My Guardian: A Personal Safety Mobile Application

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***Abstract*—Smartphones have become somewhat essential and most people have one on hand at all times. Smartphones have been considered a blessing as it has many capabilities and is not just limited to calling and text messaging unlike the regular mobile phone. It can be utilised by converting it into an emergency safety device that can be used when users are placed in a potentially unsafe and dangerous situation. It will ease the process of getting help by allowing users to quickly notify people of an emergency situation with a press of a button. My Guardian, a personal safety application developed for smartphones, intends to help allow users to notify a set of predefined contacts when they feel they are in an unsafe situation or is simply nervous about travelling alone. With a press of a button, the application will send a text message to these contacts with their location coordinates and a personalized emergency alert message.**

Keywords—safety, mobile application, alarm

I. INTRODUCTION

The occurrence of street crimes is mostly unpredictable and can happen to anyone in a blink of an eye. When a person is alone and has fallen victim to assault, robbery or kidnapping and may be too wounded to move or has gone missing, it is usually only after a significant amount of time that their close contacts realize something is amiss and it might only be awhile before they decide it is serious enough to act on it.

A few examples of this could be snatch-theft, smash-and-grab incidents, physical or sexual assault, bump-and-rob cases involving vehicles and robberies that are visible to the public [1]. These crimes can range from petty crimes to violent crimes like kidnapping or even major assault as offenders grow increasingly brave and creative. Often times, these crimes are committed under the influence of alcohol or drugs. Although it is quite risky for crimes to be committed in a public area due to the many potential witnesses, it may also be easier for the offender to hide by dissolving into the crowd [2].

According to the Malaysian Police, despite their overwhelming efforts to reduce the occurrences of these street crimes, the public still has insecurities and often perceive that the crime rate is still high. People still remain fearful due to unpleasant crime experiences or through the spread of crime news through media coverage, especially social media. It is not an easy task to find a measure to prevent or decrease the percentages of urban crimes.

The concerns from Government to reduce crime are shown through National Key Results Area (NKRA) when it has been selected as one of the six. A Crime Lab was established in 2009 by the Malaysian government bringing together agencies from across the criminal justice system and from wider government such as Ministry of Home Affairs, The People's Volunteer Corps (Jabatan Sukarelawan Malaysia, RELA), Royal Malaysia Police (PDRM), Attorney General Chambers, Federal Courts, National Anti-Drug Agency etc [3].

In Malaysia, petty crimes are quite common while violent crimes can be considered less common, however the threat is still there. The most common targets of snatch-theft are women with children but there are also cases where men walking alone have been targets. Smash-and-grab thieves often target lone drivers on the road. This usually happens when a pair of thieves on a motorcycle identify a potential lone victim with visible valuables and smashes their window to grab the valuables and speed off [4]. There have also been cases where a woman walking alone are targeted and taken hostage in kidnappings. Just recently in June 2018, a Grab driver was murdered a parking lot in Kuala Lumpur and one of the items found in his possession is a mobile phone [5].

The existence of mobile phones has no doubt made life easier. Smartphones especially, have given us the internet and so many capabilities that are made possible with mobile applications at our fingertips. Some of the closest examples available on the market are Watch Over Me, bSafe, and Red Panic Button which will be discussed later.

There are a few ways an individual can use their mobile phones to fight crimes [6] :

i. Crime Reporting – Mobile Phones allow crimes to be reported to authorities as they happening and help quicken the response.

ii. Evidence Gathering – Most phones are now equipped with cameras, making it easier for people to capture graphical evidence of crime scenes or criminals.

iii. Evidence Tracking – In some cases, mobile phones can be evidences to crimes. If a phone has been

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stolen, tracking technology has allowed easy tracking of the perpetrators.

Derived from the usefulness of mobile applications for safety, we propose a mobile application that acts as an emergency safety device. The application intends to help users to notify a set of predefined contacts when they feel they are in an unsafe situation or is simply nervous about travelling alone. With a press of a button, the application will send a text message to these contacts with their location coordinates and a personalized emergency alert message.

The paper is organized as follows. In Section II presents the related works. Section III presents the method that was chosen for this project and section IV presents the proposed mobile application. Finally, conclusions and future works are given in Section V.

II. Related Works

In this section, the review of the similar mobile applications developed by others are discussed. Many mobile applications for personal safety is available in the market such as Watch Over Me [7], [8], bSafe [9], [10], and Red Panic Button [11] which will be discussed next. The review discussed will be based on emergency contacts notification, sharing of current location, fake call detection, and personal alarm button features.

A. Mobile Application I: Watch Over Me

Watch Over Me is a company co-founded by Xin-Ci Chin who had escaped a high-profile kidnap and rape attempt in 2012. Their mobile app 'Watch Over Me' is a tracking-service that allows users to set how long they want to be watched over. The app is available on both iOS and android platforms.

Some of the main features of Watch Over Me mobile application are tracking of user, "I'm safe" button that works in such a way that if it is not pressed in the given amount of time, close contacts will be notified, allowing user to share details on their whereabouts; like pictures and notes, a shake of the phone that activates the emergency tool setting and sends an alert to contact.

One of the advantages of Watch Over Me is that the user can select an activity like "jogging" and set an estimated duration for the activity [7]. This application also alerts their user when entering a high crime area so that users can be more alert of their surroundings [8]. This is done by crowdsourcing.

The disadvantages of this application are that the free version only allows tracking of user up to twenty minutes, alerts up to only one close contact, and no video recording function.

B. Mobile Application II: bSafe

bSafe is another personal safety app packed with features for both everyday use and emergencies. It is only available on Android but is completely free to use. It claims to be able to help in all situations.

The main features of bSafe are its ability to set up a social safety network of friends and family, user to share location with the above-mentioned network, a timer mode that triggers an automatic alarm if user has not checked in, "I'm here" feature to tell selected people exact location, and a Fake Call function to make phone ring whenever you want it to [9].

The main advantage of bSafe is that users are able to choose whether to set the alarm sound as an alert on their phone or if they want to notify their contacts in silent. Users can also set the gap time from when they pushed the alert button to when the alarm is triggered and to also set if video recording is to be initiated when triggered.

The downside of bSafe on the other hand would be the information collected by the application such as name, email, phone number, and contact phone numbers. The user also needs to be fully aware that all friends connected in the user's network will be notified when user trigger the alarm and that they can all receive the live location of user which sometimes can be sensitive [10].

C. Mobile Application III: Red Panic Button

The Red Panic Button mobile application is a universal application available on both Android and IOS. Its main features are being able to send your location to a couple of emergency contacts any time you press the red panic button via a Google Maps link.

Some features of Red Panic Button include sending panic Short Message Service (SMS) with user's current location and address in the form of a Google Maps link, automatically sends panic email to contacts, tweet to user's entire list of friends and followers on twitter, emergency number feature as well as a widget feature that can be installed on both Android and iOS devices.

User has the advantage of adding an unlimited number of contacts to their emergency contact list with the premium version of this application. User can also record a short video using their device and automatically [11].

The disadvantage of Red Panic Button is that it can only customise the body of the email panic message. It would be more useful to be able to customise the SMS instead as that is a more rapid message compared to the email which has the tendency of not being checked at all.

Table 1 shows the features comparison of the existing mobile applications for safety. Based on the comparison features, our proposed mobile application able to notify emergency contacts, share current location and alarm button. Additionally, the user will be able to customize the SOS message.

TABLE I. Features Comparison between Three Similar Mobile Applications and My Guardian

Mobile Application	Features			
	Notify emergency contacts	Share current location	Alarm button	Personalized SOS message
Watch Over Me	√	√	X	X
bSafe	√	√	√	X
Red Panic Button	√	√	√	X
My Guardian	√	√	√	√

III. METHOD

A questionnaire was conducted and distributed online. It reached a total of 61 random respondents as My Guardian is not restricted to any group of people; as long as they are using smart mobile phone. A large percentage of the respondents (78.7%) consisted of people aged between 16 and 25 years old, while 19.7% were between the age of 26 and 54 years old. Only 1.6% of respondents were 55 years and older. 63.9% agreed that they would definitely notify someone when they feel potentially in an unsafe situation, and 71% from those would notify their family members.

The most suitable methodology for the development of this mobile application is the agile method. The software is developed in increments with the customer specifying the requirements to be included in each increment [12], therefore, agile methodology leaves more room for changes and is very flexible and focused on simplicity [12] as opposed to traditional methods. Although every project is bound to have risks, implementing this methodology will significantly reduce the overall risk due to its frequent delivery and inspection. If a new requirement or a scope change emerges, the agile methodology will accommodate it through diligent prioritization. As there are definitely bound to be changes and upgrades in functionality over the course of developing this mobile application, agile would be the perfect methodology to use.

For this project, we have chosen Android Studio to develop the mobile application; My Guardian. Although there are plenty of Integrated Development Environments (IDE) freely available on the market, it is incredibly important to pick the right software by taking several factors into account and not just using the first one you come across. Some of the factors considered when choosing the software is the reliability of the performance, if it supports wide ranges of languages and framework and the ease of use.

The sole purpose of Android Studio is to develop Android based mobile applications and make the whole process much more simple and straightforward. Android Studio has low system needs and is quite reliable in terms of performance speed [13]. Besides that, Android Studio provides template-based wizards for creating common designs and components. It also includes gradle-based build support and has a large set of analytical tools [14].

IV. MY GUARDIAN AS A PERSONAL COMPANION

My Guardian is a mobile application aimed at personal safety that can be used as an emergency device when users are in a dangerous, unwarranted situation. That being said, the mobile application has to be accessible at any given time or place. Fig. 1 shows the use case diagram of My Guardian.

Upon registration, users will be required to key in their basic information. This includes their mobile number, email address, and name that can be used by users to identify known friends and add them as a friend on the mobile application.

The application will require the user's data and location services to be turned on for its functions to fully work. When both these services have been turned on, the user will be able to view their current location on the map.

Users can also create a list of close contacts which can consist of anyone but has a limit of four contacts. When users are in actual danger, the mobile application has an SOS button that will automatically send a text message to every person on user's close contacts list. This text message will contain the user's location and a personalized or default SOS message. This is one of the best features of My Guardian; to personalize the SOS message.

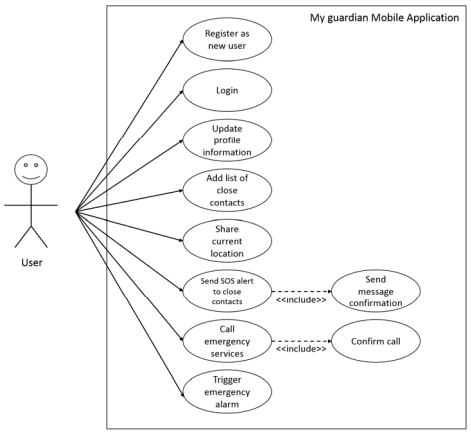

Fig. 1. Use Case Diagram of My Guardian

The mobile application also includes an alarm button that will trigger a loud ringing sound that serves as an alert to user's surroundings that they are in danger and in need of immediate help. Apart from emergencies, users are also able to check in with friends or family when travelling alone by sharing their current location using the app to any other method of communication that exists on user's mobile phone. Users are given the flexibility of choosing the destination app available on their phone.

Once users have been successfully logged in or registered, you will be redirected to this main page where the main function lies. Users will be able to do the following:

A. View exact location on the map

When the user allowed permission for the application to access the location and turned on the GPS, the user will be able to view their exact current location on the map as shown in Fig. 2 automatically. This function is important to capture your current location to send to contacts in an emergency.

B. Trigger alarm button

When the user taps on the alarm switch at the bottom of the main page as shown in Fig. 3. A loud, continuous ringing will emit from your phone that is used to alert your surroundings and capture their attention if you feel unsafe. This can be very useful in a crowded environment where crime happens right in broad daylight. Recalling back the case in December 2017, a student was allegedly sexually assaulted on a Light Rail Transit (LRT) train in Kuala Lumpur [15]. In situation like this, a loud alarm would draw attention to the assaulted victim and help could have been given to her right away.

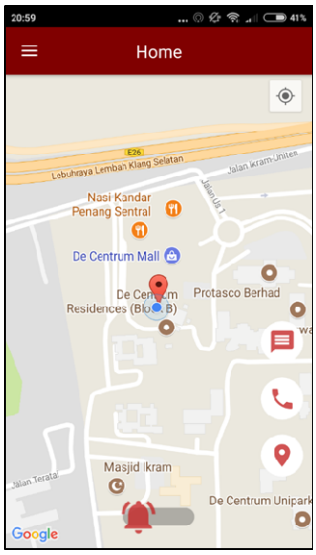

Fig. 2. View location on the map

Fig. 3. Alarm button

C. *Personalized 4 close contacts*

User can add up to four close contacts or emergency contacts as depicts in Fig. 4. These contacts are the ones that the emergency text message will be sent to when the button is pressed and confirmed. User can also update their emergency contacts if any changes are necessary. This will give flexibility to the user to set up their own personal security network of friends and family (guardians). All emergency contacts will be alerted with SOS message in the event of emergency.

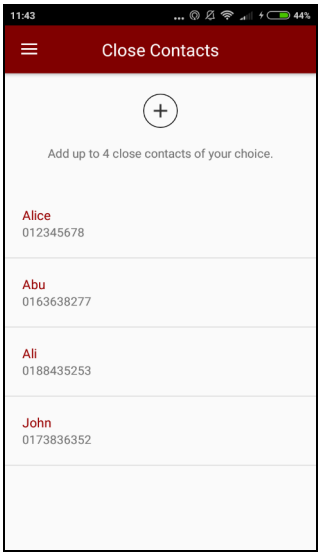

Fig. 4. Update Close Contacts

D. *Personalized emergency text message*

In a real crisis, it is important to notify someone comes to rescue. In Fig. 5, user will be able to setup their own personalized emergency text message. Once "message" button is pressed, all emergency contacts will received SOS messages containing the personalized emergency message and a google maps link to the current location that was captured upon application launch.

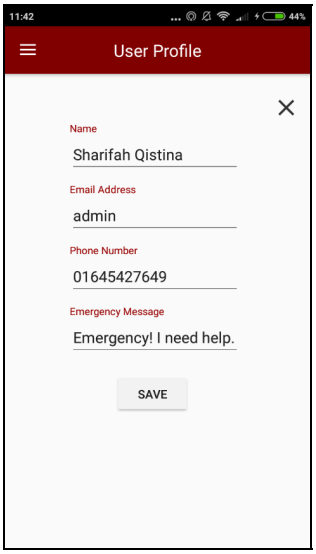

Fig. 5. Update user profile

E. *Call emergency services*

If the user is in danger and require the help of emergency services such as police, this function will allow the user to quickly call emergency services with a tap of the button as depicted in Fig. 6.

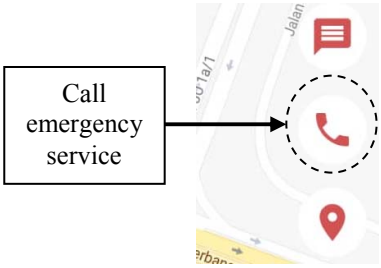

Fig. 6. Share Current Location

F. *Share current location*

When travelling alone and no one is aware of our current location, it is good practice to let family or friends know where we are. This function allows user to quickly do so. Fig. 7 shows the location check-in can be sent to anyone through different applications available on the phone.

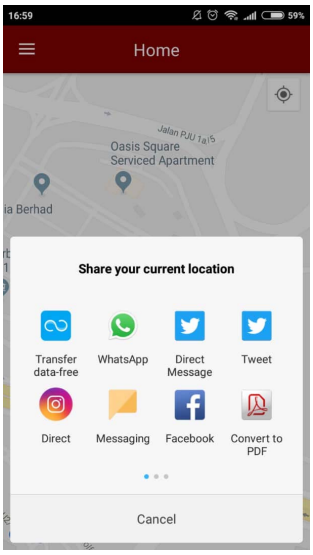

Fig. 7. Share Current Location

V. Conclusion and Future Works

After the first iteration of development done, My Guardian mobile application is able to allow registration of new users and successfully insert the information given by users into the database. It can then allow users to log in by checking if the set of email and password given as input already exist in the system. User's information can be displayed in the user profile just for reference and can be edited when need be.

Users are able to add up to four close contacts of their choice. Then, users can update their added contact's information or delete the contact altogether. The application will display the close contact information correctly according to any changes made. On the main page, users can view their current location on the map. After successfully adding close contacts, users are able to send them an emergency text message along with their personalized message and location if needed. Besides that, users can trigger the loud alarm ring and share their current location with friends to any other mobile application on user's phone.

Most of the functions of My Guardian are up and running. In future, we plan to program, manipulate, and use the existing side buttons of smart mobile phones to trigger the personal alarm and also to make emergency calls to the authority when clicked. Further research are still on-going in exploring the possibilities of doing so.

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