1 Abstract

The goal of this design project is to create an iPhone application that helps prevent drunk driving and its casualties. The application, called Bye Bye DUI, utilizes a GPS, a sobriety test, and SMS to help prevent the user from getting into a car after becoming intoxicated. Upon entering a bar, the user can set his location as well as the radius of the bar. Using the GPS function on the iPhone, Bye Bye DUI pulls up a sobriety test when the user exits the selected radius. If the user fails the sobriety test, the phone will send a preset text message containing the user’s location (determined automatically using GPS) to a designated contact. Having been informed of the user’s situation and location, the contact can then pick up the user or find an alternative way for the user to avoid driving while intoxicated.

2 Introduction

Ubiquitous in everyday society, smartphones have revolutionized the world. They have radically changed social interaction, communication, and entertainment. However, despite these astounding achievements, smartphones still have unrealized potentials in fields such as health and safety.

Bye Bye DUI is an iPhone application that has the potential to help prevent drunk driving. Additionally, it has the ability to expand further and can be accessed by more users because it is a cross-platform application. The application will run on both the Android and the iPhone. Please see the Android group’s research paper (written by Evan Clements, Zachary Klapwald, and Revan Sopher) for more information on the Android aspect of the application. While the iPhone and Android versions of the application have some differences due to platform design issues, the core functionality of both applications is the same.

Drunk driving is one of several preventable causes of death. In 2009, over 33,000 people died in traffic accidents in the U.S. An estimated 11,000 of those people died as a result of alcohol-impaired driving [1]. Car accidents are the leading cause of death for teens, and one out of three of those accidents is related to alcohol [2].

Most people are well aware of the dangers of drinking and driving. However, alcohol impairs judgment, causing people to make choices they would not have made had they been sober. Thus, some people might go to a bar fully intending to avoid driving afterwards, but ultimately end up driving in an incapacitated state. Bye Bye DUI is
targeted towards people who wish to ensure that they will not drink and drive after going to a location that serves alcohol.

3 Background

3.1 iOS/iPhone

Since its arrival in 2007, the iPhone has transformed the world of mobile technology. From touchscreen interfaces to multitasking capabilities, it truly is a revolutionary gadget. Although many companies have mimicked Apple, the iPhone consistently ranks at the top of the list of the world’s best-selling smartphones [3].

Certain aspects of the iPhone’s prowess were utilized to create the application. The designs were formulated specifically for iOS 4.0 and later versions (primarily the iPhone 4) because of certain GPS capabilities. In addition to the GPS, the texting service and the extremely sensitive touchscreen on the iPhone were utilized.

3.2 Objective-C and Xcode

The key to programming any application, regardless of the platform, is the programming language. Since Bye Bye DUI is designed for the iPhone, Objective-C is used. Objective-C is an object-oriented programming language that forms the basis of many iPhone applications. The Xcode software for Mac, along with the iOS simulator, makes programming and debugging iPhone applications much more straightforward [4]. Interface Builder, a software development application for iOS, was used in conjunction with Xcode to design the graphical user interface (GUI).

3.3 Driving Under the Influence of Alcohol

Driving with a Blood Alcohol Concentration (BAC) level of 0.08 or higher is illegal in all U.S. states, and for good reason – alcohol impairs mental and physical functions, greatly increasing the chances of being involved in an accident [5]. Studies show that drinking can increase one's reaction time by 15-25%. Furthermore, there is a significant impairment in coordination, comprehension, concentration and vision [6]. The dangers of drinking and driving are reflected in the law since driving under the influence of alcohol can result in heavy fines, license suspensions and even jail time.

4 Design

4.1 Sobriety Test

In order to create a sobriety test, alcohol’s effect on human functionality must first be considered. Alcohol impairs vision, coordination, and reaction time [7]; therefore, the sobriety test analyzes these factors in order to determine if a user is sober or drunk. A button on the screen randomly flashes yellow several times, and the user must be able to press the flashing button quickly enough each of the ten times to be deemed as sober. The average of his times must not exceed his calibrated time by more than fifteen percent, which is the amount human reaction time increases when intoxicated [6].
4.2 Calibration

In order to effectively use the application, the user must first calibrate the test in the Setup. The user must calibrate the application while sober. The results of how well he can perform the test are stored so that when he is prompted to take the test later on, he must be able to perform the test with similar accuracy. If the user’s performance declines by more than fifteen percent of his calibrated performance, a preset text message will be sent to a designated contact, warning that the user is drunk.

4.3 GPS

The GPS is a major part of the application. The GPS is used to determine the coordinate location (latitude and longitude) of the user, set a radius around that location, and extract an address to send to a friend in a text message. Once the user presses the “Set Location” button, the phone starts up the GPS and sets the current location as the center of a circle. The user is then able to select the radius of that circle based on the size of the bar or house where he will be drinking. If the GPS detects that the phone has left that circle, indicating that the user is about to leave, the application will alert the user that he needs to perform a sobriety test.

Because continuously running the GPS in the background immensely drains the battery life [10], the alternate option is a region monitoring GPS that consumes less power. It checks the location every ten minutes. This saves the phone’s power, but does not allow the application to know where the user is at all times.
4.4 Short Message Service (SMS)

An integral part of the application involves automatically sending a text message to a designated contact. Essentially, failing the sobriety test causes the phone to send a message that informs the designated contact of the user’s GPS location.

The user can choose whether or not to send a text message upon failing the sobriety test. Thus, the user can use the application to determine whether he is drunk and seek his own alternative methods of transportation. While this usage of the Bye Bye DUI application does not take advantage of the application’s full capabilities, this option was implemented to allow more flexibility for the user.

If the user wishes to send a text message to a contact upon failing the sobriety test, he can set the phone number and type in the desired message beforehand. The user can save a number and message so that he does not have to retype them if he reuses the application.

4.5 User Interface

The majority of the application runs in the background. User input is limited to setup, calibration, initiating the application, and performing the sobriety test. Essentially, the application is designed so that even an intoxicated person can use it.

The goal of the graphical user interface is to create an application that is easy to use and has the functionality to successfully aid in the prevention of drunk driving. It allows the user to setup the application and calibrate the sobriety test. To set the location, the user only needs to press two buttons. The application is made to be as user-friendly as possible while still performing the task to the best of the phone’s ability.
5 Results and Discussion

The application was successfully deployed onto an iPhone. The sobriety test and SMS features work properly on the iOS Simulator and device; however, the GPS feature is not fully complete. The GPS is able to set a location, but it is not able to register when the user leaves the selected radius. Implementing this feature was much more challenging than predicted and time constraints made it challenging to code the task.

Additionally, the design of the iPhone’s text messaging system puts constraints on the application. To prevent spamming, iPhones are designed to only send text messages with the user’s approval. This design prevents applications from automatically sending messages. Due to this constraint, users must press an “OK” button before Bye Bye DUI sends a text message to a designated contact.

Also, several problems with integration were encountered. Assembling the screens together proved to be a tough task because of time constraints and coding complications. Testing the application on a device proved to be an even greater obstacle because of the problems with obtaining the necessary certification. For the future, it would be wise to set aside more time to complete these tasks.

Lastly, some aspects of the application could not be completely implemented across platforms. A “Menu” and a “Back” button were needed on the iPhone version, but not on the Android version since Androids have these buttons built into the phone. Also, the iPhone’s standard guidelines put design constraints on the application design.

6 Conclusion

The application is only a few steps from being finalized and publishable; however, before embarking on such a task, fixing the GPS functionality is necessary. Rather than using a power saving GPS that checks the location approximately every 10 minutes, it would be more effective to use a GPS that continually runs in the background and checks the user’s location at all times. This would let the application immediately prompt the sobriety test when the user has left the bar radius. Additionally, this change would most likely let the GPS register the new location.

This application has the potential to reduce accidents and drunk driving. Because this application was collaborated on and created with another team who developed it as an application for Android phones, Bye Bye DUI is a cross-platform application and therefore is available for more people to use.

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8 References


