THE AWARE PHONE INTERFACE

How can customizable interface features on smartphones enhance safety and reduce errors in phone usage for individuals under the influence of alcohol?

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Abstract

This project aims to develop "The Aware Phone Interface" by designing a customizable smartphone interface tailored specifically for intoxicated users. The aim is to improve safety, usability, and accessibility through the implementation of a "drunk mode" focus setting. By utilizing concepts of inclusive UX design, the project seeks to develop an intuitive and supportive interface that integrates seamlessly into existing IOS focus modes. This report highlights progress, challenges, and the roadmap ahead, detailing key milestones achieved, obstacles encountered throughout development, and the methods to address these challenges to achieve the projects objectives. The project aims to influence designers to incorporate such features into smartphones, to promote safer and inclusive mobile design.

Chapter 1: Introduction

1.1 Background

Currently there is a lack of supportive technology for consumers who are intoxicated. When consumers are intoxicated their motor and cognitive abilities are impaired. Therefore, the need for interfaces that are accommodating and supportive for intoxicated consumers is essential for improving usability and safety.

When using technology whilst intoxicated, the ability to interact with your phone is diminished significantly. Users may struggle with making more errors such as sending the wrong text, calling the wrong person, or posting on social media when they don't intend to. They are also more vulnerable to safety risks through booking the wrong taxi or struggling to contact their emergency contacts. Users also may struggle with decreased usability as the standard phone interface is not designed with intoxicated users in mind, which may lead to confusion, frustration or struggling to efficiently perform tasks. Additionally, users may compromise personal privacy, indulge in excessive gambling, purchase unwanted items online and more.

All the above can result in social embarrassment, safety issues, financial loss, and even legal or physical harm. On top of this, the lack of phone interfaces tailored for intoxicated users shows a gap in intuitive design, where user needs are severely unmet.

Current smartphone interfaces are therefore not designed to accommodate the cognitive impairments that come along with intoxication, leaving users without the important tools to use their smartphones safely and effectively. Therefore, there is an essential need to create an intoxication-aware smartphone interface that can adapt to users' impaired abilities.

1.2 Problem Statement

Based on my research as well as my thoughts on the need for this type of technology it is clear to me that interfaces are not designed to be accommodating for intoxicated users. Specifically in the UK drinking culture is a big culture. Therefore, it is not uncommon for users to use their phones intoxicated.

Despite finding some previous research on the topic of UI for intoxicated users, there is not only a lack of formal research into this topic, but also a lack of software created to improve this problem.

Specifically, there is an unmet demand for UI that is not just for assisting users on a particular app but instead assisting them on their entire phone. This could be achieved through an interface developed by manufacturers like Apple and Samsung, featuring built-in assistance software that a user can manually activate when they are intoxicated or about to be intoxicated.

1.3 Project Aim

The aim of this project is to design and prototype a customizable smartphone 'focus' interface specifically for the needs of intoxicated users. By introducing a "drunk mode" to integrate into existing iPhones, the project will improve user efficiency, safety, and usability. The project will address common issues that intoxicated users face including safety risks, impaired vision and communication struggles through using inclusive UX design principles. Overall, this project aims to raise awareness of the importance of inclusive design, the struggles intoxicated users face when interacting with technology and how we can improve design to make smartphones safer and more intuitive for intoxicated users.

1.4 Objectives

1. Develop a customizable phone interface for intoxicated users to help reduce errors and improve safety.
2. Implement a "drunk mode' focus setting that allows users to customize their focus settings to tailor their phone to their needs whilst drunk to be activated when drunk.
3. Improve Safety, Usability and Accessibility through UX Design to ensure that the design it more straightforward for intoxicated users to navigate their phone.
4. Integrate Human Computer Interaction (HCI) concepts, focusing on usability and inclusivity for intoxicated users.
5. Test and evaluate the usability and effectiveness of the design to evaluate how well the interface can support intoxicated users and gather feedback.
6. Prototype a working demo of the interface to show key features of the focus setting and show the potential for future development.
7. Raise awareness to the challenges that intoxicated users face when using their phones and the lack of technology that exists to help mitigate these challenges.
8. Develop a system that can be adapted to existing focus mode on apple iPhones, while providing a pre-built system design for drunk mode.

Chapter 2: Background Research

For my literature review I have decided to research three separate studies that cover each angle of my project. This includes a study to gain knowledge surrounding the effects of alcohol on the human body, specifically attention and memory for visual situations, allowing for greater insight into the physical experience of an intoxicated user. Another study covers the importance of inclusive design in relation to older users experiencing cognitive design. This study ties in with the importance of this research. The final study is directly linked to this project and is a study which led to the creation of an app to assist intoxicated users. I believe that by having all three studies cover a different angle of my project it will gives me a fully rounded background for my own research and design.

2.1 Literature Review

2.1.1 The effects of alcohol intoxication on attention and memory for visual scenes

In recent years, researchers have explored the effects of alcohol consumption on cognitive processing, particularly with visual attention and memory. One phenomenon in this subject is "alcohol myopia", which is a theory introduced by Steele & Josephs (1990), that suggests that alcohol narrows focus and directs attention of the individual towards the more prominent subjects of the scene and reduces the attention to peripheral details. This phenomenon has been linked to behavioural effects of alcohol and has been found to have effects on decision-making. As visual attention is important in how individuals recall scenes, examining the effects of alcohol on visual attention can offer valuable insights into how intoxicated individuals process and recall information from visual scenes.

A study by Harvey, Kneller, and Campbell (2013) looked into how being intoxicated effected individuals to focus their attention on the central parts of the scene and ignore the peripheral details around the edges of the scene. They wanted to discover if alcohol makes people pay less attention to the "peripheral" parts of the scene and more attention to the central parts of the scene, and particularly if this effect is more prominent when the image is more emotionally engaging. The study consisted of 106 undergraduate students who were randomly split into two groups (alcohol or no-alcohol). The alcohol group received a drink of 450ml containing 0.6ml of ethanol per kg of their body weight mixed with orange juice with the knowledge that it contained alcohol, and the no-alcohol group received 450ml of pure orange juice and informed it was non-alcoholic. Both groups drank within 10 minutes, followed by a 20-minute absorption period and then breathalysed again. Participants were then set up with the eye-tracking equipment and freely viewed an image for 10 seconds where eye movements were recorded (first 53 were shown an emotionally salient police scene and the rest were shown a benign busking scene). Participants then returned to the lab the next day when sober and completed a recall task to describe everything they remembered from the image.

The study found that alcohol does cause people to focus more on central parts of the image and not pay attention to the peripheral details of the image. The increased central focus however was not affected by how noticeable the central event was and did not help the intoxicated individuals recall details from the central part, as well as the sober participants. Regardless of how noticeable the centre is, intoxicated people spend most of their time viewing it and therefore do not explore and recall the whole scene. This supports the idea of "alcohol myopia", therefore showing that alcohol narrows individuals focus and results in them missing out on other details.

Despite the well planned out research method, there was still limitations to this study. Harvey, Kneller, and Campbell (2013) suggest various improvements that could be made to the research in the future. In order to rule out whether the narrowed attention was due to the location of the image on the screen, they suggest that the location of the main event and starting point of the participants view should vary each time. The study also only measures visible attention, but future research could explore whether intoxicated participants still pay attention to peripheral areas of the scene whilst simultaneously looking at the centre which

could be tracked with higher tech eye-tracking technologies. It should be noted that the study acknowledges the lack of a placebo group due to concern that participants would be able to confidently detect if there was little or no alcohol in their drink even if the researchers tell them, it has a high concentration, making it difficult to efficiently add a placebo group to the study.

Despite these limitations, this study gives good reasons to confirm that alcohol intoxication narrows individuals' attention to central features of the scene aligning with the "alcohol myopia" theory and reduces their efficiency at memory recall. These findings are important to help us understand the real-world implications, such as safety issues, including driving or navigating unfamiliar places; behavioural insights into how alcohol affects social behaviour; and how intoxicated individuals process information and the visual scenes, including crimes, conversations, and their phones.

2.1.2 Designing Mobile Applications for Older Adults with Cognitive Decline: Inclusive Design Considerations for User Experience Designers

UX designers are always looking to create intuitive technology and systems that are meaningful for all users. Inclusive design, however, considers ability, language, culture, gender, age and more when considering the needs for the end user when developing systems. UX professionals in healthcare, education and government have already been considering the needs of their users with visual impairments, hearing loss and motor issues. However, there has been a lack of attention to designing for users with cognitive disabilities which include things such as autism, dementia, learning disabilities and cognitive decline. This lack of attention is mainly due to a lack of knowledge within the UX industry about cognitive disabilities.

Tomasz Pokinko (2015) created this major research project (MRP) to represent the "vital 'edge case'" of older adults with cognitive decline so that UX designers can learn the importance and requirements of their needs. Pokinko wanted to achieve two goals. Firstly, to help in making mobile apps easier to use for older adults with cognitive decline. Secondly, to spread awareness of cognitive accessibility amongst UX professionals and academics.

Despite the increase in research surrounding the use of mobile technology adults with cognitive decline still find mobile devices some of the hardest technology to use. Pokinko found that there was still no inclusive set of UX design considerations for the mobile and therefore aimed to develop a research-based set of inclusive design considerations for UX designers in order for them to meet the needs of older adults with cognitive decline but also for UX designers to be better informed on designer for mobile technology in general.

The MRP consisted of a four-step approach to create the set of design considerations. First to establish the foundational concepts and criteria, then to develop the preliminary list from a literature review, then refine the list after gaining feedback from experts through surveys, then producing the final completed list. The main research method was through data collection and content analysis in the literature review in addition to the two rounds of surveys with experts to gain feedback.

The research from the MRP supports the "paradigm shift" toward accessible user experiences and creating accessible technology. The MRP produced a practical guide for UX designers to improve designing for older adults with cognitive decline. The guide includes simplifying layouts and content, integrating credibility, and incorporating elements that increase engagement and that the user can personally identify with. It suggested design strategies that welcome user connection and make the older adults more engaged with the technology. The guide was laid out as a list of design considerations and to be treated as a "living document" that adapts and evolves in line with UX. This list could then have the potential to become a social tool with designers so that they can collaborate on inclusive UX solutions and gain knowledge from each other. This would support creating meaningful and accessibly technology in UX design.

There were a few limitations that effect the scope of the findings in this MRP. The research relied on a small expert panel that consisted of only thirteen professionals which may not fully represent the range of insight that was needed to create the guide. Expert feedback is valuable; however, it can carry biases that would inevitably influence the final design. Additionally, the guide does not include end user testing in real-world scenarios to prove that it is effective and useful. The MRP suggests due to the fast changes in mobile technology, this guide should be a "living document" to maintain relevance as it can continuously be updated and edited to fit new ideas. The limitations indicate the need for more continued research in the future to validate and expand this research for additional real-world contexts.

This Major Research Project provides UX designers with a valuable foundation for creating inclusive mobile technology for older adults with cognitive decline. Through addressing cognitive accessibility, it fills a big gap in UX design and encourages designers to focus on building trust with the users. Although it has limitations, it offers a practical guide that can evolve with technology and whilst user needs change, ultimately helping mobile technology to be more accessible and meaningful for all users.

2.1.3 Wingman: Your Digital Drinking Companion

Uncontrolled alcohol consumption is a rapid growing issue in India with studies showing that 62.5 million people in India are addicted to alcohol. The most prominent group in excessive drinking are young people between 18-24 years. This excessive drinking can lead to crimes including rape, assaults, road accidents and engaging in vandalism. These young people may experience consequences for their crimes however, there is currently a lack of a system to control this problem as the only current services available are primarily directed at tracking users drinking patterns not supporting or controlling them.

Four students from MIT Institute of Design looked further into young people's experiences with alcohol and what services exist to assist them on a night out (Srivastava et al., 2022). The main objective was to develop a robust system aimed at young people to not only track their drinking habits but to additionally improve their drinking experience and to ensure

they reach home safely. Currently, the existing services primarily focus on streamlining their actions while intoxicated and lack design to take control of the user's drinking experience. This study wanted to adapt to this by developing a mobile application and breathalyzer to detect the user's alcohol intoxication levels and then trigger a "drunk mode" on their phone.

The research to develop this consisted of a six-step methodology including: contextual inquiry, questionnaire, persona creation, storyboarding, empathy mapping and competitive analysis. Observations and interviews with bar staff and owners revealed problems including bar fights and drunk calling. For the questionnaire it included 65 participants aged 18-25 focusing on how alcohol affects their academic and social experiences. The design of the surveys focused on demographics, behaviors, and academic/professional life. This aids systematic evaluation and prepares the participants for the types of questions they were going to be asked. The personas and storyboards were useful as they helped to visualize the user experiences and better understand the users' behaviors, and needs regarding alcohol consumption. The flow model was used to represent how the primary and secondary stakeholders interact during the events alongside a cultural model to show how potential users approach certain and how certain areas of the users' lives would affect their drinking habits e.g. culture, family. The desk study was a competitive analysis conducted to gather information on relevant technological developments and where they were limited, and identifying gaps.

The six-step research gave an in-depth result set. Regarding demographics and drinking patterns it found that 62.3% of the 65 participants were below the legal drinking age. 80% of them were undergraduates, 18% had recently started working, and 2% were dropouts. Out of the participants only 52.5% could handle less than 120ml of hard liquor, and 47.5% could handle up to 200ml. Each of the participants drinking frequency varied, with 9% drinking daily, 30% weekly, and 68% of them are at higher risk of drink related problems due to lack of drinking moderation (Srivastava et al., 2022). In relation to market analysis, the research showed that competitors existing services focused on location tracking and transport options but lacked any reliable safety features. Lastly in relation to empathy mapping it provided insight into challenges and risks that participants face during alcohol intoxication. These included trusting anonymous individuals, finding themselves in dangerous situations such as vandalism, not informing a guardian, drinking beyond the limits, loosing inhibitions and more. In summary, the results show a pattern of underage drinking, frequent alcohol consumption and a lack of moderation among the participants, which ultimately puts them at higher risk. There is also an identified gap in the market for solutions that focus on user safety regarding alcohol consumption.

These results led to the development of the mobile application wingman that couples a to a portable breathalyzer and supports a user in a drunken state. The breathalyzers connect to the app to detect the alcohol content to know when to trigger the "drunk mode" on the phone however, there are also DUI tasks to test for a drunken state if the breathalyzer is not present. The application can then support the user with interactions including cab booking, controlling phone activities, maintaining a record of the users' clubbing details and connecting with emergency contacts in times of need. The flow of the app includes the user selecting the activity they are taking part in that night, details about the event and people,

how they plan to get there and back, and how they plan to get home. Once the app has detected that the user is drunk (either through the breathalyzer or the DUI tasks) it then activates drunk mode which limits the users' actions and ensures their safety.

After usability testing, which involved given tasks that the participants had to complete to assess the usability and effectiveness, there were some unsuccessful aspects that the participants highlighted. Many participants found that the UI of the app was not appealing or not suited to a drunk user. It was also pointed out that the lack of features felt excessively controlling and the questions about the user's night felt intimidating. Furthermore, some users doubted that the application was practical and would work in a real-life setting.

The research was also subject to some limitations. The sample size was limited to 65 participants due to the pandemic, therefore in the future it was suggested that a larger sample size for research would be more beneficial. The participants in the sample size were mainly participating over the phone and therefore the research also could have benefitted with gathering data directly from people in bars and clubs. Additionally, the researchers believed that surveying non-alcoholics could have provided insights into how non-drinkers perceive alcohol-related issues. Therefore, helping the researchers identify solutions to address issues such as Uber's new policy to refuse service to drunk passengers. This could lead to more holistic solutions that involve both alcohol users and non-alcohol users in the process.

Despite these limitations, this research has resulted in a well though-out and successful application 'wingman'. It directly addresses a gap in the market to combat a rapidly increasing issue surround dangerous drinking in young people and works well to support and keep them safe instead of condemning them to not drinking at all. This app is important in highlighting the lack of technology to support drunk users and opens a door to allow more research and technology to be developed in the future.

2.2 Similar Works

Below is a comparison of similar apps and works with their key features identified and its limitations.

Existing system	Features	Limitations
Design and assessment of a personal Breathalyzer intervention to support responsible drinking	-Target population focuses on college students -Breathalyzer connected to a smartphone app to monitor Blood Alcohol Concentration (BAC) -Design improvements of color-coded BAC indicators and reliable contact notifications.	-Small participant pool (24 in the user study) -The reliance on the breathalyzer device limits accessibility -Relies on users to remember to use the device when drunk -Feedback showed that the app's UI was not fully optimized for intoxicated users.

	-Estimated time to sobriety and sharing BAC levels with trusted contacts.	
Drunk Mode: Mobile App for managing phone usage when intoxicated	-Call and Text Blocking -Location-sharing feature that allows friends to locate each other if someone becomes lost -Tracks where the user has been on the night out to retrace their steps. -Allows users to discover nearby parties -Timer to activate and deactivate when the app is running.	- As a third-party app it doesn't have full integration with the phone's core functions -Some users may hesitate to share their location or use tracking features due to privacy issues. -Features like location tracking through the app can drain the phone's battery which can be problematic on a long night out.
Drunk locker: Mobile app to block apps for the duration of your night out	-App locking by blocking access to selected apps during specific times -Users can pre-set days and times when the app activates -To access locked apps users must complete a challenge e.g. answer simple question -Blocks texting or calling specific contacts -Available in 16 languages	-Requires user to schedule lock in advance which may not always happen -Determined users could bypass the app by uninstalling the app. - As a third-party app it doesn't have full integration with the phone's core functions
Drunk Mode Locker: Mobile app to manage intoxicated users on their phone	-App blocking to select which apps to block before you drink -Customizable Timer & puzzle that users must complete to deactivate drunk mode. -Ride share Integration where the app automatically open ride-sharing apps if the users fail the puzzle -Emergency features where the app allows access to emergency contacts or vital apps in urgent need.	-Inability to completely restrict phone functions, can block apps like social media but doesn't have system-level access to lock core phone functions like calls. -Determined users can bypass the puzzles by uninstalling or force-closing the app. -Battery and Location Usage might drain the phones batter if the app is running in the background for long periods of time.

Drunk Mode keyboard: Mobile App to prevent texting when drunk	-Prevents user from typing and sending messages when intoxicated -Works in every app on IOS -Can customize the aesthetics of the keyboard -Draw on your keyboard and send drawings -Can use swipe gestures such as swipe to the left to delete an entire word.	-User reviews show it has a lot of bugs and doesn't have regular updates therefore the app is inefficient -Only focus on messaging, doesn't block broader problems like apps, or purchases -Users can bypass the app by simply switching keyboards to deactivate this one.

Overall, after analysis of these similar systems, there have been a few attempts to improve intoxicated user's technology experience, but the same issues continue to arise. With all the above apps, the user is very easily able to bypass the "drunk mode" features by force quitting the app, deleting the app, or switching back to normal keyboard. The app's also do not have access to all the features of the iPhone as they are a third-party, therefore limiting its efficiency. Therefore, the common error is the systems being a mobile app instead of a pre-built system into the user's iPhone.

Chapter 3: Requirements

3. 1 Requirements Analysis

Before writing requirements, it was essential to gather data to deepen the understanding of user needs, behaviors, and preferences for the system. This was carried out through the previous literature review and an online questionnaire. This approach was to ensure that the design is based on real user preferences and needs. Overall, this process ensures the system is user-centered, realistic, and more likely to be used by users.

Literature Review

The three key sources of the literature review touched on the physical effects of alcohol on a person, the importance of inclusive design, and a similar app with a drunk mode feature to ensure users get home safely. From these reviews, an analysis identified several essential details that need to be considered when identifying requirements of the project. The research emphasises that intoxication impairs decision making, vision, and precision therefore a simple, easy to use, error-resistant interface is crucial. The need for the design to be based on realistic scenarios such as booking a taxi home, is also emphasised as something the interface should include and be easy to use. Additionally, inclusivity in the design is essential to consider the cognitive and vision challenges the user is experiencing.

Online Questionnaire

In order to gather data on what user's would like to see from the intoxication feature, I conducted a questionnaire using google forms which received 32 responses. The questions asked in the questionnaire are shown below:

1)How often do you use your phone whilst intoxicated?

2)What are the most common activities you perform on your phone while intoxicated?

3)Have you ever encountered any of the following issues when using your phone while intoxicated?

4)How often do you feel frustrated or confused when trying to use your phone while intoxicated?

5)How concerned are you about the potential consequences of using your phone while intoxicated (e.g. safety risks, social embarrassment, financial losses)?

6)Have you ever felt unsafe or unable to complete an essential task (e.g., contacting someone, booking a ride) due to your phones layout or design while intoxicated?

6.1) If the answer is yes, please explain…

7)Would you be interested in a customisable "drunk mode" focus setting for your phone?

8)Which features would you find most helpful in a drunk mode setting?

9)Would you like to receive notifications or reminders while using drunk mode (e.g., reminders to drink water, check transportation, how much money you have spent)?

10)How important is it for you to be able to customise the settings of drunk mode to suit your needs?

11)How would you prefer to activate drunk mode on your phone?

12)Would you find it useful to review an activity log of your phones usage after using drunk mode?

13)Do you have any additional suggestions or ideas for features that a drunk mode should include?

The responses gave a good set of feedback on usage patterns of the user when intoxicated, the common activities they perform whilst intoxicated, the challenges they encounter, the interest in a "drunk mode" feature, what specific features they desire, preference on notifications/reminders and customisation and activation preferences.

Results Analysis

The research findings, gathered thought the questionnaire and insights from the literature review, were used to establish key factors for designing the intoxicated smartphone interface.

The initial questions focused on how much individuals currently use their phones when intoxicated and the struggles they face. Almost all respondents reported that they use their phone often or always when they are intoxicated, with only 6.3% of respondents claiming they rarely use their phone. The challenges that are commonly faced by intoxicated users include texting/calling the wrong person (83.3%), posting on social media unintentionally (46.7%), struggling to book a taxi or transportation (46.7%) and making unintended purchases.

These responses demonstrate the fact that majority of users do use their phones when intoxicated, alongside this, they all experience challenges and struggles during intoxication, highlighting a gap for customisable interface to help mitigate these issues.

Another important aspect of the questionnaire was the data on the details of the struggles and emotions the users face. Many users reported that they experience frustration or confusion when trying to use their phone whilst intoxicated, with 25% saying they often feel frustrated/confused, and 43.85 saying they sometimes feel frustrated/confused. Additionally, one respondent reported that they felt unsafe or unable to complete an essential task due to their phone's layout leading to having to "close one eye to be able to see what I'm texting".

This demonstrates that frustration and confusion does play a part in user's experiences of their phone usage whilst intoxicated which can lead to consequences including safety risks, social embarrassment, and financial losses. This could be solved through customising available features such as limiting app access or simplifying the UI design of the phone when drunk mode is activated to allow larger and clearer visual elements.

Participants were also asked to identify features they would like to see in the smartphone interface. Responses revealed several preferences:

- Simplified User Interface (71.9%)
- Blocking or restricting certain apps (59.4%)
- Preventing accidental texts or calls (59.4%)
- Easy access to emergency contacts or safety apps (59.4%)
- Reviewing phone activity after exiting drunk mode (65.6%)
- Notifications and reminders (84.4%)

These insights are crucial in demonstrating which features the users would want, even though some user's may of voted in previous questions that they didn't feel a strong need for a drunk mode on their phone, almost all of them went on to agree that they would benefit from the above features.

Some participants even gave open-ended suggestions including a "confirmation before action" feature for sensitive actions including texting, calling, or posting on social media. Another participant also suggested being able to add certain friends that the user selects to their location sharing which is only activated in drunk mode.

Through the literature review, a great amount of knowledge was gathered to help with the project. The study by Harvey, Kneller, and Campbell (2013) on alcohol's effects on attention and memory for visual scenes introduced the concept of "alcohol myopia". This should be taken into consideration when designing the interface, as it highlights the importance of a simple layout with emphasised key elements. Interfaces that require less focus on the peripheral details will help support the intoxicated user.

For the study by Tomasz Pokinko (2015) on designing mobile applications for older adults with cognitive design, it becomes clear the importance of inclusivity in design. The study recommends designing for trust and engagement, to help build user confidence through feedback, guidance and robust error prevention mechanisms so that the user can rely on their phone when they are intoxicated and not cognitively alert. Additionally, it links in with the feature suggested by a participant in the survey – "confirmation before action"- as

Pokinko's research highlights the importance of integrating elements to help the users feel confident and that their actions are safe. Therefore, an error prevention system like the "confirmation before action" can help users feel more secure in their actions.

The last big research project in the literature review is *Wingman: Your Digital Drinking Companion.* Due to this project being very similar to my own it was key to see what room for improvement there was. Firstly, this project is done through an app with a breathalyser. Even though this can be effective, the app depends on the user opening the app, connecting the breathalyser, or completing DUI tasks for it to then function. This means that it relies on the user remembering to actively engage with the app, which may be difficult or unlikely if the user is intoxicated. Additionally, it is an external addition of the phone, therefore it cannot take full advantage of system-wide features including calls, texts, disabling apps etc., which is crucial to the effect of the app. Lastly, many users reported that they found the wingman app intimidating and too limiting, which suggests that more customisation and more features are required to help user's to feel less trapped.

In conclusion, the research findings from the questionnaire and literature review highlight the significant challenges that users experience when intoxicated, including frustration, confusion and making errors. The data shows that there is a big demand for a customisable smartphone interface for intoxicated users so they can ensure their own safety and prevent unintended actions. The solution needs to be user friendly, inclusive and extremely helpful for the user. By considering the factors analysed above, the project can provide a tailored way to address these problems for intoxicated users. They key findings from the analysis above is shown in the functional and non-functional requirements.

Proposed Solution

The aim of my project is to develop a system built into the users' phone which allows them to activate a drunk mode on their phone. They will be able to set up preferences in their settings, then when activated the phone will be modified to suit their preferences and the UI of their phone will be modified to be optimized for a drunk user. Then when they exit the

drunk mode, the user will be able to see an overview of their phone activity whilst it was in drunk mode. The diagram below illustrates the processes the system will take and the flow of the system to create a drunk UI environment when toggled.

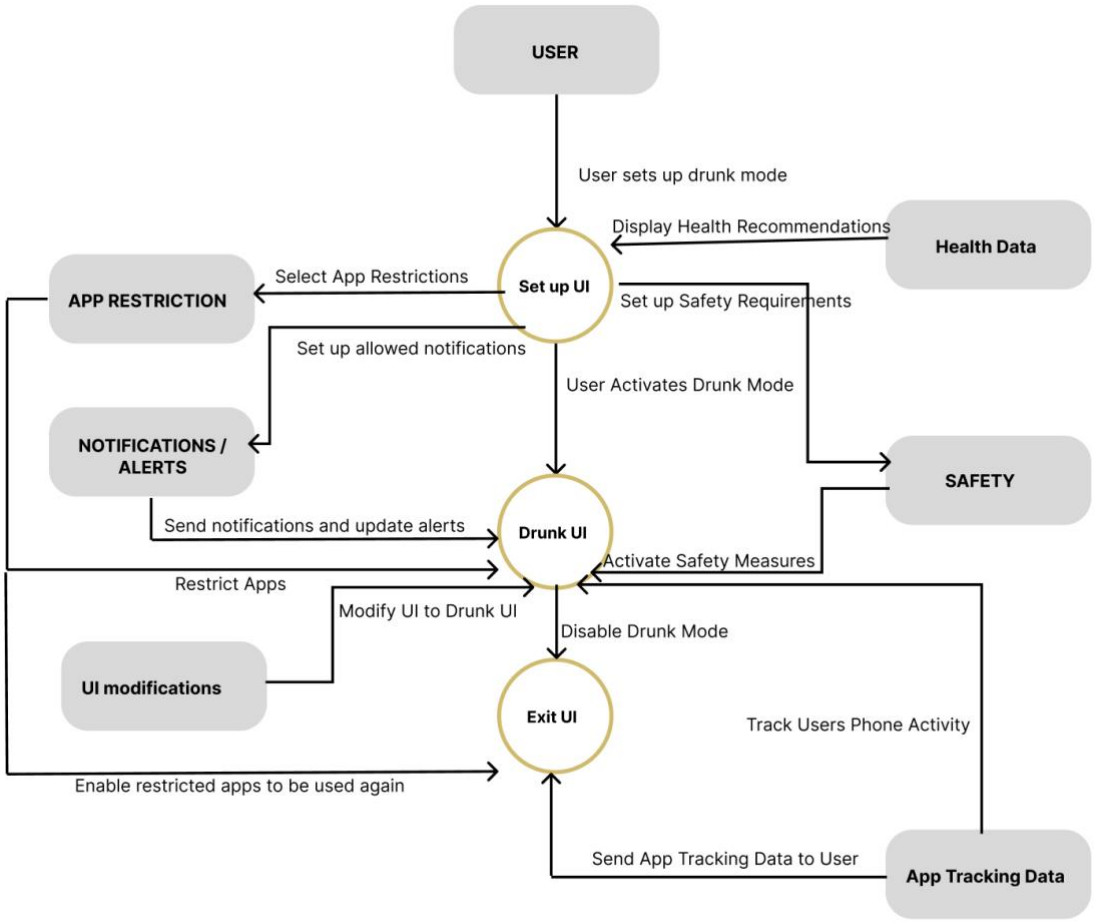

Figure 1 Problem Solution

3. 2 Functional Requirements

	Requirement	Completed
1.	Drunk Mode Activation: the system must be activated through a toggle button where the user can turn the drunk mode off and on.	

2.	Simplified User Interface: when drunk mode is activated the interface must adjust to a simplified layout, prioritizing large, easy-to-read visual elements and not having detail in the peripheral.	
3.	App restriction: the system must allow the restriction of specific apps selected by the user (e.g. messaging, social media, gambling apps) when in drunk mode to prevent unintentional usage.	
4.	Error prevention mechanism: "confirmation before action" the system must provide an additional confirmation step before sending messages, making calls, buying items online, to check the user is sure beforehand.	
5.	Emergency contact access: the user should be able to easily access emergency contacts or safety apps during drunk mode with easy navigation to these apps/contacts.	
6.	Overview after exiting drunk mode: the system must allow the user to review phone activity once they exit drunk mode with a summary of the actions taken during drunk mode.	
7.	Customizable features: the user should be able to customize which features they would like in set up mode such as selecting a designated driver so that these features appear in active drunk mode.	
8.	Notifications and Reminders: the system must send reminders or notifications to the users e.g. you have spent X amount on your bank card.	

3. 3 Non-Functional Requirements

	Requirement	**Completed**
1.	Usability: the system must be intuitive and easy to navigate, with the interface being easy to understand.	
2.	Performance: the system must work seamlessly without any crashes, especially when drunk mode is activated and providing safety features.	
3.	Reliability: the system must not fail in high-risk scenarios like when the user is performing dangerous actions on their phone whilst intoxicated.	
4.	Accessibility: the app must meet accessibility standards for all users to ensure inclusivity	
5.	Scalability: the system will be designed to scale in future iterations, and to support new features with integrations of third-party apps (uber, emergency response)	
6.	Maintainability: the system should be easy to update and maintain for developers, with modular code that is easy to fix.	

7.	User satisfaction: the system will be designed to maximize user satisfaction, to ensure it is a helpful experience and to encourage users to rely on it in the future when intoxicated.	

3. 4 Software Requirements

Hardware Requirements

1. Device:
    a. iPhone: required for testing and running the "drunk mode" system.
    b. Mac: required to develop the app, compile the code and run the code.
2. Internet Access: Required to download software and update libraries.

Software Requirements

1. Figma: To design the prototypes
2. React Native: Main framework to build the app
3. Node.js: used to run react native and manage the environment
4. Npm: used to manage dependencies and libraries.
5. Expo: framework for testing to preview React Native apps on physical device. Also offers built-in APIs for device features including location, notifications, camera etc.
6. Supabase: Used as an open-source backend for real-time databases, authentication, and file storage.
7. JavaScript
8. Bootstrap

3.5 Key Features List

Customisable Settings:

- Users can set up their drunk mode preferences through the set-up menu
- Options include restricting app and contact access, enabling and setting certain notifications and alerts, planning safety and travel, allowing tracking.

Health recommendations:

- Users can allow access to health data in order to be recommended alcohol unit consumption recommendation.

Drunk Mode activation:

- A single toggle activates drunk mode, transforming the phone to fit the users' selected preferences.

Activity monitoring:

- Tracks activity of user whilst their phone is in drunk mode

Simplified user interface (UI):

- Enlarged buttons, simple colours, simple layout etc.
- Designed to make layout easier to navigate when intoxicated.

Travel Planning:

- Directs users to book taxis or set up safe travel reminders directly from Drunk Mode.

Alerts and Notifications:

- Sends custom reminders and notifications during intoxication (you have spent X amount on your card)

Access Restrictions:

- Temporarily blocks specific apps, contacts, or phone functions based on user preferences.

Activity Overview:

- After exiting drunk mode, user receives an overview of their activity whilst their phone was in drunk mode.

Safety Features:

- Integrates features like emergency contact access, designated driver or travel reminders.

Chapter 4: Design

In this chapter, the user interface and different states that the system goes through is explained. This gives background on how the application and its functionalities will work. The Flow of the system and the system architecture is explained below. As well as the design principles that will be used for the final design.

Flow Charts

The diagrams below demonstrate an overview of how each state of the system works. It shows the data flow and interactions within Set Up UI, Drunk Mode UI, and Exit Drunk Mode UI, highlighting the different processes of each section.

Set Up Settings Flow Diagram

The Set-Up Settings Flow Diagram is where the User will first interact with the Drunk Mode system. Here the user has access to app restrictions they want to set, contact restrictions they want to set, which notifications and alerts are allowed, safety processes to ensure their safe return home, and a display of health recommendations in relation to their alcohol consumption.

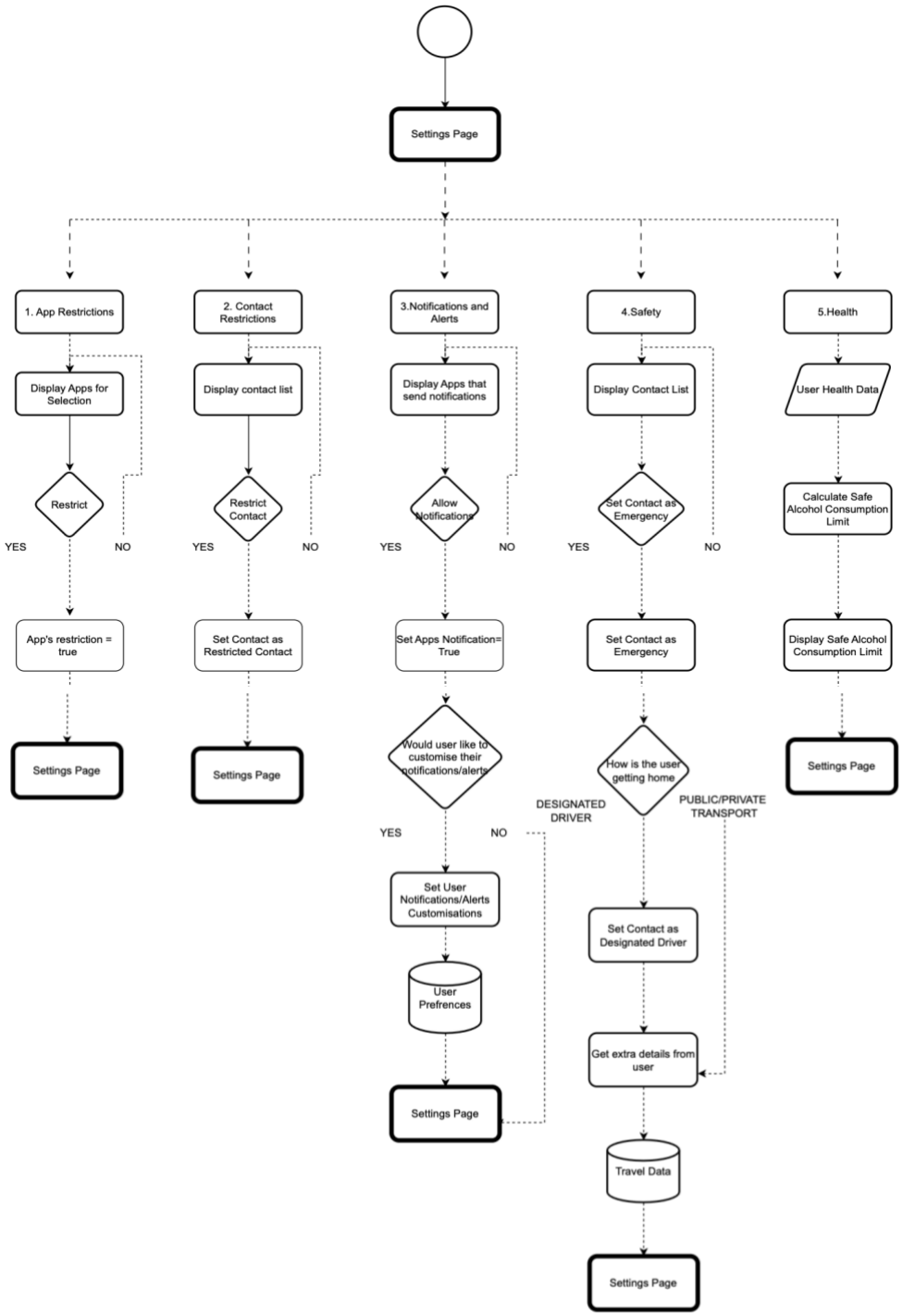

Figure 2 Set up flow diagram

Activate Drunk Mode Flow Diagram

The below flow diagram demonstrates the flow of the system when the drunk mode is activated. During the activated drunk mode, tracking will be activated and send this tracking data to the tracking database. Alerts and Notifications will be sent to the user during drunk mode if they are previously activated and allowed. App and Contact restricted content will be blocked to restrict access to apps and certain contacts. For the travel plan the user will be prompted if they previously gave a travel plan in the set-up UI. If they have given a travel plan it will ask the user to confirm that the designated driver is present and if not, it will test the contact the user previously assigned to the designated driver. If it is confirmed that the driver is present, then the user will confirm their safe arrival home. If the user failed to give a travel plan in set up, then other transport modes will be suggested, and the user will still confirm safe arrival home. After safe arrival home, emergency contact will be contacted to confirm this.

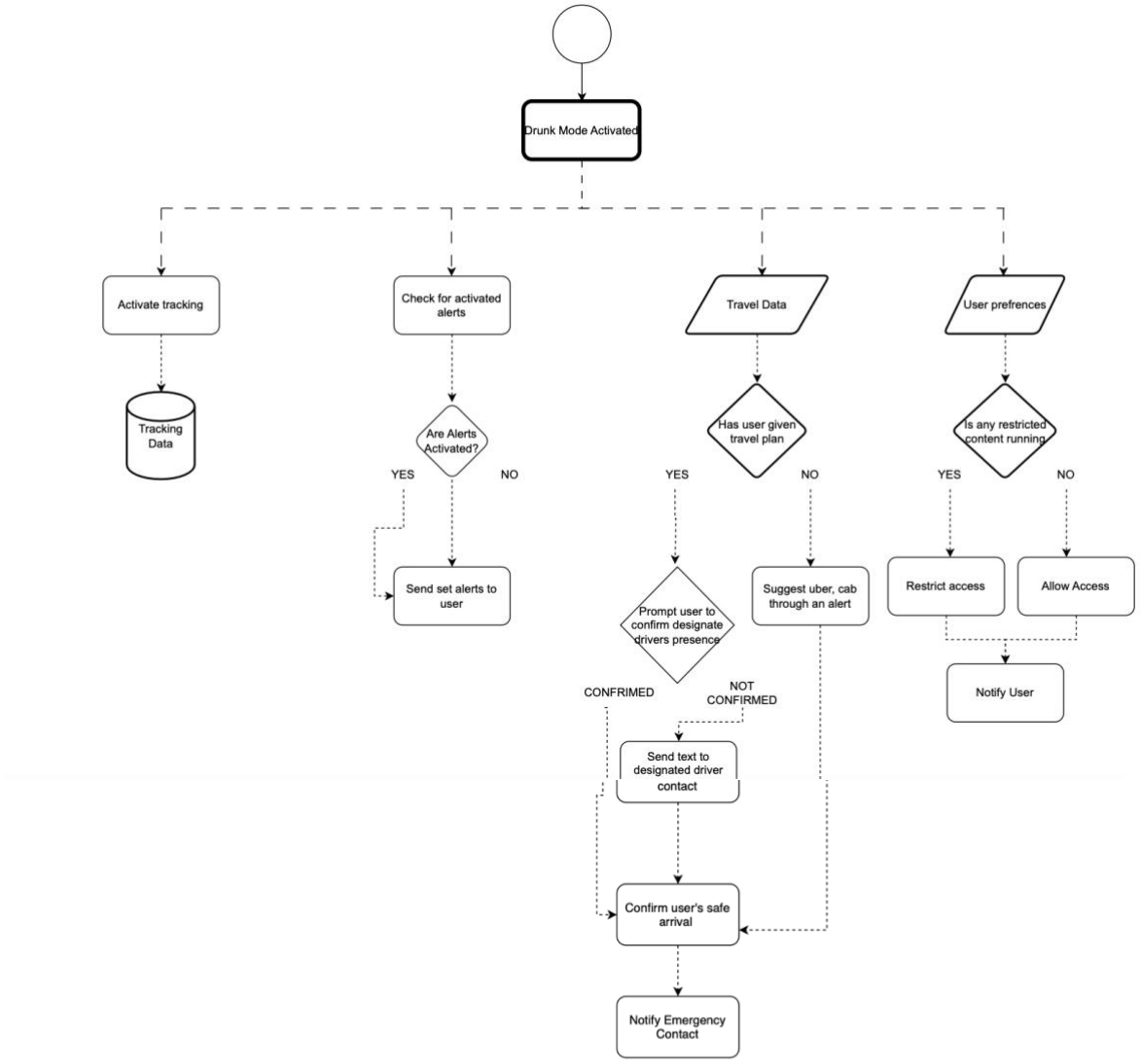

Figure 3 Active Drunk Mode Flow Diagram

Disable Drunk Mode

This flow diagram demonstrates the flow of the system when the user disables drunk mode. Once drunk mode is disabled the phone will return to its original state. Then it will access the tracking data and generate the phone usage overview and display this to the user so the user can view their activity whilst the phone was in drunk mode.

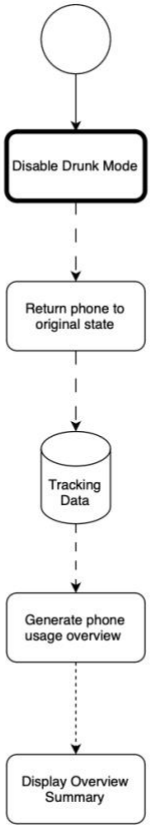

Figure 4 Disable Drunk Mode Flow Diagram

Component Diagram

This component diagram represents the high-level physical structure of the system. It shows how the system is divided into components, their relationships, and their interactions.

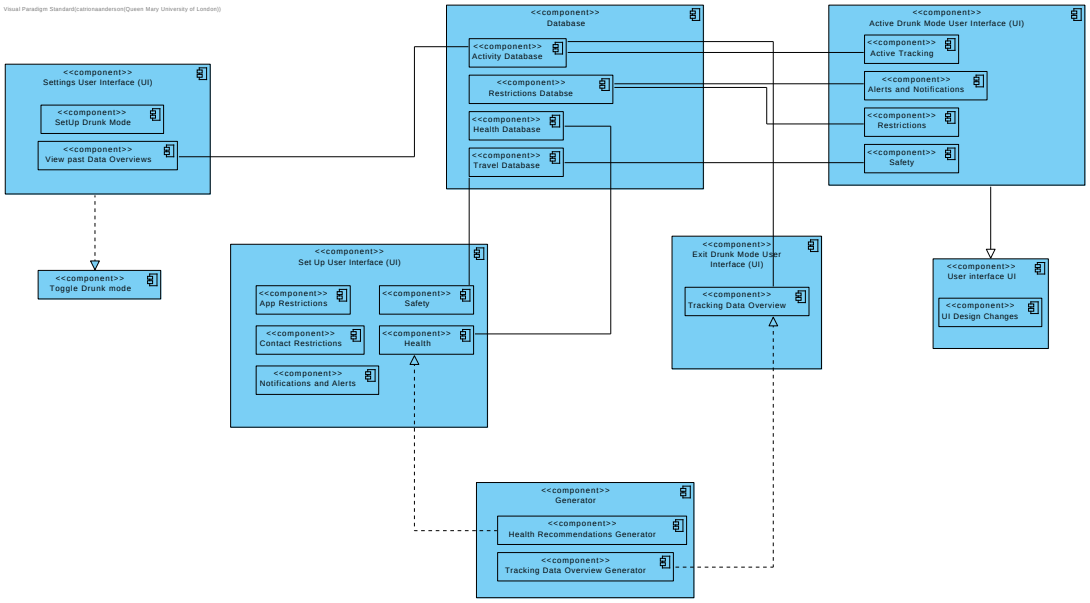

Figure 5 Component Diagram

Figure 5 demonstrates that there will be four separate UI components in total with three main ones. Settings UI, Set Up UI, Active Drunk Mode UI, and Exit Drunk Mode UI. The Settings UI is just the main page in the users' settings to access the drunk mode set up. The Set-Up UI is where all the customization is done by the user including app restrictions, contact restrictions, notifications and alert features, safety features, and health features. The Active Drunk Mode UI is what features will be involved in the active mode whilst the user is intoxicated, here the tracking will be activated, alerts and notifications will display, restrictions will be activated, and safety features will be activated based off the users previous set up. Then the Exit Drunk Mode will display an overview of the tracking data whilst in active drunk mode. These components link to the database to store activity, restrictions, health and travel data. The connections between database and UI are shown in figure 5 above. The Active Drunk Mode also relates to a UI which changes the smartphones interface e.g. larger buttons, bigger text etc. To generate tracking info and health recommendations figure 5 also has a generator component which links to appropriate UI to process and generate data to be displayed to the user.

State Diagram

The figure below is a state diagram to represent the state of the objects and the transitions between these states in response to certain events and conditions.

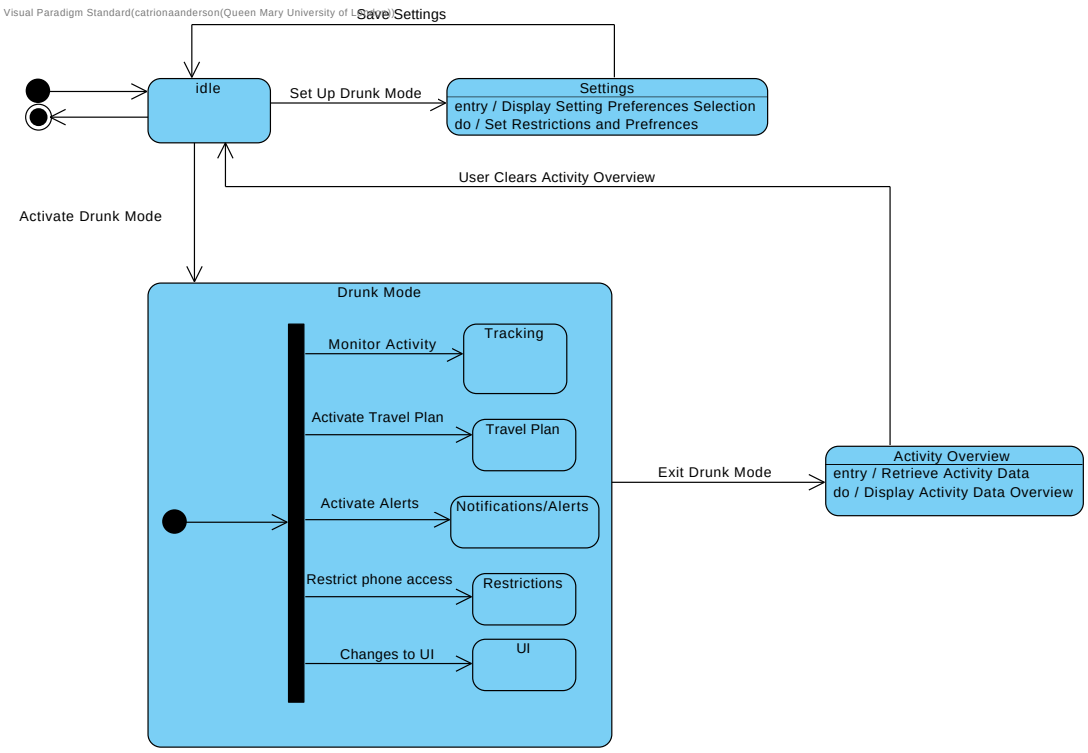

Figure 6 State Diagram

Figure 6 shows that after the start state, the state is "idle" to demonstrate that the system is not performing any significant task related to the drunk mode system. The other states involved are settings state, drunk mode state, and activity overview state. First the user can set up drunk mode which will take them to 'settings' stage. Then the user saves these settings and returns to idle. When drunk mode is activated by the user they are sent to the 'drunk mode' state. Here all the drunk mode features are enabled, with subcomponents including tracking, travel plan, notifications/alerts, restrictions, and UI. Once the user exits drunk mode they can view their activity overview. The state then transitions back to idle once the user clears the activity overview.

System Architecture

This section details the interaction of the system between the user, UI, server, data processor, and database. It explains how the front end (UI) interacts with the back end (server, database, and data processor) and how the backend deals with the data its processing. a

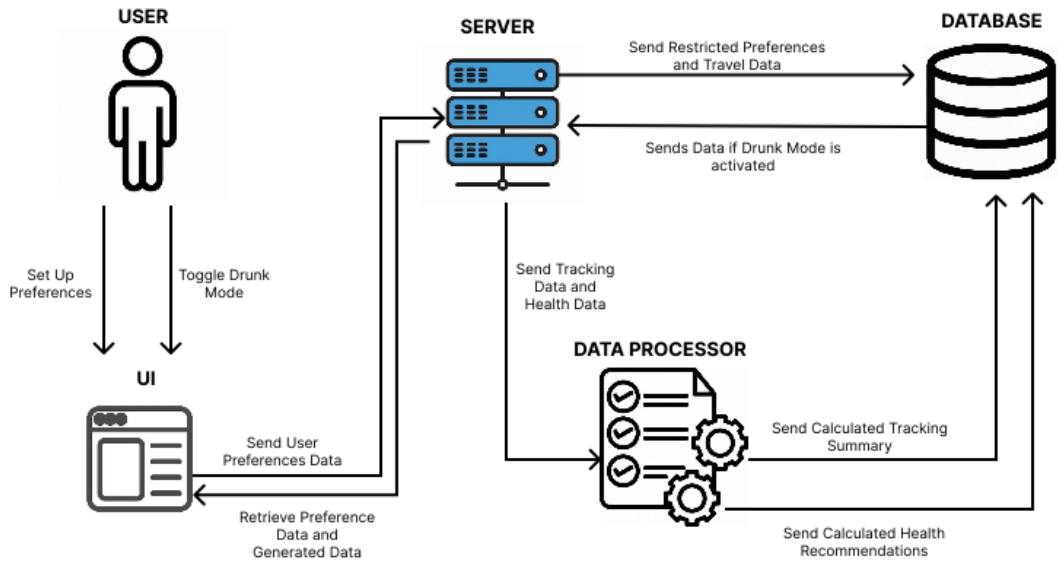

Figure 7 System Architecture Diagram

As shown in the diagram above, the client uses the UI to set up their drunk mode preferences and toggle drunk mode. The user preference data is then sent to the server. From the server the data either goes to the database including the restricted preference data and travel data. The Tracking Data and Health Data is instead sent to the data processer. Here the processor generates the activity tracking summary and the health recommendations with the user that it receives from the server. This generated data is then sent to the database to be stored. After, if the drunk mode is toggled the database sends any preference data that was saved to be used during the drunk mode back to the UI. Additionally, the database sends the tracking and health generated data to the UI if requested. The health data is requested in the setup UI and the tracking data is requested when exiting drunk mode and in the settings UI. The different available UIs are shown in the component table below.

Design Pattern

Model View ViewModel

For the design pattern MVVM (Model-View-ViewModel) was the best choice as it adapts well to technologies such as React Native. MVVM with the Model representing the data and business logic of the system. The View is the interface which will display the data to the user and capture user interactions, in this instance it is passive and waits for updates from the ViewModel. The Viewmodel acts as a link between the View and the Model where it processes data from the Model and sends it in a state that the View can display.

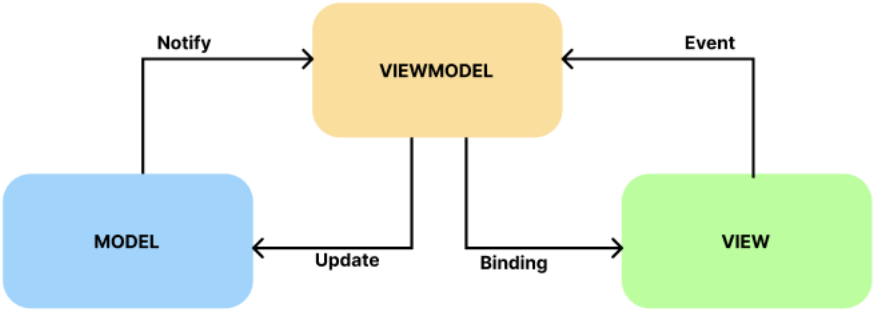

Figure 8 Model View ViewModel Diagram

For the drunk mode system, it will work as follows. The model will store data (user preferences, health data, app restrictions, etc), process data (health recommendations, app restrictions, track user activity, etc) and interact with the database to store and fetch data. Then the View will have UI's including Setup, Active Mode, and Exit Mode, where the user interacts with the app. It will update automatically when the ViewModel changes. Lastly the ViewModel will deal with stage-management (if the drunk mode is active, what preferences are set), making data suitable for the view to display from model (health data, app restrictions etc) and handling actions such as toggling the drunk mode, exiting the drunk mode by interacting with the model.

This model is beneficial as it creates a cleaner separation between the UI and the business logic. It works well with technology such as React Native as it supports two-way data binding, which is helpful to simplify the way View and ViewModel Communicate. Additionally, it comes with other benefits including modular code, easier testing, and scalability.

Design Principles

When it comes to designing a user interface for intoxicated users, it is crucial to focus on inclusivity, usability, and safety. Everett McKay's *UI is Communication (date)* gives a good background of design principles that should be implemented.

1. Simplicity and Visual Clarity
    a. The interface needs to be clean and minimalist when in drunk mode to reduce distractions in the peripheral parts of the screen and to help emphasize key elements.
    b. Large-high-contrast buttons and text will help make the interface more accommodating for intoxicated users cognitive and visual impairments.
2. Error Prevention and Forgiveness
    a. McKay talks about "forgiveness in design" where the interface is made to help prevent mistakes, e.g. confirmation prompts when sending a message.
    b. This also aligns with the concept of error prevention from *designing for older adults with cognitive decline (date),* which emphasizes the importance of having user confidence in your system.
3. Accessibility and Inclusivity
    a. The design will be tailored for the cognitive and visual impairments of the intoxicated user through features like simplified navigation paths, or alternative input methods e.g. large touch areas.
4. Trust and Safety
    a. McKay also highlights the importance of trustworthiness in UI design. In this project there will be:
        i. Location sharing with friends
        ii. Easier access to emergency actions
        iii. Designated driver contacts
    b. All of this will help the user feel safe and supported when intoxicated.
5. Customization and Motivation
    a. It is important to motivate users to use the system, McKay believes this is done through customization so that the interface can align exactly with each individual user's needs.
6. Engaging and Familiar Design
    a. Even though the design needs to be simple, it still needs to resonate with the user. If it is pre-built into an IOS then it needs to match previous IOS UI design so that the user's feel familiar with the feature and are more likely to use it.

Why UI is more Affective than an App

The reasons for developing a built in "focus mode" which would be integrated directly into the IOS operating system for this project is due to it being more effective than a third-party app. This is due to reasons including:

- **Seamless integration**: the built-in feature can access all core phone functionalities whereas third-party apps have limited access.
- **Trust and Privacy:** Users already trust IOS and Apple with their data security, therefore a focus mode managed entirely on IOS, would ensure no sensitive data is getting leaked.

- **Reduced User Effort:** Users will be more motivated to use such a feature as it is already built into their phone, instead downloading a third-party app is a lot less likely to stick and user's will eventually end up deleting the app.
- **Performance and Battery:** Native features are developed to work efficiently, whereas third-party apps may drain battery life in the background.
- **Familiarity**: The design on the drunk mode will be more familiar to the user as they have probably used IOS devices before.
- **Distribution and Maintenance:** The system would be easy to distribute in a new IOS update and would be easy to maintain and improve in the future to align with apple's regular IOS updates on smartphones.
- **Accessibility Features:** The focus mode will be able to integrate apple's already existing robust accessibility features e.g. voice control, to make it more inclusive.

Overall, a pre-built "drunk mode" will offer better functionality and integration making the experience more reliable and encouraging users to use the system more than they would have through a third-party app.

Progress So Far

Achievements:

1. Report Progress
2. Carried out a literature review to gain background on already existing systems and research.
3. Conducted a requirements analysis based off my literature review, an online questionnaire.
4. Planned the functional and non-functional requirements and software/hardware requirements.
5. Written a Proposed solution.
6. Completed Flow Chart diagrams, system architecture diagrams, and design pattern diagram to display how the system will be structured.
7. Carried out research into UX concepts that will specifically benefit the target users and what concepts are going to be used in the system.
8. Planned out tasks to come and timeline.

Challenges and Risks

Challenges

<u>Identifying relevant features:</u>

- Ensuring the features included address the most critical struggles for intoxicated users without overwhelming the design.

<u>Balancing simplicity with functionality:</u>

- Making sure that the UI is easy to navigate and easy to use whilst still having all the functionality it requires.

<u>Customization:</u>

- Designing a system that users can customizes without making the set-up process too long or overwhelming.

Technical Constraints:

- Deciding which existing phone system to target the design for (IOS or Android) as the system being designed is aimed to be pre-built into a phone and therefore will have to completely different final products depending on the phone system.

Testing and User Feedback:

- Gathering meaningful feedback that is reliable even though the testing participants will not be intoxicated.

Accessibility:

- Ensuring the interface is inclusive, such as considering the visual and cognitive difficulties that may arise from the users being intoxicated.

Risks

User safety concerns:

- If the system fails or is used incorrectly, it could lead to creating more of a struggle for the user's safety.

Technical Failures:

- Issues with implementing or integrating features like activity logs, app restrictions, or focus mode configurations.

Data Privacy:

- Handling user activity data responsibly, especially the overview of actions taken in drunk mode, to avoid privacy violations.

API Integration Delays:

- Potential delays in API integration e.g. contact syncing, booking a taxi home.

Overcomplication of Features:

- Risk of making the system too complex, leading to low user usage of the system and user confusion.

Plan For Completion

Remaining Tasks

Design Phase:

1. Complete system design diagrams (Database Overview & Use Case Diagram)
2. Create Wireframe Prototypes in Figma
3. User Test the Prototype in Figma before implementation to iterate on design if necessary

Development/Implementation:

1. Set up the development environment (React Native, Expo)
    a. Integrate GitHub for version control
2. Build front end user interface using react native
3. Set up Database (supabase)
4. Create APIs for storing and retrieving data (e.g., user preferences, activity logs).

Core Feature Implementation:

1. Drunk mode activation toggle
2. Customisable settings
3. Drunk mode activated UI
4. Exit Drunk Mode UI
5. Activity Overview

Database and API Integration:

1. Connect the front-end to the back-end APIs and database.
2. Testing to ensure functionality and fix bugs

Testing:

1. Unit testing
2. Usability testing
3. Feature testing

Documentation:

- Complete Project Report
- Develop a user guide to explain how the system works

Final Presentation and Submission:

- Create final presentation slides
- Submit final project

Conclusion

In this interim report, it has emphasized the crucial need to design an accessible, safe, and efficiency user-centered smartphone interface for intoxicated users. Intoxication can lead to impaired cognitive skill, impaired vision, and poor decision – making, leading to problems and safety risks for the user. Research conducted in this interim review and the user survey demonstrates that there is a gap in the market for a smartphone UI design.

The proposed system is a customizable "drunk mode" focus setting on IOS which users can set up the features they want to use beforehand and activate it when drunk. To ensure the phone is easy to use, the report has also highlighted the importance of effective UI design, Everett McKay's research helps to back this up and gave great insights into the types of design concepts that should be addressed. The system would be pre-built into IOS instead of a third-party app as a built-in solution has several advantages over creating a separate app.

This project is being developed to create a functional prototype by also to highlight the gap in the market for a working intoxicated smartphone interface, and overall, the important of UI design for all users, and the states all users are in when using their smartphone.

Description of risk	Impact of Risk	Likelihood Rating	Impact Rating	Preventative Measures
Difficulty implementing core functionalities	Delays in development or incomplete prototype	Medium	High	Use agile development, and consult documentation for guidance
Bugs or glitches in prototype	Reduced usability, making it unable to demonstrate prototype	Medium	High	Perform testing and use version control throughout.
Time management problems	Delay's in meeting my own set deadlines	Medium	High	Use project management tool (Notion) to keep track of each phase and my progress.
Difficulty understanding and applying academic concepts	Misalignment between my research and actual implementation	Low	Medium	Review literature review, seek guidance from supervisor, go to drop-in sessions.
Lack of focus on inclusivity or accessibility	Due to time limitations, can be difficult to ensure interface is inclusive for every single user type, as focus is on intoxicated users.	Low	Medium	Use inclusive design guide that was in the literature review and evaluate with all user types in mind.

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