no seats are available.
 - 3.2.1. If seated, sit down and wait for the journey to begin.
 - 3.2.2. If standing, find a secure spot and hold onto the handrails.

Bus ride

- 4.1. Sit or stand for the duration of the journey.
- 4.2. Monitor bus stop locations to prepare for alighting.
 - 4.2.1. Check for visual or auditory cues (bus announcements or personal map app) regarding upcoming stops.
- 4.3. Press on stop button to indicate to the bus driver for alighting

Alight from the bus

- 5.1. Tap out using the fare card at the reader near the exit.
- 5.2. Safely exit the bus at the designated stop.

3.2. Evaluation

3.2.1. Pros of the Current System

- The bus route is reliable, providing a direct connection from Punggol Interchange to SIT Punggol campus.
- It seamlessly integrates with the existing public transport network, allowing for smooth transitions between different modes of transit.
- The experience of using this bus service is familiar to students, mirroring the standard bus services available throughout Singapore.

3.2.2. Cons of the Current System

- The bus service experiences long waiting times due to its infrequency, which is particularly problematic during peak hours.
- Buses are often overcrowded, especially during rush hours, leading to discomfort and inconvenience for the students.
- There are no alternative routes available, which leads to congestion and limits options for commuters.

4. Identified User Needs

4.1. Increased Bus Frequency

Students require more frequent bus services, especially during peak hours to minimize waiting times and avoid overcrowding.

4.2. Expanded Routes and Stops

Introducing more bus routes and additional stops closer to student living areas or points of interest could decrease the load on the current routes and provide more direct and convenient travel options.

4.3. Larger Capacity Buses

Buses with higher seating and standing capacity are needed to accommodate the volume of students during busy periods.

4.4. Real-Time Updates for Bus Status

Access to real-time information on bus schedules, capacity, and expected arrival times would enable students to make better-informed decisions about when to leave for the bus stop or whether alternative transport options are needed.

4.5. On-Demand Stop Requests

The ability to request stops would allow for a more tailored and responsive commuting experience.

5. Implications & Conclusions

The following implications and conclusions were derived from the need-finding and task analysis.

5.1. Incorporation of User-Centric Design

- The need-finding results highlight the importance of a user-centric approach to redesigning the bus service. This includes addressing user demands for increased frequency, larger capacity, and multiple routes, ensuring that the system aligns more closely with the actual needs and schedules of the students.
- Autonomous vehicles should be designed with customization capabilities, such as on-demand stops and real-time updates, to enhance user control and satisfaction.

5.2. Integration of Technology for Real-Time Data

- The expressed need for real-time bus tracking and capacity information can drive the integration of sophisticated technology solutions, including mobile apps that interact with the autonomous bus network to provide up-to-date information. This could help in reducing uncertainty and anxiety associated with bus schedules.

5.3. Enhancing Safety and Security Measures

- Concerns about safety and the need for human oversight in autonomous systems suggest that the design should not only focus on technological sophistication but also on ensuring robust safety measures, including the presence of attendants or emergency controls accessible to passengers.

6. Appendix

Appendix 1: Queues at Punggol Interchange



Appendix 2: Waiting Times for Buses



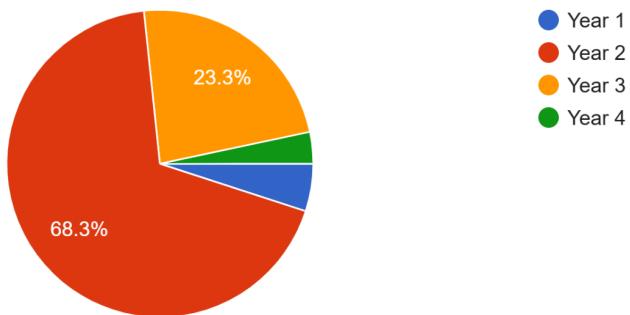
Appendix 3: Queues at SIT Punggol Campus Bus-Stop



Appendix 4: Survey Results

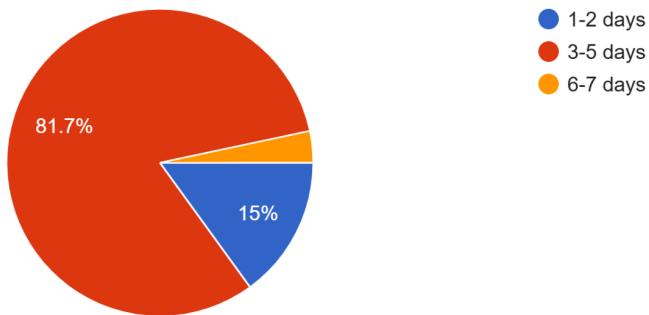
What is your year of study?

60 responses



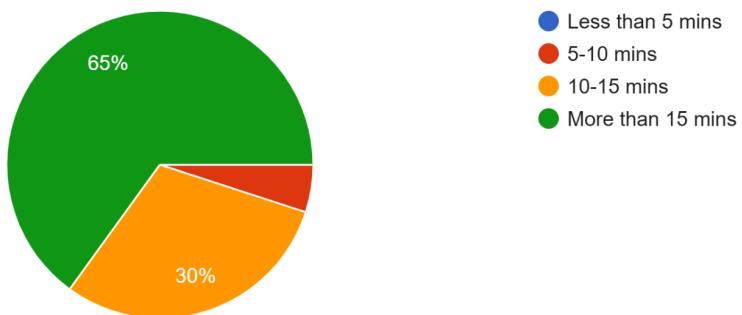
How often do you commute to campus per week?

60 responses



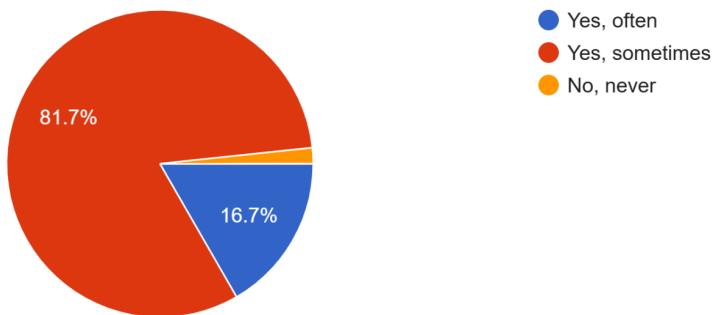
On average, how long do you wait for the bus during peak hours (9 - 11 AM, 4-6 PM)?

60 responses



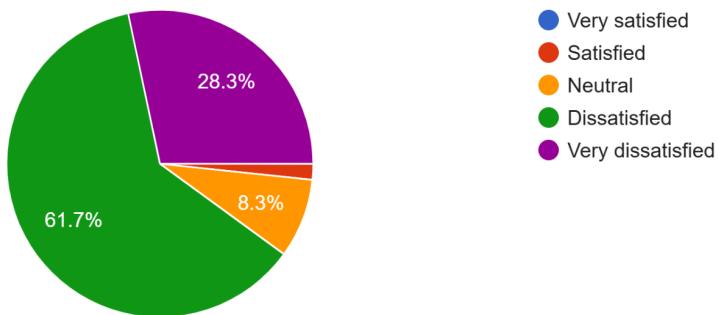
Have you ever been unable to board Bus 84G/84W due to overcrowding?

60 responses



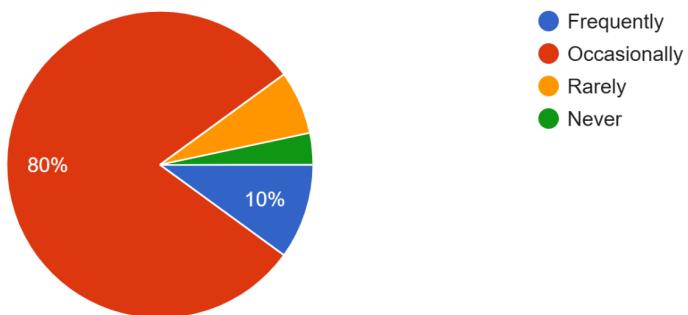
How satisfied are you with the current frequency of Bus 84G/84W?

60 responses



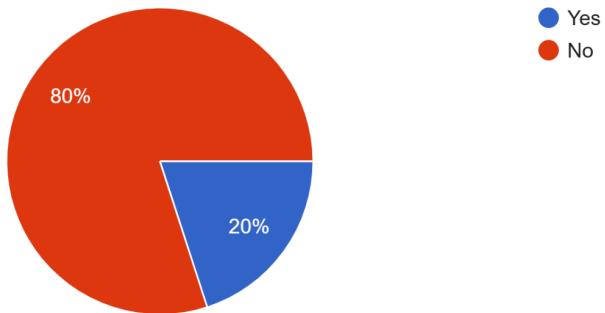
Has commuting affected your punctuality for classes?

60 responses



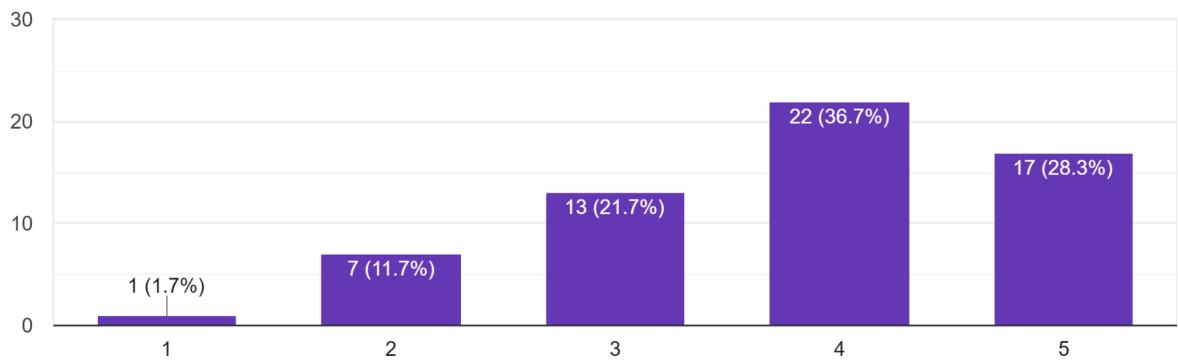
Have you sought alternative transportation options due to overcrowding issues or long waiting times with Bus 84G/84W?

60 responses



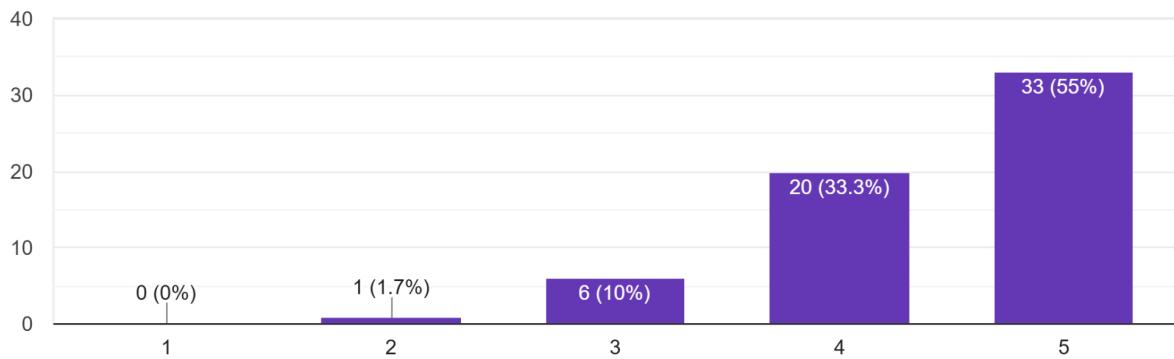
How familiar are you with autonomous vehicles?

60 responses



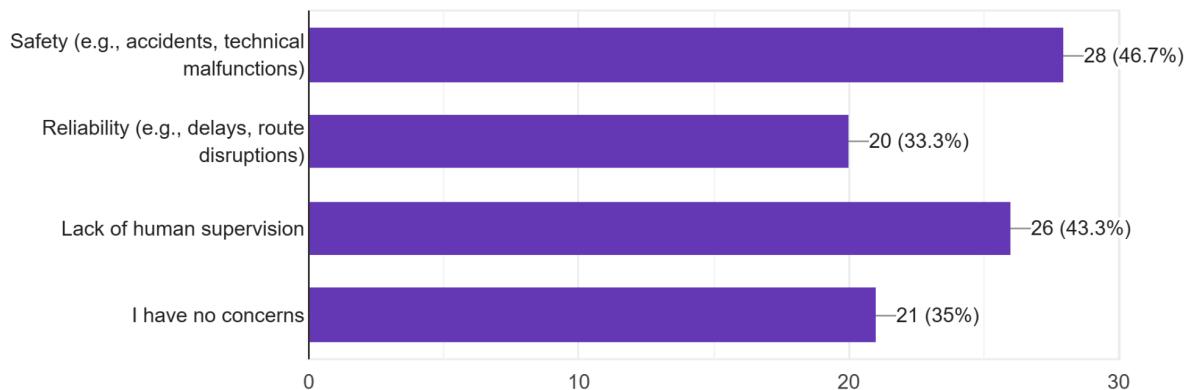
How interested would you be in using an autonomous shuttle bus as an alternative commuting option to SIT Punggol?

60 responses



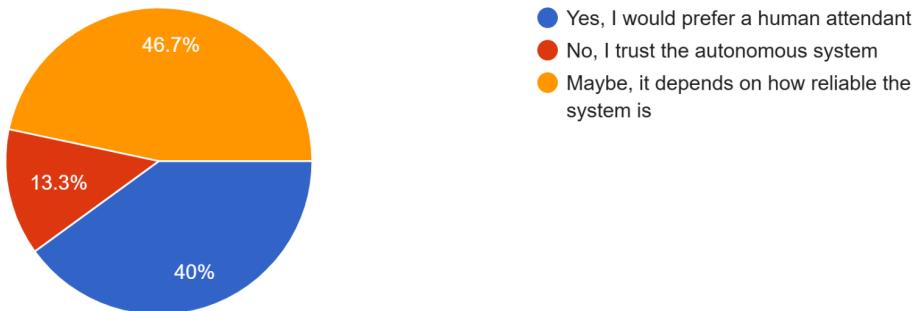
What are your primary concerns about using an autonomous shuttle bus? (Select all that apply)

60 responses



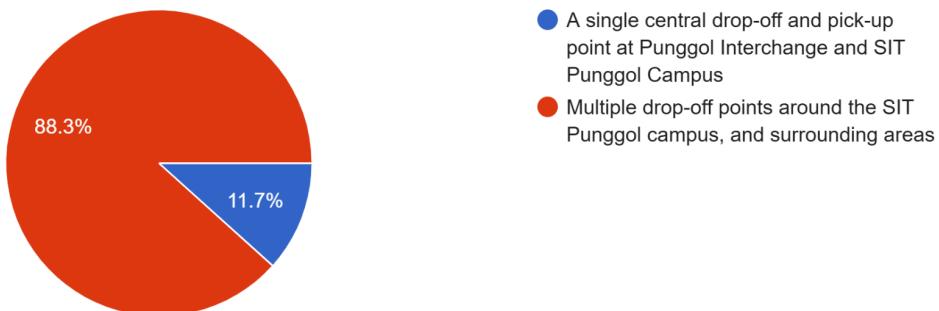
Would you feel more comfortable using an autonomous shuttle bus if there was a human operator or attendant present on board?

60 responses



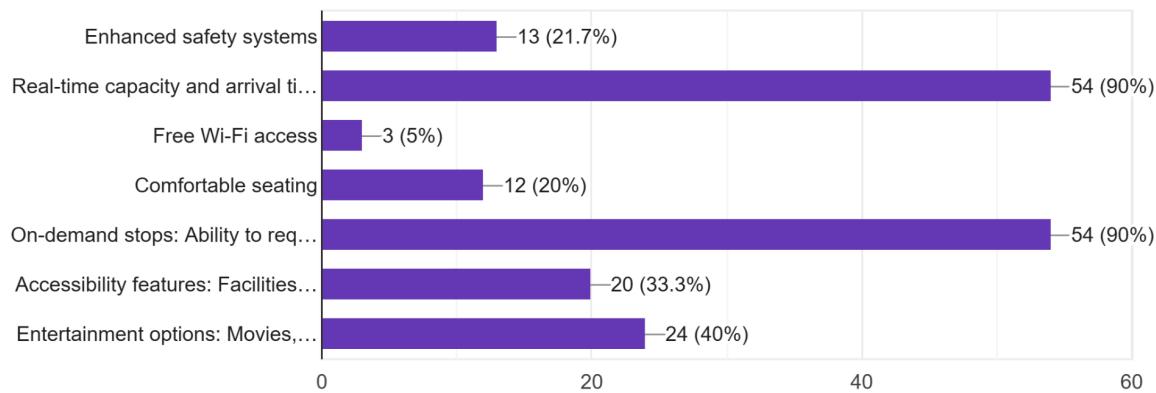
Would you prefer an autonomous shuttle bus that drops off and pick-up passengers at a single central location (Punggol Interchange and SIT Punggol campus) or multiple drop-off points around the SIT Punggol campus and surrounding areas?

60 responses



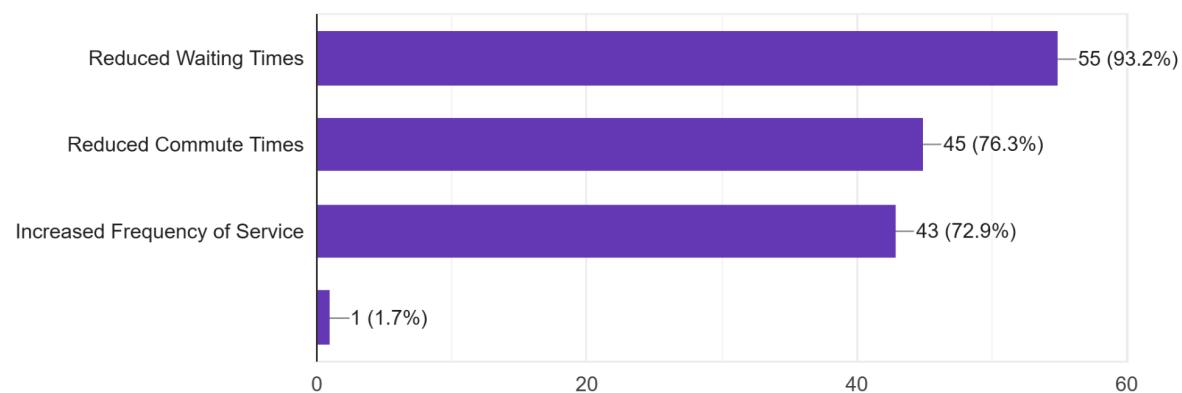
What features would make you more likely to use an autonomous shuttle bus? (Select 3 that apply)

60 responses



What improvements do you think autonomous vehicles would make to the current commuting experience? (Select all that apply)

59 responses



Appendix 5: Interview Transcript With Anthony

Benedict:

First of all, thank you for taking the time to talk to us today. My name is Benedict and I am here to talk to you about your experience in commuting to the new SIT Punggol Campus.

Let me give you an outline of what's going to happen. I am going to ask you a series of questions. We want to understand things from your perspective. It's important to highlight that this isn't a test. There are no right or wrong answers to any of the questions.

I would like to ask you to be as honest as possible. You can't offend me or anyone in any way so please speak freely. Do you have any questions or comments so far?

Anthony: No

Benedict:

We treat this conversation as strictly confidential. We won't share any details with anyone outside the immediate people working on this project.

We can talk a lot quicker than we can type, would it be OK with you for us to record this session for our note-taking?

Anthony:

I would prefer not to get recorded, it would be better if you note down my answers instead. Thank you.

Benedict:

Alright noted, we will not record it and write it down instead. We have prepared a consent form for you to review and sign. Once we have finished our interview we will double check your details so we can reward you with your S\$60 voucher.

If at any point you want to take a break or stop the interview please just let us know and we can work around it.

Any questions before we begin?

Anthony: No

Warm Up:

Benedict:

How do you usually commute lately? Any frustrations or things you really like about it?

Anthony:

I have always been taking public transport, via bus and MRT, as I am still in the midst of getting my driving license and getting my license soon. Sometimes public transport is quite frustrating whenever I miss my bus when commuting, as I have to wait roughly 15 minutes for the next one to arrive. Other than that, during peak time when commuting to school, it is extremely crowded as I have to take the

circle line to Serangoon, before changing to the northeast line towards Punggol, and then change to another bus before reaching school.

Benedict:

Oh I see, I understand your frustrations when travelling during the peak hours, especially when taking public transport and having to wait and squeeze in with other commuters.

You mentioned that you are getting your driving license soon, which means you should be familiar with driving already. Have you ever heard of Full-self-driving cars? If yes, what are your thoughts?

Anthony:

Yes, I am quite familiar with driving therefore I am waiting for my driving test to commence, then get my license. I have heard of auto-driving cars, like Tesla. I feel that this is a very interesting concept, however, as driving requires so many micro-adjustments that we humans make, I think it requires a lot of testing before it comes out onto the road.

Benedict:

It's great to hear your insight on full self-driving cars and I fully understand your concerns.

Section 1:

Benedict:

Okay Anthony, now, can you tell me a little bit more about your experience when commuting to school? How satisfied are you with the current frequency of the buses? Do you feel they arrive often enough during busy times?

Anthony:

As I stay quite far away from the new Punggol campus, I have to change quite a few times when travelling. This takes a very long time for me to reach campus, roughly about an hour and 30 minutes. The circle line is usually jammed packed during rush hour, which means sometimes I have to wait for the next train to come before boarding. Not only that, even when I reach Punggol Interchange, I usually take Bus 84W, which usually only comes every 15 minutes, and does not have enough capacity to fit everyone that wants to board. I often have to wait and board for the second bus, which adds to the time I need to commute to school to not be late. As for the frequency, I feel that the frequency of the bus can be increased to cater to all the students so that they do not need to cater more time when commuting to school, which can be quite a chore.

Benedict:

Thank you for the detailed response that you just gave me. I understand that it is very frustrating when you have to board the second bus, which may cause you to be late for school. Have you ever thought of another method to commute to school, such as taking a taxi?

Anthony:

Sometimes when I have morning classes, I have to leave so much earlier to school, which makes me want to spend some money to hire a grab driver to go to school. If only SIT could provide shuttle services to school at different pick-up points, similar to my previous polytechnic, making the transport to school way easier.

Benedict:

I get that feeling when you have to drag yourself to school.

Section 2:**Benedict:**

Thank you for your insights on having shuttle buses to commute to school. To address your concerns, How would you feel about using an autonomous shuttle bus to commute to SIT Punggol?

Anthony:

Autonomous as in self-driving? I think that it will be quite cool to have that as a commute option to school. It would be better if it had more frequency and different pick-up locations so that students would not crowd around Punggol Interchange. Because it is self-driving I think the bus drivers do not need to be trained and will reduce manpower too.

Benedict:

That answers some of my other questions too, you mentioned that to have different pick-up locations, where do you think these locations should be at and what else could be added to make this autonomous shuttle bus more reliable and efficient?

Anthony:

I think that having pick-up locations at different bus interchanges, that lie on different MRT lines, could be better for other students that stay at different areas of Singapore, making their commute to school more pleasant. To make this more efficient, maybe students can download an application to select which station they will be going to, and a specific time given. This way, if there are no students at a specific station that the shuttle bus is gonna go to, then it would skip that station to save time.

Benedict:

Thank you for your time in doing this interview Anthony. We will definitely use your feedback given during the interview. As for your voucher, it will be credited to you via the email that you provided in the consent form. This is the end of the interview. Bye bye and have a good day!

Appendix 6: Interview Transcript With Shun Hao

Jia Wei:

First of all, thank you for taking the time to talk to us today. My name is Jia Wei and I am here to talk to you about your experience in commuting to the new SIT Punggol Campus.

Let me give you an outline of what's going to happen. I am going to ask you a series of questions. We want to understand things from your perspective. It's important to highlight that this isn't a test. There are no right or wrong answers to any of the questions.

I would like to ask you to be as honest as possible. You can't offend me or anyone in any way so please speak freely. Do you have any questions or comments so far?

Shun Hao: No

Jia Wei:

We treat this conversation as strictly confidential. We won't share any details with anyone outside the immediate people working on this project.

We can talk a lot quicker than we can type, would it be OK with you for us to record this session for our note taking?

Shun Hao:

May I suggest writing down my comments while we talk instead of doing a recording?

Jia Wei:

We can do that instead if you are not comfortable with a recording. We have prepared a consent form for you to review and sign.

If at any point you want to take a break or stop the interview please just let us know and we can work around it.

Any questions before we begin?

Shun Hao: No

Warm Up:

Jia Wei:

How do you get around daily? Do you use public transport?

Shun Hao:

I usually take public transport to school and I sometimes book a BlueSG to carpool with my friends to school instead during days with very early lessons.

Jia Wei:

I see, how was your commute recently? Any frustrations or things you like to talk about?

Shun Hao:

Ever since SIT moved our campus to Punggol this trimester, it has significantly increased my travelling time to almost 2 hours every day. Some of our lessons are in the late mornings, so the commute is rather peaceful for those days. If I take the public transport on days with very early lessons, the commute is usually very undesirable and daunting.

Jia Wei:

That sounds like a frustrating problem. What is your commute routine to school?

Shun Hao:

I usually take the MRT, North South Line to Khatib and change to Bus 39 to get to Punggol Interchange. Then, I change to bus 84W to get to SIT Punggol campus.

Jia Wei:

I see, that is a lot of transfers to get to school. Are you someone who likes trying out new technology or sticking to what's familiar to you?

Shun Hao:

I like trying cool new things in tech as I am also deep in the tech field myself as a computer science student. Knowing more about the new innovations help me keep up to date with recent trends and happenings.

Jia Wei:

Cool, I like new tech too. They are refreshing and exciting to see what the future holds. What is one thing you think could be improved with the Singapore public transport system?

Shun Hao:

I believe the bus services in Singapore should have increased frequency and less intervals between buses. Even though I believe buses are increased during peak hours, they are just not enough to meet the demand. Especially for 11 am lessons, my commute will be during off-peak hours and missing one or two bus in my long commute can turn into a 30 min delay to reach class. With such a long commute, the commute duration daily differs day to day and it is too unpredictable.

Jia Wei:

That is a very big problem especially if you have an important event like an exam to be in time at school for.

Section 1:

Jia Wei:

Let's talk about the new bus service 84G/W that was recently launched at Punggol Interchange to accommodate for the new SIT Punggol campus. On average, how long did you wait for the bus during peak hours? Were there any difficulties such as overcrowding?

Shun Hao:

I usually wait around 10-15 minutes if I miss a bus. If I was lucky, I could take the bus immediately as soon as I reach the interchange. The queue situation is usually really bad, the queue becomes very long and extends all the way to 2 berths away from where the 84W berth is at. When I board the bus, I usually stand or go to the upper deck to find a seat. The bus is usually full, I've not seen a day with any space left for passengers at upcoming bus stops to board. I see the bus is mostly made up of SIT students.

Jia Wei:

It can cause disruption to other passengers waiting for bus at other berths as well if the queue situation is this bad. Sounds like a very bad situation to be in everyday commuting to school. Have there been any instances where you were unable to board the bus because of the overcrowding situation? What did you do then?

Shun Hao:

Yes, there were a couple of times when even a double deck bus could not fit the entire queue. I was unfortunately one of the few who could not make it onto the first bus, and had to wait for another to come which was costly to my commute time. I could only wait for the next bus because there was no alternatives to get to SIT Punggol.

Jia Wei:

From what you have told me so far, this is sounding like a significant problem for SIT students commuting to Punggol everyday. How satisfied are you with the current frequency of the buses? Do you feel that they arrive often enough during busy times?

Shun Hao:

I feel that the frequency of the bus is too low. Missing a bus meant that we would be late 10-15 mins for lessons and each bus is just not enough to meet the demand. The current frequency that is deployed now is not enough to meet the demand to transport all SIT Punggol students to school efficiently.

Jia Wei:

I see, did the bus ever affect your punctuality for classes or meetings? Could you share an experience?

Shun Hao:

Yes, I had a few times where I missed the 84W and I arrived to lesson 30 minutes late. I missed a significant part of the lesson at the start which took me a while to catch up to what was going on in class. This was compounded with the other buses I missed during my commute to school, it is devastating.

Jia Wei:

Surely we could do something to help students like you to solve this major problem with the bus to school. Have you ever tried using alternative transportation options due to this?

Shun Hao:

No, the other options are not viable. The campus itself is located so far away from Punggol Interchange, walking is not feasible. The only other option is the new Teck Lee LRT station that was recently opened, but the station itself is also located quite a distance away from the campus. Alighting from the LRT would mean walking a distance under the hot sun to get to class. By the time I got to class, I would be covered in sweat and feel terrible to start the day in school. The only option available is the bus 84W.

Jia Wei:

Even with the bus problem, there is no other way around it. This sounds like a headache! If there was an improvement you could suggest for the current bus system, what would it be?

Shun Hao:

I could suggest increasing the frequency of the bus, that would already solve the big problem with the bus service. It is an easy solution to accommodate the demand.

Jia Wei:

Yes, that is definitely one way to go around it. Increasing the bus frequency will already solve this problem greatly and help students to get to school on time.

Section 2:

Jia Wei:

Can you tell me what you know about autonomous vehicles? Have you ever experienced using one?

Shun Hao:

Autonomous vehicles like self driving cars? I have heard of them. But I have not experienced using one before. We currently don't have any in Singapore right?

Jia Wei:

Yes, Singapore currently does not have full autonomous vehicles without the presence of a human driver. We currently have cars like Tesla supporting assisted driving, with some form of machine assisted driving, but requiring the driver to be awake and hands on the wheel at all times in case of emergencies.

How would you feel about using an autonomous shuttle bus to commute to SIT Punggol?

Shun Hao:

That would be pretty cool. Sounds like an amazing innovation. I think I've heard other campus like NTU using the autonomous shuttle bus. Is it similar? I would be excited to use one for sure, if it could fix the commute problem.

Jia Wei:

Yes, similar to the one at NTU. It is currently on pilot testing. What concerns would you have about using an autonomous shuttle bus? Let's say for example, in terms of safety, reliability and privacy?

Shun Hao:

The safety is the biggest concern for sure. Whether it is able to safely transport so many students to school at regular intervals would be a big question. Especially a bus is such a big vehicle, and there is so many passengers on board, many lives are at stake. Since it is autonomous, I believe reliability shouldn't be an issue, the timings and intervals should be pretty fixed and predictable. Well, for privacy not much concern on that part. It doesn't really matter if any information is known about the passengers who take the bus, because public transport collect the same data.

Jia Wei:

I see, safety is a big concern for you. As autonomous vehicles are already increasingly getting adopted by the day in other countries like China and the US, we should be prepared for such adoption in Singapore in the future as well. Autonomous vehicles have already existed for more than 5 years, and they have been constantly improving since. It has become a very safe mode of transport as it is able to judge situations and react faster than humans can.

Would having a human attendant on board make you feel more comfortable with using the autonomous bus? Why or why not?

Shun Hao:

Yes, a human attendant on board will make me more comfortable. If we start adopting this, the early stages should still have some sort of human on board to assist in any emergency situations. Having a human who knows what to do in certain situations if the bus was to fail would be helpful and assuring to passengers. Otherwise, the passengers would not know what to do if there were such situations.

Jia Wei:

I agree too, we humans still like some sort of human presence and not fully rely on machines yet. If you had a choice, would you prefer a shuttle bus that only stops at a central point like the Punggol interchange, or one that has multiple stops around the campus and nearby areas? Why so?

Shun Hao:

I would prefer a shuttle bus with multiple stops around the campus. A shuttle bus that only serves the main entrance of the campus would be quite a waste of such great technology. We can make use of the technology to efficiently plan routes for each stop, reducing waste of time and transport passengers efficiently. Because my classes are sometimes at a different building, walking from the main entrance would be quite a distance. With the multiple stops of the shuttle bus, it would help significantly in my commute time by completely eliminating the walking time from the entrance to the building. Nearby areas, not so much. I think it would help for people staying nearby, otherwise there is not much nearby the campus. The main and most important pickup would still probably be Punggol Interchange as most students will transfer from there.

Jia Wei:

I agree with your point. We should make use of the technology if we were to introduce it. What features do you think would encourage you to use an autonomous shuttle bus more frequently? For example, real time tracking, more busees or larger capacities.

Shun Hao:

The real time tracking will definitely be useful. As walking from my transfer bus stop to Punggol Interchange is quite a distance, it would be helpful to be able to tell where the next bus is at, what time it will exactly arrive and when it will depart. This will help me plan my walking speed better to help me board the bus. More buses and larger capacities should be implemented if it were possible. With the current demand, being able to get to school on time is the most important. If it could do that, I would definitely use the autonomous shuttle bus more.

Jia Wei:

Sounds like it will really help you a lot if these were to be introduced. In your opinion, how could an autonomous bus improve the overall commuting experience for you? Do you think it could reduce waiting times or overcrowding?

Shun Hao:

I can definitely foresee a significant improvement in my commute time from Punggol Interchange. Just the commute from Punggol Interchange to SIT Punggol takes up a bulk of my overall commute time to school. It takes more time than the rest of my journey. This will make the journey more pleasant and soothing to travel to school everyday.

Jia Wei:

Let's see what we can do to help students like you. Your answers have given me a great insight into a major problem a lot of the SIT students are facing. We will take this feedback and see what we can do to make the commute to school better for you. Thank you for your time Shun Hao. I will conclude the interview here. Have a great day ahead!

Appendix 7: Interview Transcript With Elfian

Zuhairi:

First of all, thank you for taking the time to talk to us today. My name is Zuhairi and I am here to talk to you about your experience in commuting to the new SIT Punggol Campus.

Let me give you an outline of what's going to happen. I am going to ask you a series of questions. We want to understand things from your perspective. It's important to highlight that this isn't a test. There are no right or wrong answers to any of the questions.

I would like to ask you to be as honest as possible. You can't offend me or anyone in any way so please speak freely. Do you have any questions or comments so far?

Elfian:

No

Zuhairi:

We treat this conversation as strictly confidential. We won't share any details with anyone outside the immediate people working on this project.

Would it be alright if we recorded this session to help with our note-taking?

Elfian:

Can you write down my responses instead, I do not like to be recorded. Thank you for understanding.

Zuhairi:

Alright noted, we will not record it and write it down instead. We have prepared a consent form for you to review and sign. Once we have finished our interview we will double check your details so we can reward you with your S\$60 voucher.

If at any point you want to take a break or stop the interview please just let us know and we can work around it.

Any questions before we begin?

Elfian:

No

Warm Up:

Zuhairi:

How do you usually get around the city? Do you prefer public transport, or do you sometimes cycle or walk?

Elfian:

I mostly take public transport, especially the bus because it is quite convenient as the public transport system here is well-connected. Also, I do have a driving license, but I don't really drive around because it's more convenient to just take the bus for my daily commute.

Zuhairi:

Oh I see, I can agree with that as Singapore has one of the most robust transport systems in the world. How has your commute been lately? Any frustrations or things you really like about it?

Elfian:

Honestly, the journey to school has been frustrating and it should be something that students like me should look forward to everyday. Firstly, I will take bus 39 from Tampines East Downtown Line Exit C. Next, it will roughly take me about 13 stops to alight at Punggol Temporary Bus Interchange. Afterwards, I will take Bus 84G and it's always packed, especially during peak hours when students are rushing for classes. As a result, I had to miss a few classes because I couldn't get on a bus. Lastly, waiting for the next one is a hassle too, especially when I'm in a rush.

Zuhairi:

That is a very interesting insight, I can see why it can be quite frustrating as the entire journey is very long and having to wait for the next bus is an unpleasant feeling. Are you someone who enjoys trying out new technology, or do you prefer to stick with what's familiar?

Elfian:

I like trying out new technology because it is something that I am passionate about. On the other hand, I also want to make sure that it needs to be efficient and it helps me in making my everyday life better.

Zuhairi:

That's a fair point that you have mentioned. Furthermore, speaking of improvements, what's one thing you think could be better in Singapore's public transport system?

Elfian:

Ultimately, the buses frequency for bus services that are commonly used by public commuters. For example, bus services like 84G/W. If there were more buses, it wouldn't be so crowded, and I wouldn't have to worry about reaching class on time.

Section 1:

Zuhairi:

Speaking of which, on average, how long do you wait for Bus 84G/W during peak hours? And have you had trouble with overcrowding?

Elfian:

During peak hours, I have to wait between 10 to 15 minutes, but even when the bus shows up, it's usually filled with students and public commuters. As a result, I had to skip the bus a few times because I couldn't squeeze in. It's a common issue that has been happening ever since we started this new trimester here at SIT Punggol campus.

Zuhairi:

It can be seen that you had to wait for the next bus due to overcrowding. Thus, how did you handle it when it affected your class schedule?

Elfian:

Yes, you are correct. Due to unforeseen circumstances, I have missed a few classes because of this overcrowding issue. As a result, it is stressful because sometimes, I might reach class late unintentionally even though I went out of the house a little earlier than usual. On the other hand, I ended up waiting another 10 to 15 minutes for the next bus, and that can make me late for my classes.

Zuhairi:

Honestly, that sounds very frustrating. How satisfied are you with the bus frequency in general? Do you feel they arrive often enough during busy times?

Elfian:

Not really. The current frequency of the buses just does not feel right, especially during peak hours. I often find myself waiting much longer than I should have to, sometimes 15 minutes or more. And even when the bus finally arrives, it's already filled to the brim. It's frustrating because there are so many people trying to get in, but the quantity of buses could not handle the demand.

Section 2:

Zuhairi:

Now, I would like to ask you about autonomous vehicles. What do you know about them? Have you ever experienced using one?

Elfian:

I know they're self-driving and use a combination of sensors, cameras, and AI to navigate the roads. Personally, I'm really into cars and the technology behind them. Also, I've been following the development of autonomous vehicles for a while now, and it's interesting to see how far the growing technology has come. In addition to that, I've seen a few autonomous vehicles like Tesla around Singapore.

Zuhairi:

That's nice to hear. How would you feel about using an autonomous shuttle bus to commute to SIT Punggol?

Elfian:

One of the big game changer for me would be the possibility of the buses coming more frequently than the current bus service 84G/W. Currently, the long waits and overcrowding are huge issues for me. Nonetheless, if an autonomous shuttle could solve those problems, it would make my commute so much better. Lastly, I'm also curious to see how it would handle the routes and timing compared to a regular bus with a driver.

Zuhairi:

Thank you so much for taking the time to have an interview with me today. I really appreciate the opportunity to know more about your experiences and thoughts on commuting and transportation in Singapore. It was a great conversation, and I enjoyed discussing how we can improve public transport, especially with the potential of autonomous vehicles.