

SAVE ME EMERGENCY DETECTION IN MOBILE APPLICATION FOR TEENAGERS

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Abstract: The smartphone comes with many advanced features such as Wi-Fi, Global Positioning System (GPS) navigation, high-resolution cameras, and a touchscreen with broadband access that help users stay connected worldwide. This study focused on the development of a system framework for mobile application in emergency services that triggered fall detection. The mobile application is named Save Me! Application (app), where it can provide a simple medium to provide safety awareness to public people, especially among teenagers. The app can pinpoint the victim's exact location when the device triggers fall detection. Subsequently, the message can be distributed to relatives, parents, or friends who have been pre-registered in the app to help the victim. The app also offers additional protection to parents or families who are busy working so that they can keep track of their children.

Keywords: Fall detection; Mobile app; Device triggers; Safety awareness.

1. Introduction

Over the years, tracking systems have been developed for various tracking purposes, especially for vehicle detecting and tracing maps (Shen et al., 2019). Tracking the mobility of a person has become a significant problem these days, whether it is tracking a criminal coming on payroll or a cost-effective device that can be used to track people using a cell phone fitted with a Global Positioning System (GPS) and General Packet Radio Service (GPRS) instead of using a handheld GPS receiver (Abbate et al., 2012).

Crime case increases when people are most likely staying alone. This type of person is vulnerable to attempts to rob them, threaten them, abduct them, and disrupt them (Mao et al., 2017). If someone is alone, they cannot get assistance from anyone. Therefore, technology would play a significant role in this scenario in seeking help from friends or relatives by pressing a panic key on a smartphone. To date, smartphones are functionally as intense as supercomputers in the 1990s. More importantly, nowadays, a vast number of people afford to have a smartphone (Kim, 2020).

Smartphones are equipped with many essential tools, such as a compass, a gyroscope navigation system, cameras, key indicators, GPS, and communication capabilities (Sikder et al., 2020). In ancient times, people would require bags to hold the communication device. In comparison, nowadays smartphone is tiny but have the functions to do everything needed in daily life. Making advantages from these technologies, we can promptly provide some protection for those who are alone and seek help by just pressing a button on their smartphones (Ana et al., 2020).

Android is the standard operating system (OS) available globally with the dominance of 80% of the global market with much fast-growing development. The application development is faster than any other platform. The Android OS platform follows the Object-Oriented Programming (OOP) principle, an autonomous platform that suits multiple tools available in the market (Azman et al., 2019). This platform allows the user to fully use all the hardware resources and produce the best result, while on other systems, hardware cannot be used without the owner (Doria et al., 2020).

The main feature of the proposed application in this study is slightly different from other applications developed initially. Specifically, users would need to enter trusted contacts that are more than three contacts. When the user clicks on a specific button on the smartphone, the emergency contacts receive an alert message with the victim's location. At the same time, recorded voice/video and images will be transferred and received by the contacts. Overall, this study aims to develop a robust platform adequately for teenagers and children to alert them in our society to contact trustworthy people automatically for assistance during a trouble situation.

2. Literature Review

The world is constantly bombarded and alarmed with various personal safety cases every day. Some of the most common issues are snatch/theft cases and road accidents. In Malaysia, as

reported by the Department of Statistics Official portal, street crime mainly covers three types of index crimes: snatch, robbery with and without a gun. The index crimes ratio of 100,000 people in Malaysia is as high as 273.8. On average, there are approximately 35,000 street crimes being reported every year, which is accounted for around 17% of the total crime index reported (Abdullah et al., 2019).

Other than that, the total number of road accidents in 2018 was the highest, where it recorded the number of 548,598 cases. These cases worsen the safety situation when it involves loss of life. According to the statistics published by the Ministry of Transport Malaysia (MOT), in 2018, 6284 people were killed due to road accidents. Dealing with this current situation, an initiative must be taken to help address such issues (Ghosh et al., 2018). One of the best initiatives is to have a system or use of cutting-edge technologies such as a mobile app to assist or raise awareness of teenagers' issues of self-sufficiency (Ishak & Bani, 2019).

Based on statistics in 2019 as shown in **Figure 1**, 4,660 cases involved criminal cases were reported, in addition to 10,271 robbed cases and 1,900 other cases involving violence. Other than that, the index crimes ratio of 100,000 people in Malaysia is 273.8. This number means that there are 35,000 street crimes reported every year, which is around 17% of the total crime index reported.

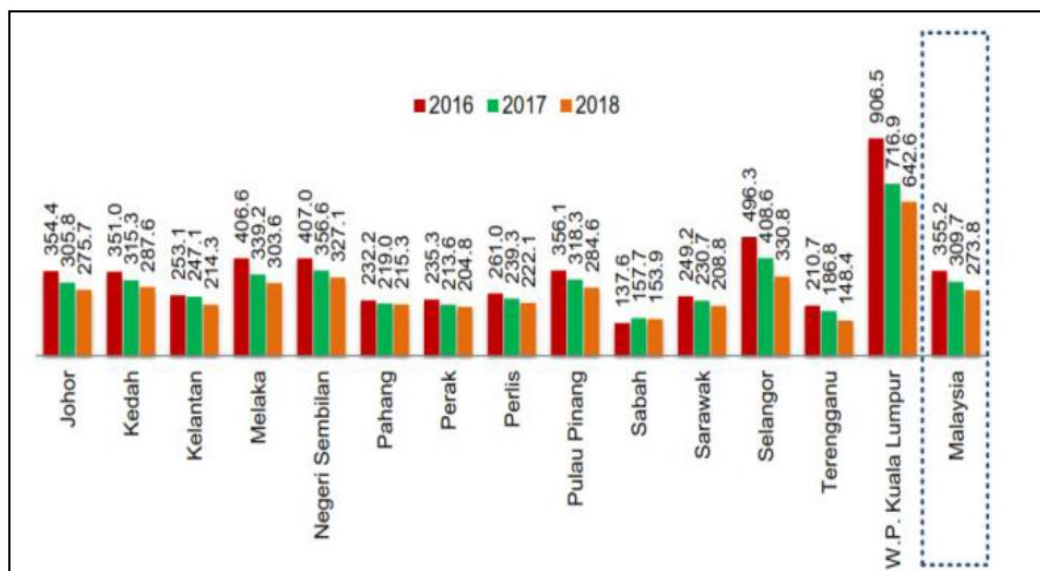


Figure 1. Malaysia crime ratio at national and state level based on data from 2016-2018

Fall Safety Pro is a mobile application purposely designed by Tidyware, LLC for fall detection. This app targets individuals who are working at a professional level and in the business industry. The main features of this mobile app are fall detection and the ability to send a message to seek help. However, it has a shortcoming: it does not have the exact function to send alert messages to the emergency contact automatically. More importantly, the multiple emergency contacts are only available for the paid version, which is not suitable for people who cannot afford to pay for the upgraded version.

Another application, known as Fall Detection – Fall Alert Saves Lives, is a mobile application designed by Medigap. This application works when a device fall occurs, and it has supported multiple contacts for sending an alert message. However, the alert message only supports plain text that does not display the victim's location, adding challenges to locate the victim location and arrange for rescue.

MyNotify application, created by Johnny Ross and owned by Madhab, is supported under Android OS. The primary purpose of this application is for diet routine monitoring. The main feature of this mobile app is emergency chat through email and monitoring of diet routines such as workout lists, exercise diary, and walking step counters. Therefore, this application is not specialised to address safety concerns or give awareness to users when they are facing a dangerous situation.

Last but not least, I-Safe is an Android mobile-based women protection app functions to know if a woman is safe. The application provides a woman's location at risk by providing fake phone calls, video transmission, location, and first-aid information, but this application cannot generate log reports and only supports less than three emergency contacts.

3. Proposed Solution

The proposed solution is to update existing mobile applications based on the limitations reviewed in the previous section. New and updated applications would be beneficial and more accessible to users. The comparison of features and the proposed solution is summarised as shown in **Table 1**. The proposed application has been named Save Me! App and this application is intended to be used for Android users.

Table 1. Features comparison for three existing system

Features	Fall Safety Pro	Fall Detection	MyNotifi	Proposed
Login/Logout	Yes	No	Yes	Yes.
Fall Detector	Yes	No	Yes	Yes
Multiple Emergency Contacts	No	No	No	Yes. Up to three emergency contacts
Pause Protection	Yes	Yes	No	Yes
Send alert location	No	No	No	Yes
Communication Application	SMS	SMS	SMS	WhatsApp
Recorder	No	No	No	Yes
Triggered log	No	No	No	Yes
Subscription Fees	Charges	Charges	No	No.

3.1. Proposed Application Framework

Save Me! application will be developed for Android users that can trigger fall detection, give notifications to trusted people, send an alert message through Telegram messenger with their location, take pictures, record video/audio, and produce logs of history that have been triggered.

This application uses GPS to identify the victim's location in trouble, uses a camera to take pictures, and uses a mic to record video and audio. The system can be divided into five modules; namely, user, read user's data, fall detection, notify emergency contact and report, as illustrated in **Figure 2**.

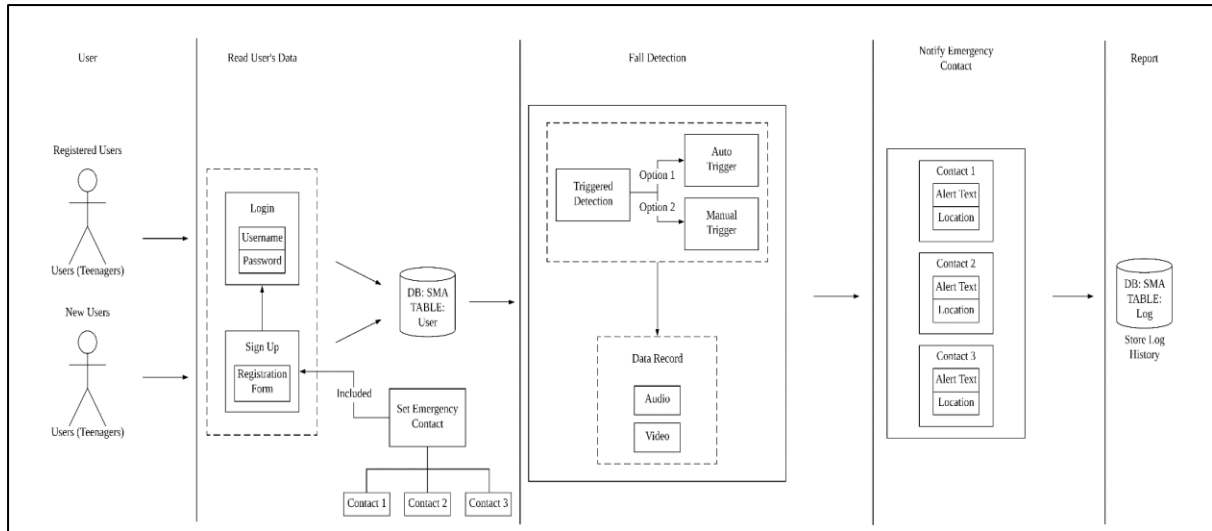


Figure 2. Proposed application framework for Save Me! App

The first module is the user for the authentication process. The screen will show a signup form for the first-time user and a login form for existing users. For the second module, the system will read the user’s data, and in this module, the user needs to set up the emergency contacts. In this module, users can set up user’s accounts for efficiently managing the account details.

The third module is to trigger fall detection to be implemented on the device, which would activate the emergency alert in the app and record the situation in video and audio. Then, the fourth module sends a notification to the emergency contacts. This happens when the app has triggered the dangerous situation through Telegram messenger and report the victim’s current location. The fifth module displays the logs report that has been triggered.

The following is an algorithm shown in **Figure 3** that has been identified to use during the development process:

```

BEGIN
  READ Data
  IF Existing User
    READ User's email and password
    CHECK user's credential
    DISPLAY Home Screen
  ELSE
    READ User's details
    READ Emergency contact
    DISPLAY Home Screen
  READ Triggered detection
  RECORD Audio and Video
  SEND Alert Text and Location
  DISPLAY Log History
STOP

```

Figure 3. Algorithm for fall detection app

3.2. Proposed Functional Requirements

The purpose of this application is to ensure the safety of the user. Additionally, the app also functions to notify family or emergency contacts if something bad happens. Therefore, this application is suitable to be used by teenagers and parents who work and do not have time to observe their children. It will immediately alert the nearest contact(s) along with the location of the victim. In addition, the app is automatically triggered when there is danger and starts video recording and blasts it to the emergency contacts for immediate action.

The immediate main intention for developing this application is to ensure the safeness of users. To create an android-based mobile application, the station and the surrounding area must be examined, and the unsafe and suspicious activities must be reported to the system by the user. If the system detects a problem, another mechanism can give attention to report to the authority. The following lists are the main functional requirements:

a. Fall detection

The app needs to have the feature of linking the app with the accelerometer sensor on the user's smartphone for fall detection.

b. Triggered features

The app needs to be automatically triggered when a fall has been detected. The app has to help the user in a challenging situation where the user does not have much time to open the app and click on some panic buttons.

c. Alert Message/Notification

The app needs to send an alert message to the emergency contacts. After receiving the service, they will get in touch with the victim, and there is no time to make a call or SMS.

d. Record video and audio

The app needs to record audio for further investigation and create an alert call and message to the pre-set contacts with the instant location.

e. Display logs history

The app needs to have a log history where each time the app is triggered, the data and details will be recorded and stored in the database

3.3. Proposed Screens

The following subsections show the proposed interface of the application.

3.3.1. Home Screen with Drawer Menu

Figure 4 shows the main screen of the application once the user has installed it on their device.

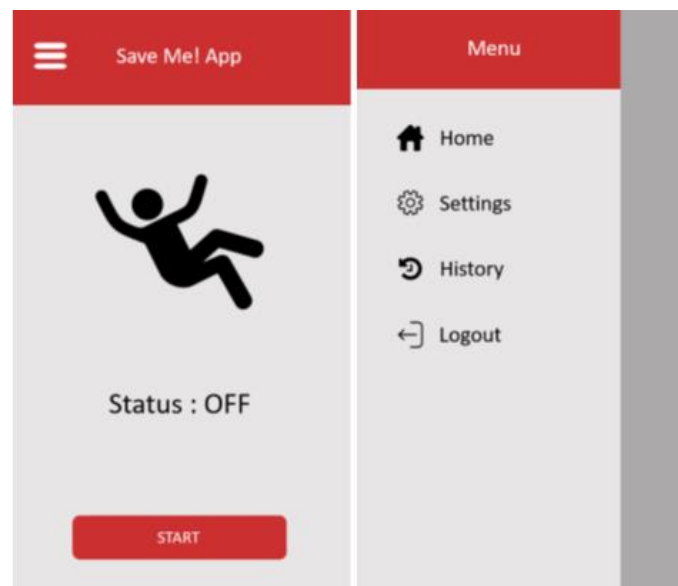


Figure 4. Proposed screen for splash screen

3.3.2. Emergency Contacts

Users can add up to three close contacts or emergency contacts, as shown in **Figure 5**. Also, the app gives flexibility to users to update their emergency contacts. In addition, it gives flexibility to users to manage the security network of their friends and family (i.e. guardians). All emergency contacts will be notified via WhatsApp in case of an emergency.



Figure 5. Proposed screen for emergency contacts list

3.3.3. Log History Screen

The proposed application will be provided with a history log report to easily users and guardians tracing the location was visited, as shown in **Figure 6**.

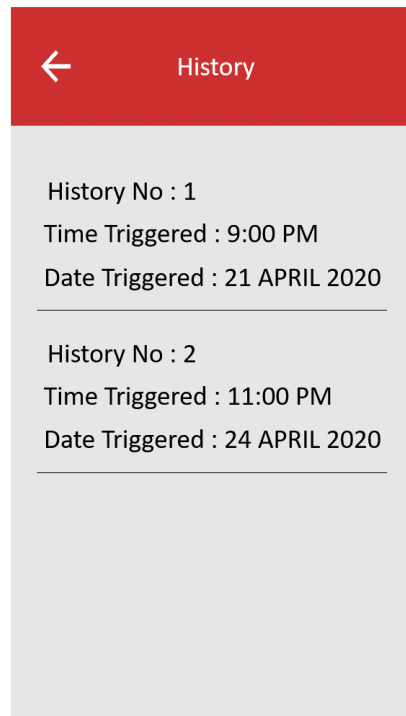


Figure 6. Proposed screen for logs history

4. Discussion

In the current market, many mobile-based applications have a similar feature to the Save Me! application. However, in most state art applications, the victim's location is sent only once to registered contacts in SMS, EMAIL, or MMS. The main problem is that most of these apps are packed with very few features, and these features do not even work correctly or are not fully relevant to the emergency situation.

Based on the reviews on previous applications, those readily available mobile applications in the market depends on the panic button provided on the application homepage. However, the app uses the Emergency button function in the form of a complicated key trigger, indicating that the user must press the power button several times before the app can be triggered and do what it intended to do. This limitation makes it difficult for users to do so if they are in a very emergency or injured situation. Therefore, the proposed application in this study will address the issue by performing an automatic function after the system triggers that the user is in an emergency situation.

5. Conclusion

The safety problem is on an increasing trend in this setting. Hence, this study proposed a practical Android application to avoid criminal or natural disasters by alerting the relevant authorities concerned, which helps stop this type of illegal activity and track the concern. This study will be based on the Emergency Tracking Framework using Google's Android Mobile platform and framework. The emergency would be identified by the Android mobile app concerning criminals, accidents, and personal protection.

Similarly, accident-based emergency scenarios and personal safety can be integrated, and alert messages containing GPS location information can be sent to the corresponding emergency contact through the Telegram messenger. Technologically, Android technology is proven to be a versatile operating system that would allow us to exploit the numerous built-in features of Android mobile app for developing an intelligent app such as Save Me! App.

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