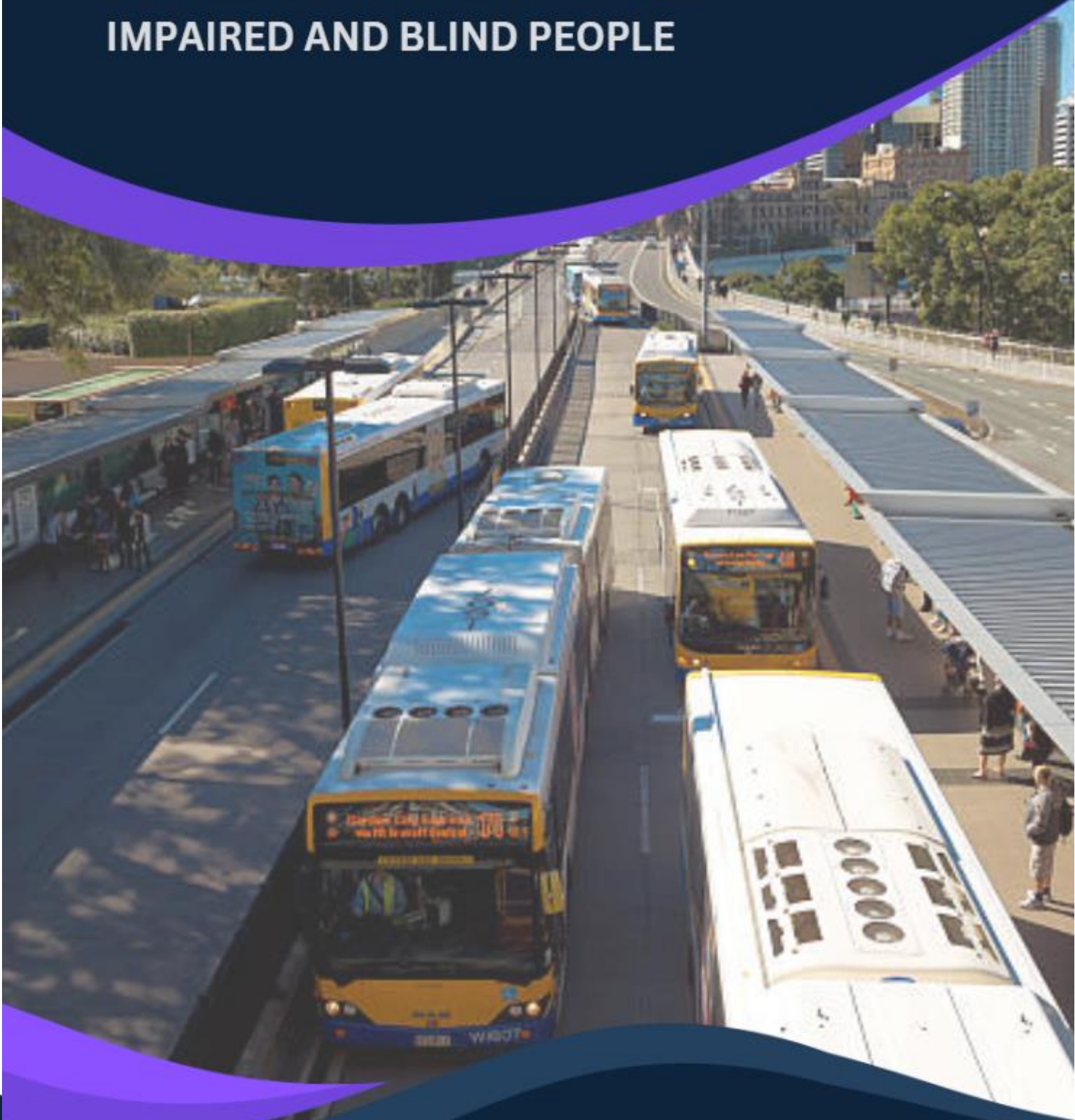


RESEARCH REPORT

BUS ASSISTANCE FOR VISUALLY IMPAIRED AND BLIND PEOPLE



ADRIANA SILVEY

N10816224

Authenticity Statement

This is to certify that to the best of my knowledge; the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work and that all the assistance received in preparing this report and sources have been acknowledged.

Your name: Adriana

Student number: N10816224

Date: 12/09/2023

Contents

ABSTRACT.....	2
1.0 INTRODUCTION.....	3
2.0 LITERATURE REVIEW	4
3.0 RESEARCH	7
4.0 ANALYSIS AND FINDINGS.....	9
5.0 DISCUSSION.....	12
6.0 DESIGN IMPLICATIONS AND CONCEPT SKETCHES	13
6.1 CONCEPT 1.....	14
6.2 CONCEPT 2.....	15
6.3 CONCEPT 3.....	16
6.4 CONCEPT 4.....	17
7.0 CONCLUSION	18
REFERENCES	19
8.0 APPENDIX.....	21
8.1 SURVEY RESPONSES.....	21
8.2 INTERVIEW QUESTIONS.....	21
8.3 AFFINITY DIAGRAMMING.....	0

ABSTRACT

Access to good, reliable public transport is a fundamental service for local government to provide to all able and disabled persons. For Visually Impaired and Blind People (VIBP) this basic activity can present as difficult and challenging, however an essential service. VIBP are an important user group to consider when designing for public transport, as they have limited travel options. Without the ability to drive, they have to be comfortable travelling independently and develop way-finding tools and techniques. Amongst VIBP many will simply not attempt to use public transport due to the lack of safety, high stress levels, and resources available. Currently there are several smartphone applications that can assist users throughout their journey. However, through research a gap has been identified in products catering for users who aren't or would rather not be reliant on their phone. This report aims to identify the pain points within their journey and innovate design implications to reduce or remove these barriers. These designs will be informed by both primary and secondary research, through interviews, and a literature review, respectively.



1.0 INTRODUCTION

Access to public transportation in any city is a basic human right not only for travelling to and from work but to keep people connected and allow people to participate fully in society. Public transportation is a way for people to engage in the community and have independence and for some people it is their only means of transportation for many reasons.

The aim of this project is to improve the access and reliability of the journey, and the experience for visually impaired people using bus services. Even with the advances in technology today, visually impaired people still utilise rudimentary means of gaining access to buses. They may experience unnecessary difficulties and anxiety throughout their journey on public transport due to a lack of well-designed and functional devices that allow them to board easily, safely and have an accurate journey. Due to these factors, and the absence of well designed technological advances the majority of VIBP do not or cannot use a bus service. Stress levels are high in anticipating the bus journey and many blind people opt for alternate means of transportation altogether. As a result it becomes more difficult to access education, employment, and health care as well as social activities. This is an issue on a global scale, with at least 2.2 billion people have some level of vision impairment (WHO, 2023). Visually impaired persons have the right to access and utilise bus services as easily and safely as other members of the public in terms of public transport. The technology is readily available to design and create innovative, and functional alternatives to the current means. This report will outline the experience and perspective of visually impaired people who currently or have previously engaged with public transport, specifically bus services. Existing literature will be reviewed, and primary research conducted to highlight the pain points of the users journey, and understand the industry and technology. Through an analysis of the research, opportunities will be identified for design intervention.

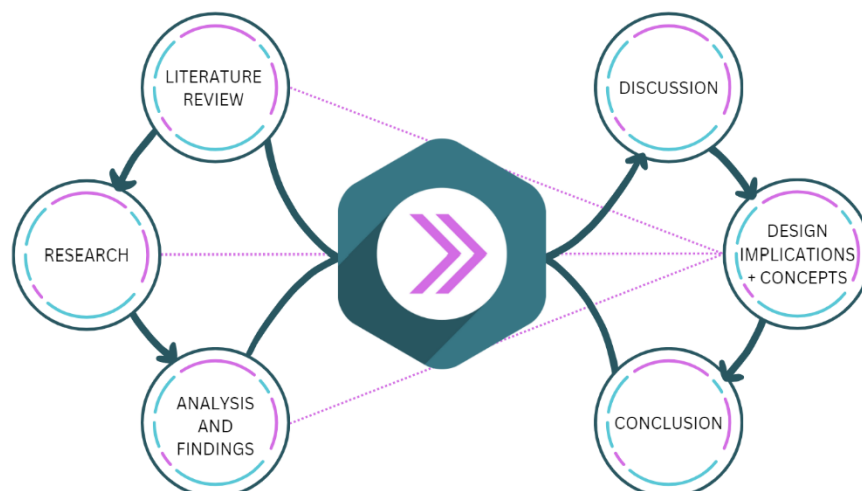


Figure 1: Visual of overall project

2.0 LITERATURE REVIEW

The literature review will explore what is currently being achieved in the industry and the universal barriers experienced by Visually Impaired and Blind People (VIBP) on public transport. The research will be compared and contrasted to identify existing gaps in the industry.

Over the past few decades the development of assistive technologies and the improvements in smartphone technology have given VIBP more options to improve their journey on public transport. However, many VIBP still often have to resort to archaic ways in order to travel using public transport. There are varying circumstances in which people become blind or have poor vision, often affecting their navigation techniques and developed skills (Kuriakose, Shresthaand, & Sandnes, 2022). Some VIBP will use acoustic and/or echo location skills as a means to navigate (Kuriakose, Shresthaand, & Sandnes, 2022). Therefore it is important to consider the level and diverse range of skills that VIBP use. For visually impaired people driving is not a viable option and they need to acquire the independence and be confident to catch public transport autonomously.

A strength in the research is the depth of information reported on the experiences of visually impaired people engaging in public transport. Many journals have addressed through surveys and interview data the main obstacles in a visually impaired persons journey. Numerous studies that have conducted surveys indicate that public transport driver's attitudes and awareness is an ongoing issue when travelling. Typically, drivers will forget to stop, not offer help, and/or have language barriers (Jun Park, 2018) (Volpe National Transportation Systems Center, 2022).

Community and Lifestyle Implications

A common theme in the literature explored how public transport connects people to community allowing them to be involved with public spaces and recreational areas and activities. For many people who are disabled, public transport is avoided simply due to the high level of difficulty and stress they may experience. Due to this they can become isolated from the community and have far less opportunities available to them. This is mainly due to the complexity of the planning that is required to complete a trip via public transport (Jun Park, 2018). Furthermore, the low accessibility of public transport hinders the ability of disabled people to access education and subsequently employment. Multiple research studies indicate that there are higher unemployment rates among VIBP where lack of accessible public transport is a contributing factor (Low, Cao, Vos, & Hickman, 2020) (Bezyaka, et al., 2020).

Similarly the same studies also mention how transport barriers have an effect on whether VIBP can participate fully in social activities (Bezyaka, et al., 2020) (Low, Cao, Vos, & Hickman, 2020). Multiple studies have shown that in areas where public transport is readily available, many VIBP don't use it as it is too difficult or inconvenient (Crudden, McDonnall, & Hierholzer, 2015) (Bezyaka, et al., 2020).

Legislation

The Disability Discrimination Act (1992) (DDA) outlines the legal requirements surrounding discrimination against people with disabilities. It is further supported by the Anti-Discrimination Act (1991), and the Human Rights Act (1991) (Australian Human Rights Commission, 2022). The design requirements of public transport is outlined in the Disability Standards for Accessible Public Transport (2002) (DSAPT). Section 27.4 states that "All passengers must be given the same level of access to information on their whereabouts during a public transport journey." (Disability Standards for Accessible Public Transport, 2011). Therefore, if TransLink were to implement audio announced stops on buses, they would be legally required to also implement hearing augmentation. A report from 2013 contains interview responses from VIBP in regard to public transport accessibility (Blind Citizens Australia, 2013). Respondents indicated that the absence of audio-announcements negatively influenced their confidence to travel independently and safely, as they weren't always sure where they were (Blind Citizens Australia, 2013). It is important to note that this relates directly to the requirement in the DSAPT mentioned above. Additionally, the DSAPT states that it's at the operators discretion to announce stops or not (Disability Standards for Accessible Public Transport Guidelines , 2004). The DSAPT itself has been identified as an issue in terms of the regulatory confusion it creates (BringolfCategories, 2022).

Existing products and Technology

Among the literature available there is no shortage of research into assistive technologies through smartphones applications. An innovative product being trialled on Victorian trams lines is the *NaviLens* app and colourful QR code. Colour contrasting QR codes are positioned at stops and when scanned provide the user with audio updates on the approaching trams. It gives users other wayfinding information, such as distance to stops and elevators (NaviLens, 2023). In the development stage is another app *See Me* which helps VIBP personalise their journey on buses (Keane, 2022). A similar product created uses Bluetooth Low Energy (BLE) technology installed on buses paired with a mobile app to communicate information verbally, such as approaching buses and stop locations (Martinez-Cruz, 2017). Unlike other similar products this one doesn't rely on internet and GPS technology which can be unreliable in

certain locations (Martinez-Cruz, 2017). A notable similarity amongst these innovations is having real time data consistently available to users. On the other hand, there are a range of assistive technology wearables on the market for VIBP. The majority of these products have similar intentions – that being scanning the surrounding environment to communicate the information to the user through hearing or touch (Velázquez, 2010) (Ruxandra Tapu, 2020).

In a survey conducted through Portland State University both VIBP and Orientation and Mobility (O&M) specialists highlighted that many of the existing apps aren't compatible with an entire journey, and they have to be used in conjunction with one another (Swobodzinski, Parker, Schaller, & Snow, 2022). However, this is a difficult task to accomplish as so many users have completely different requirements and needs throughout their journeys. A significant limitation of many generic apps on smartphones is their low compatibility rate with the voiceover. In cases like this potential users can become discouraged from installing these apps and even attempting to use them (Swobodzinski, Parker, Schaller, & Snow, 2022). Throughout the research a gap has been identified in the lack of assistive technology that doesn't rely entirely on users having a smartphone and being proficient in their use.

Based on the review above VIBP experience several obstacles when using the public transport system in cities around the world. Various studies have addressed these issues with the creation of mobile applications utilising cameras, sensor, and audio based technology. Although there are some notable products, less attention has been given to solutions that don't rely on users understanding and owning a smartphone.

3.0 RESEARCH

A range of primary research was conducted to guarantee that accurate and up-to-date information was collected on the topic. This consisted of a survey for support workers and three in-depth interviews with both end users and transport accessibility experts.

Survey

The survey was distributed through Micah Projects and other organisations were contacted however; no replies were received which heavily impact the ability to utilise survey data. The targeted participant in the survey was support workers who have worked specifically with blind or partially blind clients within their career. The intention of the survey was to understand the perspective from a secondary user who is somewhat familiar with end users experience and preferences. Five out of seven questions were multiple choice and two were essay responses. Unfortunately only 2 responses were received from employees of Micah Projects. Due to the lack of responses the quantitative data is difficult to analyse and doesn't indicate valuable results. However, both responses were considered (see appendix).

Interviews

To conduct the interviews a semi-structured format was followed to allow more free-flowing conversation. Due to the nature of my project, the end users were best able to communicate their ideas and perspectives through one on one real time interaction. Two interviews were face-to-face at public locations convenient for both parties, and one utilised Microsoft Teams for an interstate participant. Below is a summary of the participants details and areas of expertise.

Table 1: Interview Participant Summary

Method	Participant	Outcome
Interview	1	Works at Transport and Main Roads Queensland as a Principal Advisor (Accessibility). Expert on legislation and human rights.
Interview	2	Works at Department of Transport Victoria. Legally blind and has a guide dog.
Interview	3	Part of Queenslanders with Disability Network. Currently university student. Legally blind and uses a white cane.

Different questions were posed to participant one versus participants 2 and 3. Participant one is an industry expert whilst participants 2 and 3 represent the end user. For participant one, six questions were pre-prepared, however during the interview not all questions were asked. The conversation naturally evolved and was allowed to flow, with different points discussed that were not covered in the initial prep. Participants two and three are legally blind and are represent the end user. The exact same questions were posed to both for standardisation of gathered information, with some questions tailored to their workplace and lifestyle. Over the course of the interviews new questions presented as information was shared regarding personal experiences and specific project work from each participant. Overall, this method of research highlighted pain points for users and their experiences based on how they currently access and utilise public transport. To record the discussion, notes were taken on a laptop. Important information was gained from the participants by allowing them to communicate their personal experiences and opinions on where attention should be focused for improving the system.

The research methods that have been utilised were qualitative providing information about user's attitudes, motivations, and beliefs that are difficult to extrapolate from quantitative data.

4.0 ANALYSIS AND FINDINGS

The qualitative data was analysed by identifying key themes throughout the interviewees responses and using these to categorise the information in an affinity diagram (see appendix).

The topics under which the information was grouped include:



Figure 2: Visual of topics, in order of most to least mentioned by interviewees

The table below summarises the key terms mentioned within the responses in order to make connections and relationship between ideas and information provided by the interviewees'.

Table 2: Affinity Diagramming Summary

Topic	Tagged Terms
Technology	GPS, battery, apps
Journey Disruptions	Pain point, way-finding tools, journey planner
Ability	Scales, proficiency, way-finding tools, considerations
Communication	Real-time, journey planner, pain points, legal
Legislation	Legal, discrimination
Attention	Pain points, listening, movement

Figure 2 identifies the forms of technology referred to by all participants, in particular the high importance of battery life was stressed by participant 2 and 3, with each of them mentioning it twice during the interview. Furthermore, leveraging the GPS technology on buses was

mentioned on two occasions, as well as ensuring that the voiceover app is compatible with a any new product comprising of a mobile app. In terms of journey disruptions, being able to personalise a route and adapt to change in a route are important factors to both blind participants. Likewise, from personal experience participants 2 and 3 brought up driver's attitudes and unawareness being a pain point. Participant 3 explained that:

At bus stations..."Sometimes I have to use the emergency phone that gets onto the control room who gets onto bus control to talk to buses to let the driver know I'm at the stop"

However participant 2 did acknowledge that it will vary between drivers as some will offer help prior to having to ask. All participants expressed that there are varying degrees of blindness and VIBP technology proficiency as well as confidence with independent travelling. Both participant 2 and 3 placed themselves on the higher end of both scales. At times on their journeys they will need to communicate to others to receive correct and up to date information in regard to approaching buses and changes to their routes. This may include ringing TransLink to locate a new bus to take, or asking the bus drivers, who receive real-time information about traffic delays, etc. Legislation was the fifth most mentioned topic, which was explained mainly only by participant 1 as he is an expert. Finally, the level of attention required during a trip was expressed as a crucial step, however once VIBP become familiar with a route and its surroundings, both participants indicated that it's fairly easy to know where you are and where you need to get off. Of course this will be dependent on the user.

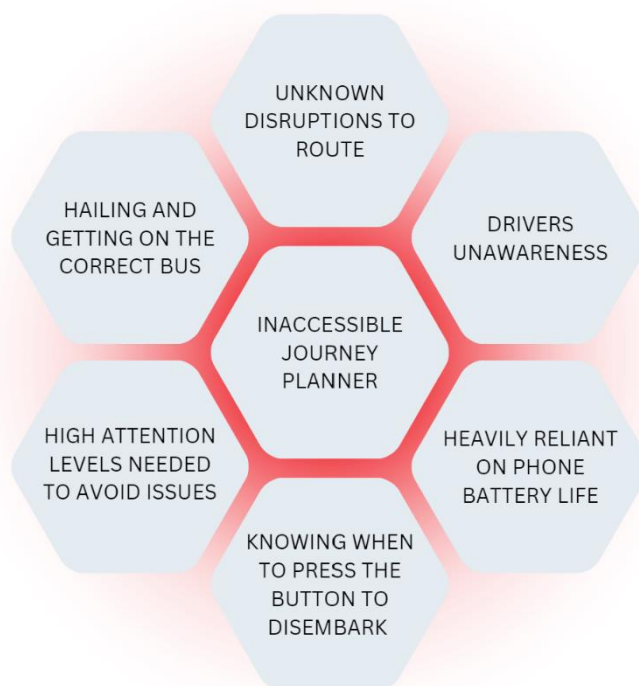


Figure 3: Diagram of Identified pain points

Limitations

The primary research and data collection process does have limitations that should be acknowledged. Interview pool of potential end users was quite small, only having two interviews conducted with blind people. However, both provided consistent and high useful information. Additionally, both blind participants considered themselves seasoned public transport users, and therefore pain points of less experienced users may not have identified or acknowledged. Another limitation of this research was the insignificant level of respondents to the survey.

5.0 DISCUSSION

The literature review covered existing products that assist VIPB to use public transport, many of which are smartphone applications. Some of these applications rely solely on verbal communication of information through the phone. In busy and densely populated bus stations during peak times the noise pollution is high. Therefore users may have difficulty hearing the information requested, particularly if it is constant real-time data being provided to them.

A commonality between the literature review and the primary research findings was the bus drivers attitudes and awareness of people with disabilities who require their services.

The gap identified in the literature review was the lack of assistive technology that doesn't rely entirely on users having a smartphone and being proficient in their use. The findings from the analysis of the primary research collected through the interviews helped to understand in more depth what users requirements are for beyond an app. Where these products fall down is their reliance on battery life of users phones. An interview participant mentioned that he has to take a portable charger whenever he leaves the house, due to dependency on phone. It has become apparent through the research and analysis processes that the technology is available to design a solution that is compatible with a range of users and can acter to the demands from VIPB.

6.0 DESIGN IMPLICATIONS AND CONCEPT SKETCHES

The research conducted has informed potential design opportunities to assist visually impaired persons with utilising bus services. Based on this, five concepts will be outlined to address this problem and have an impact on the end users lifestyle. The findings in section 4.0 and the literature review (2.0) have accentuated specific difficulties and barriers that VIBP currently experience. To guide the design solutions, questions have been posed to understand what the needs are amongst users. These are demonstrated in the below diagram.

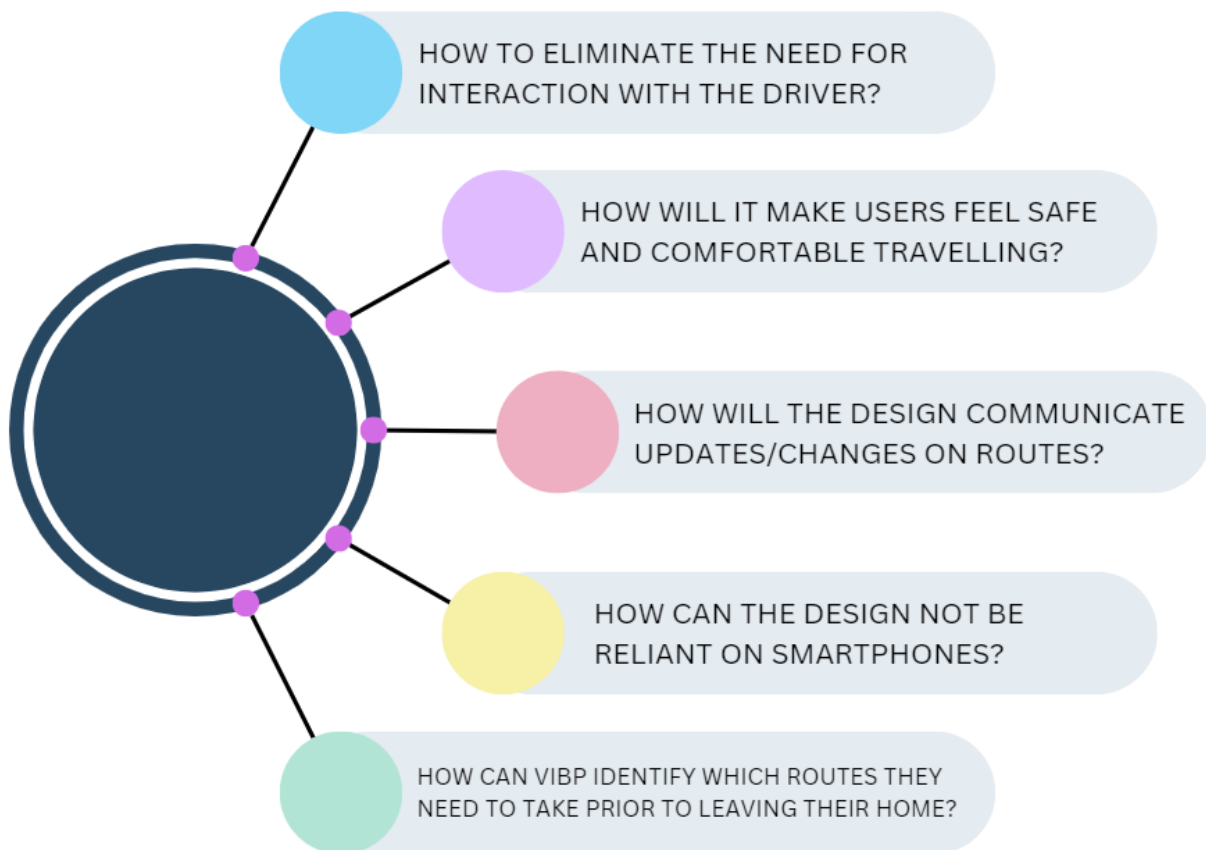


Figure 4: Mindmap of Design Questions to Consider

6.1 CONCEPT 1

This concept responds to the issue of knowing when to press the stop button and disembark the bus. VIBP will have a special card, similar to the *gocard*, which will hold specific information about their required trips. It will need to be pre-programmed perhaps through a website with their route needs. The card can be scanned on this device on the bus once seated on the bus or at any time throughout their journey. When scanned the bus driver will be notified of the users chosen stop. The goal is to reduce stress and anxiety for VIBP.



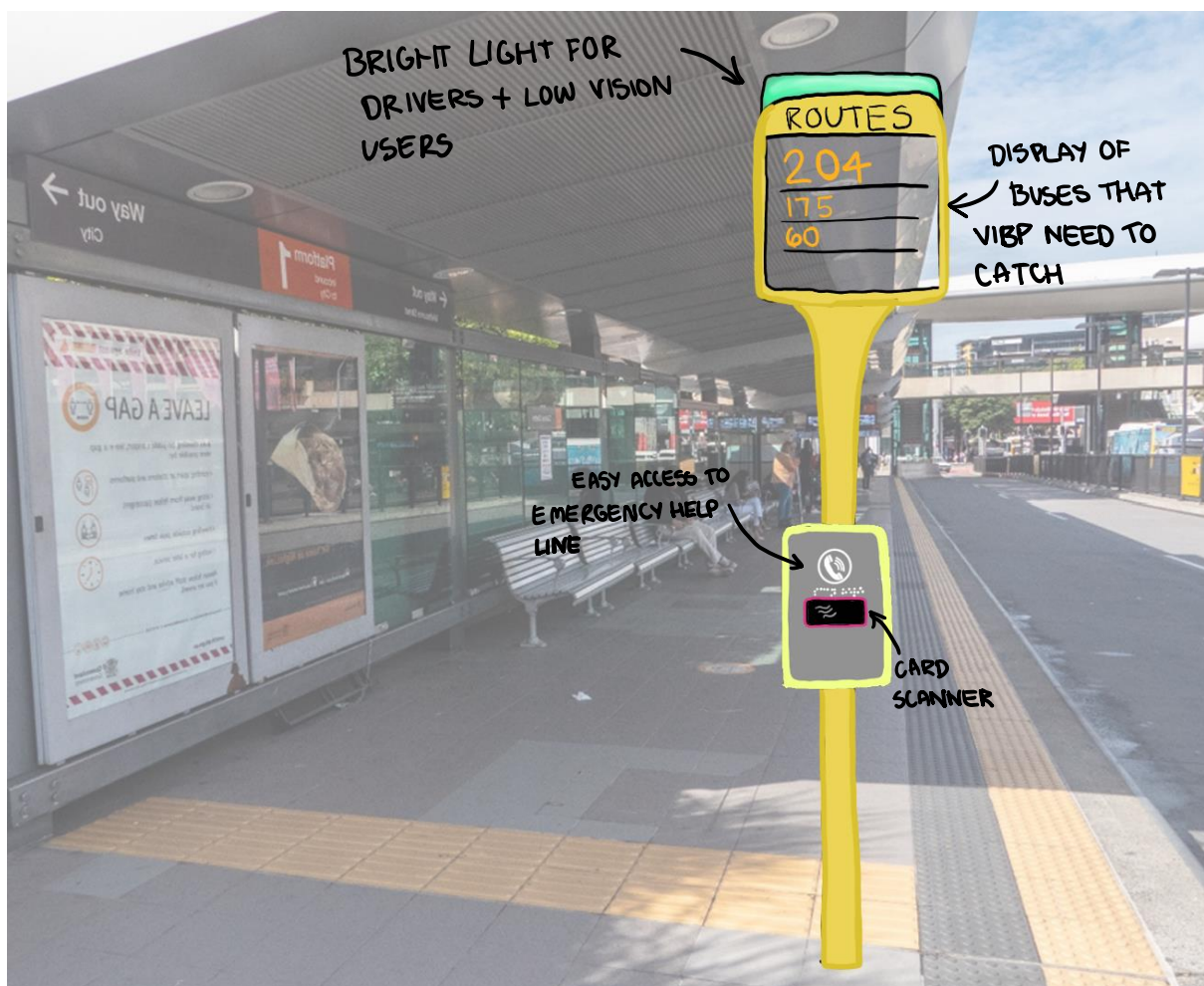
6.2 CONCEPT 2

This concept is similar idea to the concept presented above; however it helps VIBP travelling an easier and more stress free way of “hailing” a bus. Research showed that identifying and boarding a bus in the first place is a major challenging. This design allows user to use the same personalise card mentioned in concept 1, to communicate to drivers that they are waiting before the bus arrives at the stop. By scanning their card the bus driver will be notified that there is a visually impaired person waiting to board.



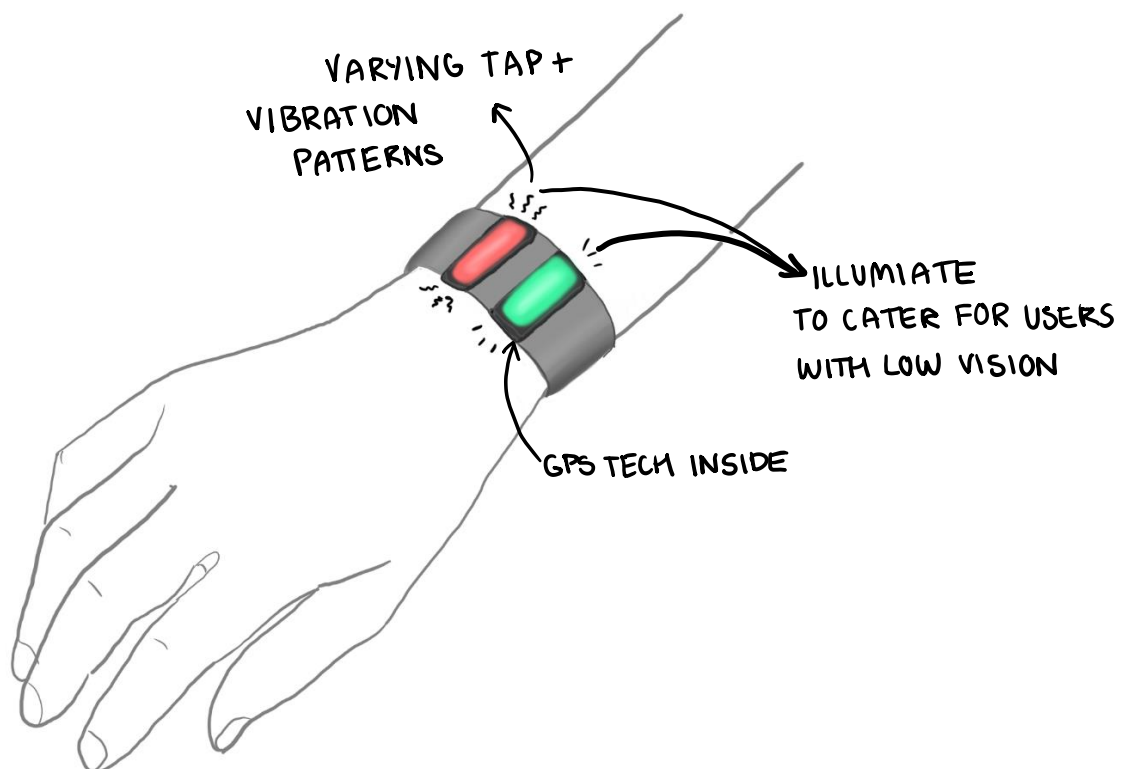
6.3 CONCEPT 3

This concept will be situated at bus stations for easy access and eliminating the need for VIBP to have yet another product they have to have on person or phone. The primary research indicated that many VIBP refrain from adopting products unless there is a very clear benefit for them. This will be positioned at the lead stop in bus stations to ensure consistency. Like the other concepts a special card will be required to be scanned to retrieve the personalised journeys of each user. The buses that users have previously selected to catch will be displayed on the screen to indicate to driver that a VIBP is waiting.



6.4 CONCEPT 4

This concept will allow users to identify when their bus is approaching their stop. It is a wearable device that communicates information to the user through vibrations and tapping sequences. The user's journey information will be pre-programmed through an app, however once set it doesn't rely on the use of a smartphone. It was chosen to be worn around the wrist as to not interfere with the user's movement or use of other assistive technologies, such as a cane or guide dog. This design is subtle as to not draw unwanted attention to the user. GPS technology is installed to know when the user has reached their boarding stop and the driver of the bus they require will be notified that a VIBP is waiting. The two small panels on the band will light up green and vibrate when the request has been sent to the bus driver. To indicate changes in the route the panel will light up red and have a different vibration sequence. Due to numerous factors potentially delaying a bus, the type of disruption will be linked to the app where users can open their phones to get the message verbally.



7.0 CONCLUSION

This research report has explored the need for accessible public transport services for visually impaired and blind people. The literature review covered the topics of community implications, legislation as well as existing products and their technology. It was highlighted that VIBP should be able to use bus public transport confidently and safely to access employment, education, healthcare, and other services available to the general public. The primary research gathered a deeper and more personal understanding of the individuals experiences on a bus journey. Within the interviews conducted, multiple overlapping pain points and barriers to the system were identified by the participants. Design solutions were explored in response to the main issues identified in the analysis and findings of the research.

- Low, W.-Y., Cao, M., Vos, J. D., & Hickman, R. (2020, October). *The journey experience of visually impaired people on public transport in London*. Retrieved from Science Direct: https://www.sciencedirect.com/science/article/pii/S0967070X19308364?casa_token=SwVs9qRfHRQAAAAA:hA6e_3S48inYhtKLe81RCYqjPiWp5z4voBh2VTvpJfMLxkEE8_AEBtCtsfJfPU_rxg54Us
- Martinez-Cruz, S. (2017). *An Outdoor Navigation Assistance System for Visually Impaired People in Public Transportation*. Retrieved from IEEE Access: <https://ieeexplore.ieee.org/ielx7/6287639/6514899/09534900.pdf?tag=1>
- NaviLens. (2023). *Discover NaviLens*. Retrieved from NaviLens: <https://www.navilens.com/en/>
- Ruxandra Tapu, B. M. (2020). *Wearable assistive devices for visually impaired: A state of the art survey*. Retrieved from ScienceDirect: https://www.sciencedirect.com/science/article/pii/S0167865518308602?casa_token=0UWQr6WWMP8AAAAA:3KdB1CfKNWHfJTCgcJrthAyCQXGr3MlbQqQA4bn6yWErWFYWhdu4iTMNO_GMVSEQE-KkpSw
- Swobodzinski, M., Parker, A. T., Schaller, E., & Snow, D. (2022, November). *Pedestrian Wayfinding Under Consideration of Visual Impairment, Blindness, and Deafblindness: A Mixed-Method Investigation Into Individual Experiences and Supporting Elements*. Retrieved from NATIONAL INSTITUTE FOR TRANSPORTATION AND COMMUNITIES : <file:///C:/Users/adria/Downloads/Pedestrian%20Wayfinding%20Under%20Consideration%20of%20Visual%20Impairment%20B.pdf>
- Velázquez, R. (2010). *Wearable Assistive Devices for the Blind*. Retrieved from <https://arxiv.org/ftp/arxiv/papers/1611/1611.09480.pdf>
- Volpe National Transportation Systems Center. (2022, August). *Accessibility in Transit Bus Automation: Scan of Current Practices and Ongoing Research*. Retrieved from Volpe National Transportation Systems Center: <https://www.transit.dot.gov/sites/fta.dot.gov/files/2022-08/FTA-Report-No-0228.pdf>
- WHO. (2023). *Blindness and vision impairment*. Retrieved from World Health Organisation: <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment#:~:text=Globally%2C%20at%20least%202.2%20billion,are%20refractive%20erro,rs%20and%20cataracts.>

8.0 APPENDIX

8.1 SURVEY RESPONSES

Q6 What are the main ways in which you assist visually impaired clients?
Essay

Date	Answers
3 days ago	Daily tasks such as- driving to medical appointments, logistically assisting to attend social events, basic cleaning/food prep

Q7 From your perspective what are the major difficulties that blind people encounter when travelling on public transport?
Essay

Date	Answers
3 days ago	During peak periods, a lack of a time is given to adequately receive information on track/route/platform changes ultimately ending in missed services to or from a destination

8.2 INTERVIEW QUESTIONS

Participant	Work	Prepared Questions
1	Transport and Main Roads	<ol style="list-style-type: none"> 1. What projects have you worked on where you've had to engage with VIBP? 2. How easy would it be to implement the device/product on buses? 3. Are there existing products that are currently being used in QLD? 4. How does a project come about? Do you research issues or problems constantly? 5. Do you have any potential contacts who are visually impaired or blind?
2	Department of Transport Victoria	<ol style="list-style-type: none"> 1. What do you do for Transport and Main Roads? 2. Do you catch public transport regularly? 3. What are your main pinpoints? On your journey does anything cause you stress or anxiety? 4. What could you see as the benefits or challenges of having a product on your person? 5. How do you navigate in public and on buses? 6. From other visually impaired people you know, how proficient are they in general with new assistive technology? Is it fairly easy to pick up for most people?

3	QDN and student	<ol style="list-style-type: none">1. What kind of work do you do within the Queenslanders with Disability Network?2. Do you catch public transport regularly?3. What are your main pinpoints? On your journey does anything cause you stress or anxiety?4. What could you see as the benefits or challenges of having a product on your person?5. How do you navigate in public and on buses?6. From other visually impaired people you know, how proficient are they in general with new assistive technology? Is it fairly easy to pick up for most people?
---	-----------------	--

Generate

Journey Disruptions

People need to personalise their journey - service disruptions

Blind people catching public transport often and using the same route generally become quite familiar with the route fairly quickly

Becoming familiar with a route means that disruptions can quickly become challenging

At bus stations drivers don't acknowledge or look for vision impaired people

Especially at cultural centre it's super busy and the phone is difficult to access

I have to use the emergency phone that goes into the control room who gets onto bus control to talk to buses to let the driver know I'm at the stop (Inconsistent and long process)

Doesn't consider where your bus is going from and too (if you have to transfer), needs to cover whole journey (traffic lights/one road)

More factors can delay a bus over a train

Integration of journey planner, for example google maps have integrated bus and train timetables and route options - doesn't cater to disabled people (seeing)

Ability

Consider that visual impairment is a scale - depending whether one is born blind or has an accident

Older people with vision loss over time are a forgotten cohort - not as tech savvy

A device on person caters for people who aren't as proficient with smartphones

Uptake of an app depends on if there are benefits for the user

Younger blind people are generally very proficient with technology

Some blind people use echolocation around buildings, areas in a sense to understand where they are located which direction to go.

Scale of ability in terms of proficiency and confidence travelling independently

Older blind people are reliant on friends and family to get them technology

Technology pick up rate is fairly quick amongst blind people

Attention

Ask smartphone where he hit and it gives him the address verbally - useful when you miss you stop

Risk - being distracted by your phone as a blind person (miss stop)

Always have to stand at lead stop - would be more accessible if all buses were required to stop there

Always thinking about when you're going to meet your stop - interview vs social event mean different levels of anxiety

Getting on the bus in the first place is a major issue

Next biggest issue is finding stop to get off

Communication

Real-time communication is needed to plan trips

Way finding tools (audio announcement). Need to know when stop is coming up

Hard to identify bus routes and how to interact with the driver. Sometimes drivers will stop and approach him/stop. This is hard when there are multiple routes at the same stop

Has to ring Translink to find out what new routes to take - don't consider stairs

London transport system does audio announcements quite well

Multiple agencies to communicate through for change - Translink/TMR/ Council

Changes on the route are only communicated to bus drivers in real-time

Legislation

Disability Discrimination Act underpins all the legal requirements around discrimination for people with disability.

App notifications - Legislation says for people to have the same level of information provided

Audio/ visual/ hearing are all needed if one is being provided

No one wants to do studies at cultural centre tend to go towards Roma street instead

Phones are not considered a reasonable and necessary support under NDIS

Multiple agencies to communicate through for change - Translink/TMR/ Council

"By using the apps it's an excuse not to advocate for improvement"

Technology

Transport planning is very computer based - assumption that people are taking the same service morning and afternoon

All new buses have GPS which could be a leverage point

GPS locators on all buses are good

Not everyone uses a phone or wants to

Blind people have to be cautious of apps that chew up battery life

Doesn't rely much on technology for transport on buses

Try and stay away from self assisting apps as voice over is already on the phone

Always take a battery pack where ever he goes (big issue)

Any app has to be compatible with the voiceover application

Battery life is major

Google maps is difficult to make accessible