

GUARDIA- A One Stop Safety Solution

Shilpa Khedkar*, Kiran Chandrasekaran^{#1}, Tauseef Malik^{#2}, Manish Poduval^{#3}

*Asst. Professor, #B.Engg Students

Department Of Computer Engineering

Modern Education Society's College of Engineering, Savitribai Phule Pune University,
Puene, Maharashtra, India-411007

Abstract— Safety is one the primal needs of a human, be it children, men, women or senior citizens. A sense of security is usually achieved when family members are reachable at all times. According a recent survey, the percentage of women safety apps have increased by 10-15%, but the effectiveness of these apps are usually evaluated by the accuracy of the location, affordability and reliability. After extensive study and comparison of the current market apps' features, affordability and reliability, we have developed a system that encompasses a wearable device, and an Android app. The wearable device eradicates the need to carry phone in the hand at all times. It also consists of a button, which when pressed consecutively sends out an SOS to the chosen guardians. The App in contrast to the other apps can be used either with the device or as a stand-alone app. This system has been designed to not only use the internet services but also the carrier services to provide increased flexibility and reliability. The addition of street address in the SOS, automatic voice recording and use of social media increase the chances of getting saved by 10%. This system has been developed mainly to cater to the needs of people of all age groups and is aimed at providing enhanced safety along with increased affordability, efficiency and reliability.

Keywords- BLE, Mobile Computing, Safety Devices, Wearable Devices, Android.

I. INTRODUCTION

The rising developments in affordable technology have made smartphones available to every person. Based on recent studies it has been seen that around 70 % of the world population owns a smartphone of some kind. In such a scenario it is important that safety be made available to everyone at the touch of a button. There has been a steady increase in the number of safety apps in the market to cater to the safety needs of the people. Although the number of safety apps are increasing each one provides a different feature to make one feel safe. This has been our main motivation to provide a unified safety solution that makes one feel secure and reduces the need to download and use multiple apps, some of which track the movements of the user continuously, breaching the privacy of the user. After extensive study of all the current trending safety apps and devices, we came up with a system that includes the best of both, a wearable device and an Android app. The comparison of other such devices

and GUARDIA can be seen and understood from the table below.

TABLE I. COMPARISON OF FEATURES

Feature	Devices			
	Spot 'N' Save	Athena	Artemis	GUARDIA
GPS	√	√	√	√
Audio Recorder			√	√
WhatsApp				√
Reverse Geocoder				√

The system consists of a wearable device and an app which is small in size and can easily be worn or carried around without arousing any suspicion. The app has been developed to work as a stand-alone app as well as in synchronization with the device. It has been designed in a way such that, whenever the button on the device is pressed consecutively a connection is established with the app and the SOS is sent. Once the SOS has been sent successfully, automatic voice recording starts, and is stored in the phone's internal memory. Also, as social media is being used by every 7 out of 10 people, we have incorporated sharing the location on WhatsApp to provide increased reachability. The system has been designed keeping in mind the need for providing safety to a person even if he/she cannot reach their phone on time to send a distress message. In contrast to other famous safety apps and devices, Guardia has been developed keeping in mind the unstable network connectivity in India and the need for reducing power consumption by make sure that the device's constant connectivity with the phone does not affect its efficiency. The above stated, has been incorporated by making sure that the scanning of the BLE devices is suspended at regular intervals of 3 seconds, which reduces the power consumption of the device, and vibrates to alert the user that the SOS has been sent once the messages have been sent to the selected contacts.

II. SYSTEM DESIGN

In this project, we have developed two main

components for the system:

- A wearable device
- An Android application

A. Wearable Devices

The wearable device will be a wristband of very light weight. It will consist of further of two components:

- Buttons
- BLE module

A single press on the button activates the android application on the smartphone. A double press on the button further on signals the Android device to send the SOS to its recipients. The button will be Micro-Switch-Push button. The BLE module is connected to the button. As soon as the button is pressed the first time, the BLE module signals the Android smartphone to start the particular application. The communication of the wearable device with the application can be seen in the following figure.

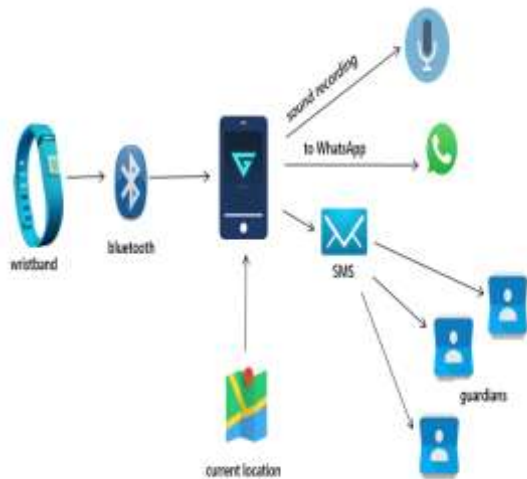


Figure 2: Communication between the device and the App

As seen in the figure, the guardians are the contacts selected from the user’s phonebook which is stored in an SQLite database. The database ensures that the selected guardian list is persistent. The current location is appended to a predefined text message. This system, ensures that the reachability is enhanced and provides increased safety to its users.

B. Android Application

The Android Application has been developed to function on receiving a Low Energy Bluetooth signal from the wearable device as well as a Stand-alone App. The main features of the App include :

1. Easy Understanding and Minimal User Interactivity

The App has been designed to help the user understand the communication between the device and the App, and to help them perform the initial process of registering the wearable device with the App to

maintain a one-to-one connection. It also has been designed such that the amount of information required from the user is minimal and non-threatening to the User’s privacy.



Figure 3: Initial user interface of the Application

2. Increased accuracy in obtaining the user location , enhanced reachability and safety

In contrast to the other location gathering technique, Guardia has been designed to use the Reverse geocoding technique to return the exact location of the user in terms of street address along with popular landmark (within 10m radius). This feature allows the user to be located precisely in terms of the street address as compared to coordinates only. Our App ensures that the user can be helped even if the sender or the receiver don’t have continuous internet subscription.

The additional feature that has been incorporated in the app is the automatic voice recording as soon as the SOS has been sent to the selected emergency contacts. This recording can be used for evidential purposes and is stored in the internal storage of the user’s phone.

The wearable device stays connected with the phone through BLE, when the button is pressed twice consecutively obtains the current location of the User and sends the SOS.



Figure 4a: Usability of the App



Figure 4b: Fetching the current location of the user



Figure 6a: The wearable device

3. Wide spread guardian circle through use of social media

The use of social media has extended the reachability and increased the chances of being saved on time by approximately 10 %. The predefined message is appended with the current location of the user and the user is then allowed to choose the group to which the SOS has to be sent.

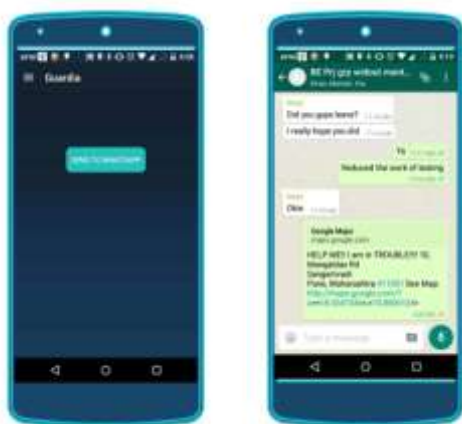


Figure 5: Using social media to send SOS

III. RESULTS

The system was developed to send an SOS in times of distress to the selected group of contacts, and start voice recording automatically once the SOS was sent successfully. This was successfully achieved and it can be seen from the figure below.



Figure 6b: Acknowledgement of the SOS once sent

IV. CONCLUSION

The system that has been implemented enhances the security of every citizen who uses it. It delivers SOS message to all contacts present in the database along with the current street address of the sender with up-to 100 meters accuracy using carrier service. The system has been also tested to work successfully in a moving vehicle.

By taking advantage of groups present in messaging service like Whatsapp, there has been significant rise in possibility of someone reading your message and taking appropriate action. Thereby using both Carrier service and Data services we have tried to ensure maximum reliability and reachability. Apart from this, even if network completely fails, the system is competent to record the sound of current event so that it can be used as an evidence later. Overall the system has been implemented and thoroughly tested keeping in mind factors like affordability, reliability, efficiency in terms of battery and performance and reachability. Some features which can be incorporated in future are integration of social media like twitter to directly

tweet SOS message, microphone to record the sound on the wristband rather than using the cell phone's microphone and an alarm on the wristband (that will alert the people nearby).

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