

Manifesting a mobile application on safety which ascertains women salus in Bangladesh

Elias Hossain¹, Wahidur Rahman², Tarequl Islam³, Selim Hossain⁴

¹Department of Software Engineering, Daffodil International University, Bangladesh

²Department of Computer Science and Engineering, Mawlana Bhashani Science and Technology University, Bangladesh

^{3,4}Department of Computer Science and Engineering at Khwaja Yunus Ali University, Bangladesh

Article Info

Article history:

Received Feb 24, 2019

Revised Apr 18, 2019

Accepted Apr 30, 2019

Keywords:

GPS

Mobile application

Safety

SOS button

Voice command

ABSTRACT

This paper reflects on the indemnity of women in our society. The proposed model ensures the embodiment of a mobile application. The algorithm, we developed for this model focuses the safety issues which is applicable to both inside as well as outside of the house for the women in Bangladesh. The solution of this problems can be done through some interrelated features such as i) SOS button pressing which ensures automatic calling, instant location tracking system through GPS of the phone and sending tracked location to all trusted numbers, automatically secrete video recording system ii) voice command detection which assures exact same features as SOS button pressing iii) phone shaking features serve user instant immunity by calling a trusted number. This research also assures experimented data analysis at Dhaka city based on respond time, the time it takes to arrive the SMS and Phone call and current location of the victim. Also do a short comparison among the most popular safety related mobile applications.

Copyright © 2019 Institute of Advanced Engineering and Science.

All rights reserved.

Corresponding Author:

Wahidur Rahman,

Department of Computer Science and Engineering,

Mawlana Bhashani Science and Technology University,

Santosh, Tangail, Dhaka – 1902, Bangladesh.

Email: wahidtuhi0@gmail.com

1. INTRODUCTION

In accordance with recent statistics of UN (United Nations), it is calculated that almost 35% women around the world experienced physical or sexual violence. Again, further statistics on women safety related issues done by many national studies shows that about 75% women faces physical and sexual ferocity.

It's also matter of concern that approximately 15 million adolescence girl have experienced forced sex at some part of life. Now, the question is what is the scenary of violence against the women in Bangladesh. A case study on women violence, sexual abuse, and physical harassment is done by Dhaka Medical College on the victims who suffered treatment at One Stop Crisis Centre (OCC) and burn unit [1]. The result of the case study clearly shows massive violence against women in Bangladesh. Almost 63% of women aged from 16 to 30 years feaced the violence either physically or mentally. So, it's a matter of great concern about safety related issues for women in Bangladesh. This is our key moto to develop an efficient way to sustain violence againgt women and ensure their safety.

On the other hand, Android application very popular in recent years as serving its greatest features. Almost every person in our society want to feel the test of android phone by using its applications. Android application makes a revolutionary changes in the field of socio-economical sectors. In recent year, android application has become essential part of modern technology in the field of medical, bio-technology, bio-informatics, economical sector, social issues and entertainment purposes. In some developed countries mobile application is used as weapon in the field of security for women. But it is a matter of great regret that

people of our country has less concern about safety related issues towards women. It would be a great idea if android application is used as the arms of women. This is the key idea and motivation of our work. So, we have taken android technology as a solution of safety against women violence. This research shows the development of an application which is mainly focused on women safety. Through the uses of this model, safety and security of women in Bangladesh become very simple, easy and spontaneous.

There's a lot of work in the filed of safety and security. Here, the paper [2] proposed voice command based application which has capability to recognize user voice. After detection of voice command, corresponding application will work and start tracking user's location by using GPS module and send tracked location to predefined number. Audio recorder will start and remain at least 5 minutes to take audio clip and save the recorded file to phone storage. Voice command will work even if the phone keypad is locked. Because of the application will work in the background. An emergency notification will generate if SMS send successfully. User can also save contact numbers by using voice command.

In the paper [3], the authors designed a SCIWARS application (Spy Camera Identification and Women Attack Rescue System) which can be considered as a part of two modules. A first module acts as an intelligent aware system that will identify the infrared rays coming from every Night-vision secret camera placed in alternative hotels rooms or rooms etc. and also sensible the user about unsecured place by sending a short message. The second module will be enabled by pressing any key continuously which will provide favor to the victims from an actual offensive unsecured situation. It sends the alert message along with GPS location to trusted mobile numbers. It also takes a proof of the voice and nearby image for 45 seconds.

The paper [4] proposed an android application that assures security in two different situations. One of them is travelling at night and another one is home security. The first module provide a feature called save our souls (SOS). This application also have capability to run in the background. So, no need to press any power button or something like that for taking actions. By pressing the SOS button and it will collect location form latitude and longitude and send location to registered number along with alert message. Second module provide home security system in absence of user at home. This application reports the user about an endeavor of information activity at home by a message and a recompose SMS triggers and a screaming alarm siren in the house. Needed an android mobile, a hardware circuit embedded with a switch and GSM modem that also connect to the door. When someone tries to open the door, the switch steed and break for the microcontroller to activate the GSM modem to send alert SMS to the registered number through the modem.

The paper [5] proposes an application, single click of SOS sends a message based on the location and audio or video calling to the parent number. Receivers touch the location URL in the message to view it in the Google Map. This application provides variety of helping tools like "First-Aid help, Fake Call Help and video call". The 'First-Aid help' tool provides help in the field of different health related problems occurred at an accidental or emergency situation during at night. First aid help works for different problems are such as foolish and not breathing, choking, bleeding heavily, burns, heart attack, diabetes etc. The 'Fake call help' reliefs from the meeting time or parties when women start feeling uncomfortable and think that, "if someone calls me then she will leave this place". Ringtone of fake call is as same as phone call ringtone. This application also sends the audio and video recording via Email or Gmail in the time of danger where users are unable to speak or tell the situation.

2. WORKING PRINCIPLE

2.1. Block diagram of proposed system

This developed system, Figure 1 is divided into some interrelated components. This components are inevitable for assuring safety issues in smart way. Users are easily able to treat this components in their regular purposes for safety specially the women in our society and country [6, 7].

2.2. SOS button pressing

Figure 2 shows the flowchart of SOS button pressing. In the figure, we have tired to figure out how the SOS button properly worked, if the mobile headphone is connected or not. We use headphone power up button as a SOS button [8-13]. First connect headphone to app. After pressing the button, system will check button pressing detection or not. If Yes, system will take some actions such as Automatic calling to one trusted number, automatic location tracking will begin and sending location to all trusted number, automatic camera will be opened and start video recording and the save recorded video in phone storage or memory card.

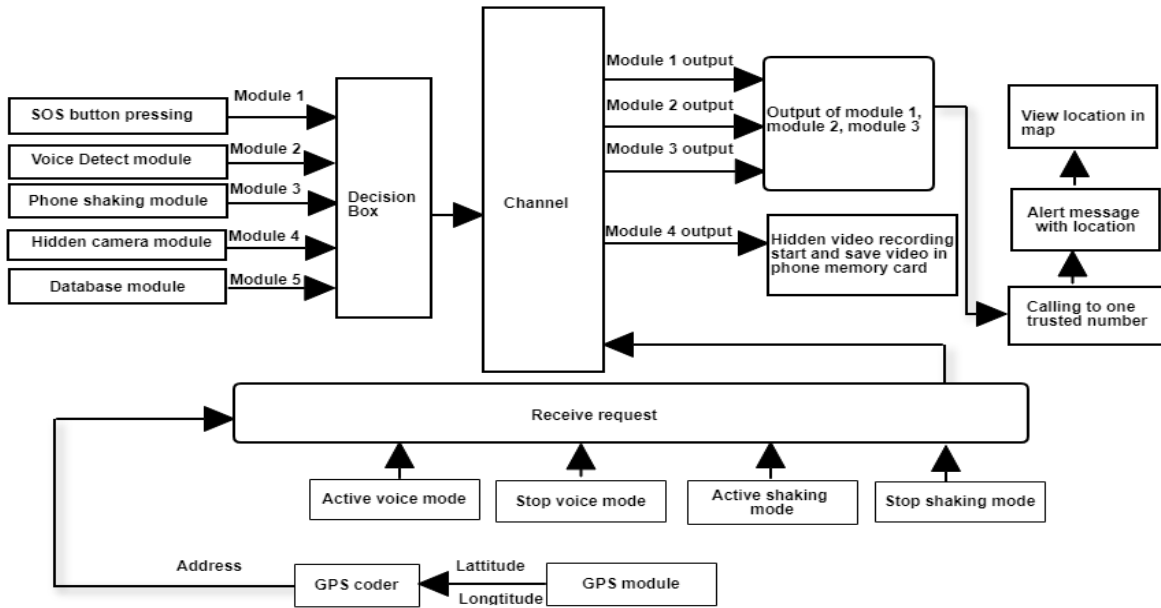


Figure 1. Proposed system architecture diagram

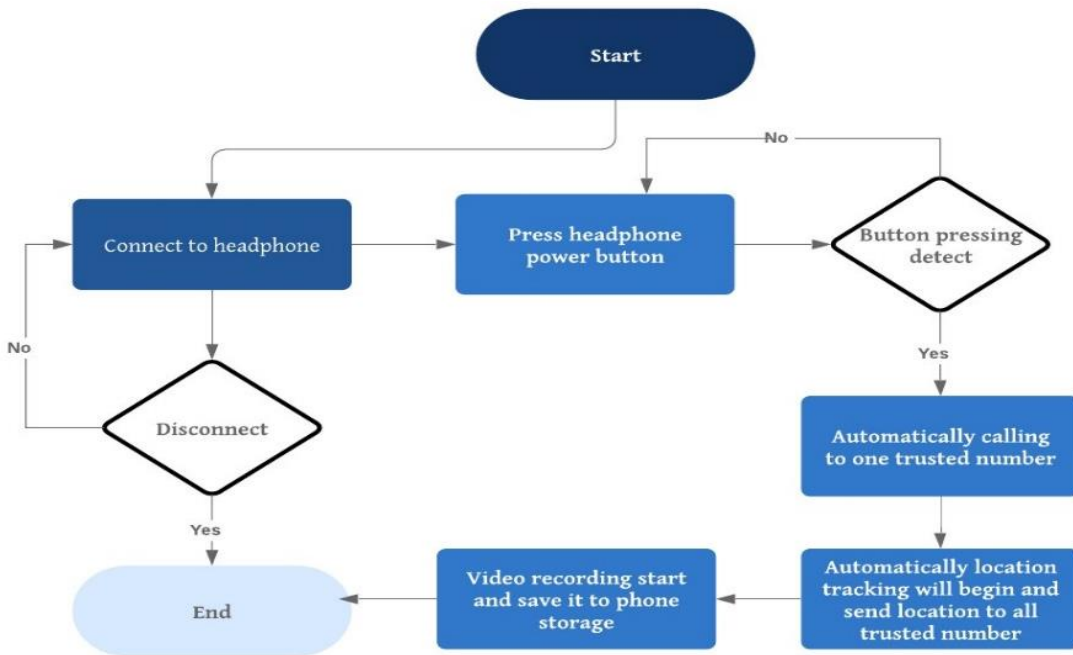


Figure 2. Flow chart and working procedure of SOS button pressing

2.3. Voice command

Voice command module can be performed by user voice detection. After finding the voice command “Help me” then system will start to detect voice. If required voice detects, automatically performing the actions same as Figure 3. When users of the application activate voice mode, it will be running in the background automatically. So, when the system find required voice command, it will be try to recognize and then perform it’s given actions. When the system finds stop command option, it will stop the whole system which is running in the background of mobile phone and users are not able to run the application on the background. To perform this operation we use Google speech recognizer.

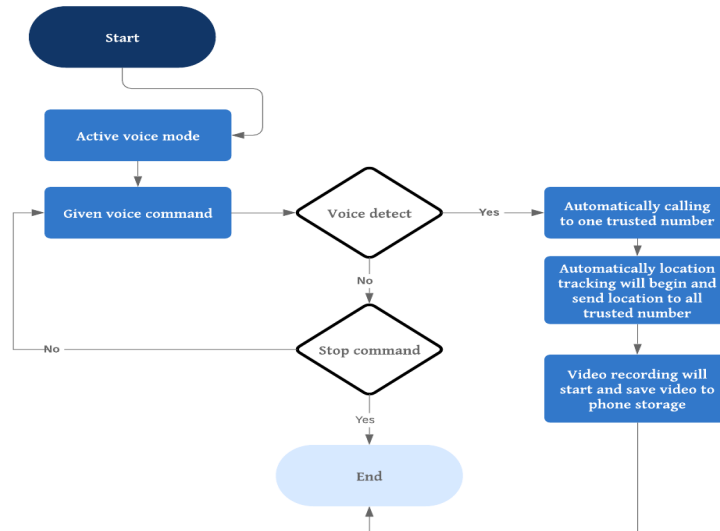


Figure 3. Flow chart and working procedure of voice command detection

2.4. Hidden camera recording

Hidden camera is a builtin camera palced in the mobile phone but programmatically it’s possible to run in the background. To work with hidden camera we have to use background service. Hidden camera will keep video recording in the background for safety related matters. In Figure 4, manually, after pressing capture button of the phone, it will automatically start video recording in the background and save the recorded video clip in phone memory card or phone storage. Again, if system detects stop capture button then background service will be finished. System is unable to take video in background without start service.

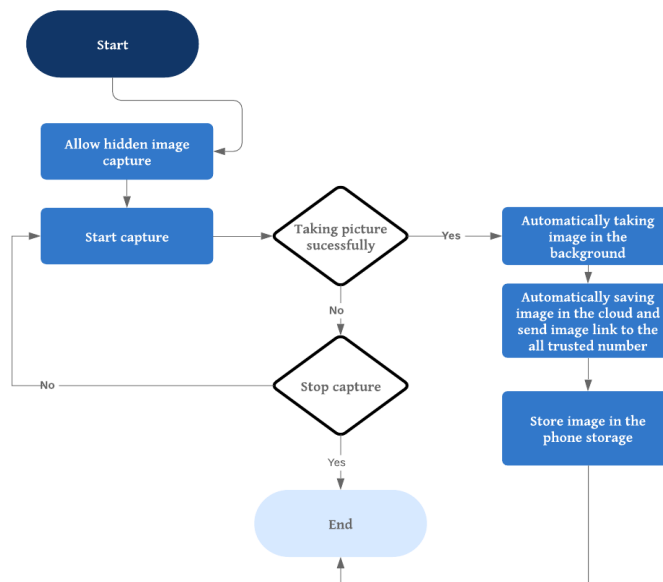


Figure 4. Flow chart and working procedure of hidden camera recording

2.5. Phone shaking detection

By using accelerometer sensor, phone shaking will be worked. First of all we need to activate shaking mode. After activation of phone shaking, it will be running in the background. Figure 5 shows the phone shaking detection system. If system detctets shaking 3 times, automatically perform the actions as described in the section 3.1. If system find the command of stop shaking mode, then shaking mode will be stopped.

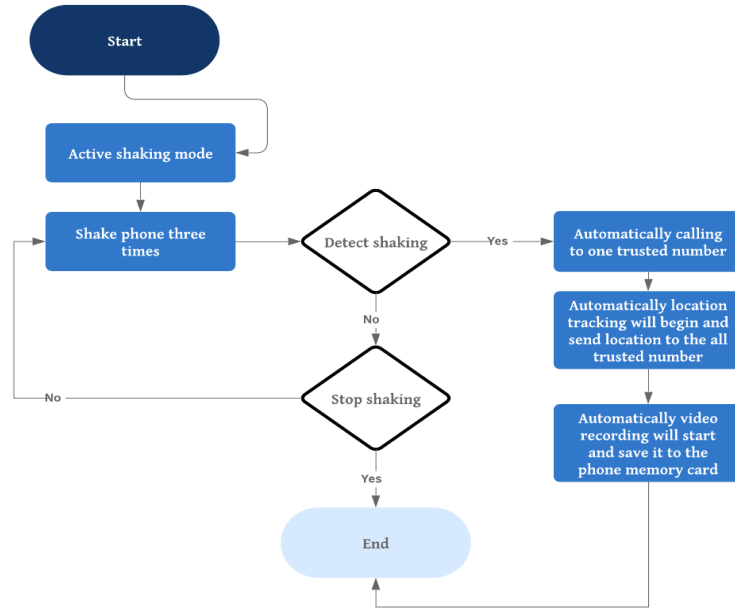


Figure 5. Flow chart and working procedure of phone shaking detection

3. SYSTEM REQUIREMENTS

The development of the proposed model can be done through software as well as hardware part of the user smart phone. Both of them plays a significant role in the process of expanding the application. Software section can be classified by required programming language, developing platform, IDE and OS (operating system). The embodiment of this application is performed by android studio, Java Programming Language. The database of this application is real time database which is firebase. Figure 6 shows database system of developed application.

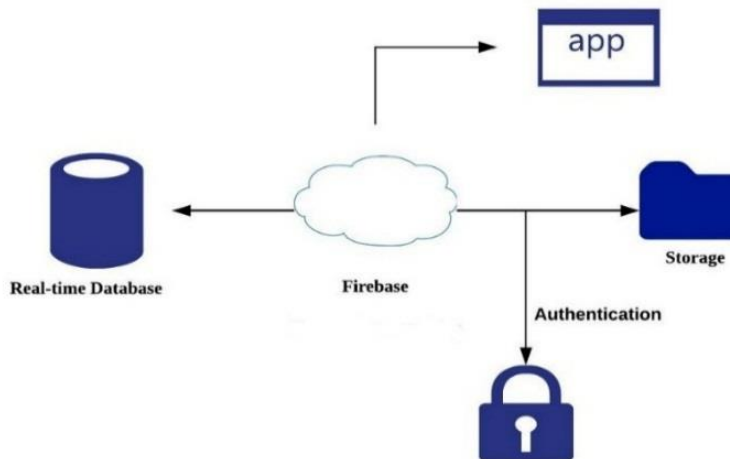


Figure 6. System diagram of database system of developed application

The user also require to add trusted number and trusted contact number will be saved in the database module. All the informations will be saved in the database. We use real-time database for storing data on the online. The hardware section divided into two interrelated parts. This two parts act as a heart of the wireless communication as well as location sharing for safety related issues. Firstly, Users have to carry out a smart phone to establish a reliable connection through GSM and GPRS module. Secondly, the user’s mobile must have GPS module for tracking the location.

Global positioning system (GPS) is a navigation and proper positioning tools that tracks the location based on latitude and longitude. The GPS coder module searches an actual address. They can be street name, nearby place, schools, colleges etc. If GPS system is not in work or GPS is disabled, location will be sent automatically only the coordinate value of latitude and longitude. But to functionate this procedure properly internet is needed. Algorithm 1, shows how the GPS module works for location sharing.

STEP 1: Request for access location.

STEP 2: Check GPS is enabled or not.

STEP 3: If (GPS== ENABLED) Then goto STEP 4 otherwise goto STEP 1

STEP 4: Tracking will begin

STEP 5: Collect coordinate

STEP 6: Send coordinate to trusted people.

STEP 7: END

Algorithm 1. Location sharing Algorithm using GPS module

To work a GSM/GPRS module effectively, needed a SIM card for mobile communication. The SIM card resides in the GSM/GPRS module and allow wireless communication throughout the world. The SIM card or Subscriber Identity module is responsible for sending SMS to all trusted numbers that are stored in the application database.

4. RESULTS AND DISCUSSION

4.1. Experiment 01

We've done some experiments with shaking and voice command crieteria and found some experimented data. Our experiment is to trace down, how much time it takes to receive the message at the receiver end after the phone shaking and voice command. We have taken tested data separately for phone shaking and voice command. Our experimented data shows that SMS sending depends on the mobile phone version and the wireless network. It's a matter of great wonder that we found very little response time for transmitting the SMS in rural areas. After succesfull 10 experiment Table 1, we found the average response time around 8.1 to 8.3 mseconds. Figure 7 shows graphical representation of experimented data.

Table 1. Experimented data passing through voice command

Experiment no	Response time(0.001s)	Distance(km)	Coordinate
Test 1	6.8	1.2	23.7516 , 90.3778
Test 2	6.87	1.2	23.7516, 90.3778
Test 3	8.1	242.6	24.3636, 88.6241
Test 4	5.2	237.8	24.8949, 91.8687
Test 5	14.42	193.3	24.8949, 91.8687
Test 6	13.13	243.9	22.3569, 91.7832
Test 7	7.60	299.4	21.8210, 90.1214
Test 8	9.30	3.0	23.7286, 90.3854
Test 9	3.1	180.5	23.5450, 89.1726
Test 10	6.60	167.3	22.8724, 91.0973

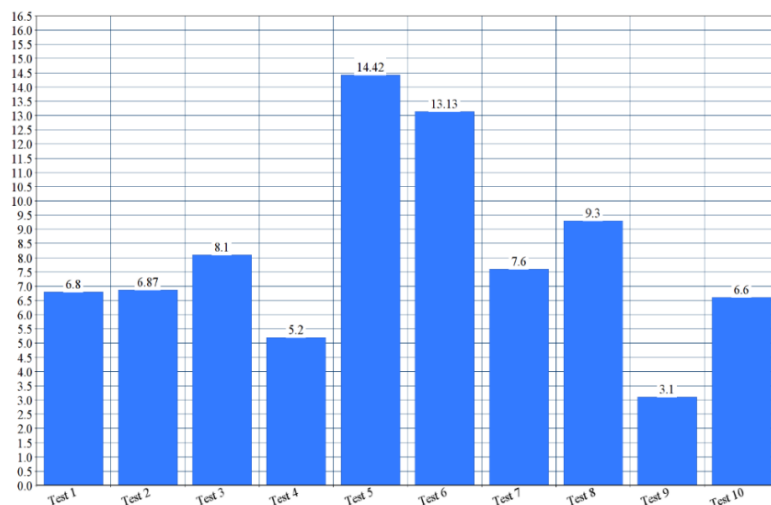


Figure 7. Graphical representation of experimented data of voice command

4.2. Experiment 02

We did some experiments in the night. The average statistical value of response time in Dhaka city is around 6.8 to 8 which is reflecting on Table 2 and Figure 8 .The time it's take to transmit actions at the receiver end. However, the whole system depend on the cellular network. We have also made a comparison on features among some popular mobile applications in google paly store. For our research, we have taken 8 applications and found the better result than their existng result reflected on Table 3. Basically, those applications strongly focus on some particular sector in the field security or safety. But in our proposed application, we tried hard to combine all the features in the field women safety. Thus making our proposed application simpler, more efficient, friendlier towards women and obiously handy

Table 2. Experimented data passing through phone shaking

Experiment no	Response time(0.001s)	Distance(km)	Coordinate
Test 1	7	1.2	23.7516, 90.3778
Test 2	7.2	1.2	23.7516, 90.3778
Test 3	12.02	242.6	24.3636, 88.6241
Test 4	8	237.8 km	24.8949, 91.8687
Test 4	8	237.8 km	24.8949, 91.8687
Test 5	6.9	193.3 km	24.8949, 91.8687
Test 6	13.13	243.9 km	22.3569, 91.7832
Test 7	8.7	299.4 km	21.8210, 90.1214
Test 8	8.5	3.0 km	23.7286, 90.3854
Test 9	38.2	180.5 km	23.5450, 89.1726
Test 10	4.30	167.3 km	22.8724, 91.0973

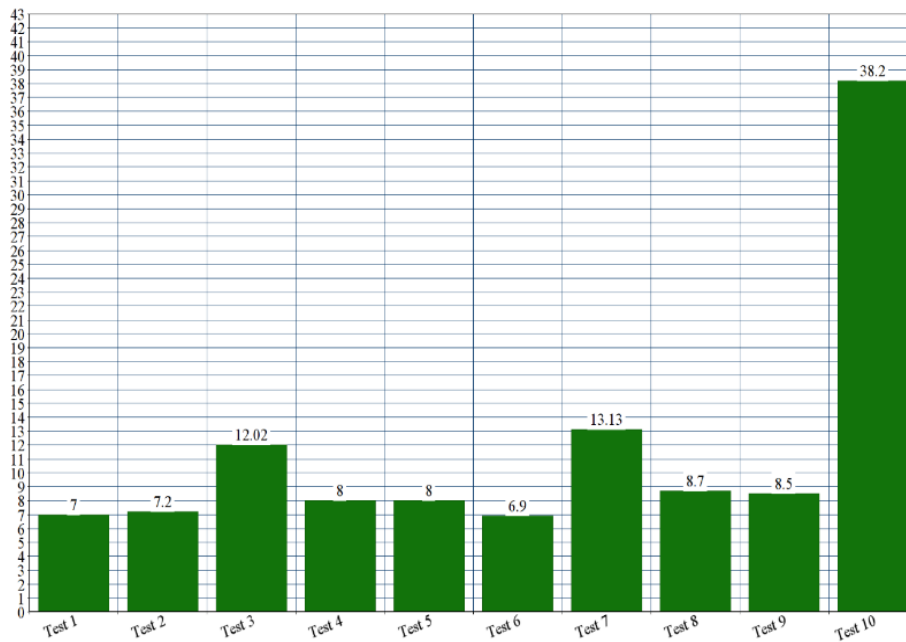


Figure 8. Graphical representation of experimented data of phone shaking approach

Table 3. Features comparison among some popular mobile applications

App name	Features	Proposed system features
Stay safe	Location sending by pressing SOS key	Yes
Chilla	Location sending to trusted the number by pressing phone power button 3 times	Yes
Shake to safety	Location sending to trusted the contact number by shake phone	Yes
BSafe	Send an alert message to guardian by pressing button	Yes
Women safety	Send a location to trusted contact number by tap to button.	Yes
VithU	Send a location to trusted contact number by tap to button.	Yes
Smart24x7	Sending a location to trusted contact number by pressing to a button	Yes
Himmat	Sending audio and video to the police station by pressing SOS	Yes

5. SCREEN SHOTS

Basically, our developed application offers variety of functions. But in order to focus main part the application we provide a part of our application in Figure 9.

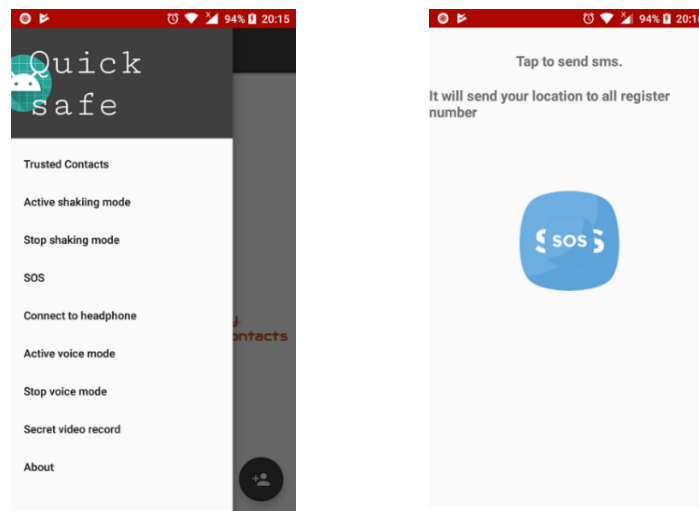


Figure 9. Screen shots of our developed mobile application

6. FUTURE WORKS

In future, we will work hard to:

- Make this application platform independent.
- Add lot of functionalities depending on the objective of the functionalities.
- Reduce the memory consumption in the device and also ensure the little memory space.
- Include Geo-fencing which can be used to identify safe and unsafe areas.
- Connect through Bluetooth with smart device.
- Develop a way where a user can find real time tracking video.

7. CONCLUSION

In concededly it's included that this system will play an effective role for the safety of women in Bangladesh. It would be possible to identify the criminal through this system so that women can ensure their safety. The proposed system provides the module SOS (Save our souls.) button pressing and through this, it's possible to sending current location to trusted number by pressing this SOS key. This system provides voice detects the module. Basically, in the time of danger, it's not possible to calling or text someone by pressing mobile button or open temporary lock. In some incident our proposed system provide some useful features. Very easy to calling someone or passing current location by voice command like "HELP". This system automatically detects user voice through these modules.

The proposed system provides Phone shaking features. Sometimes women can't call to parents if she faces problems or she can't notify her current situation to her parents in the time of danger. In this situation a women can send their location to all trusted numbers and parents by shaking phone three times. When sytem detects shaking phone three times then system will awake and automatically tracking current location and sending location to all trusted numbers through SMS. This system provides multiple safety features and through these women can ensure safety.

The proposed system provides Hidden camera module. In some cases this system also provided useful evidence. Through hidden camera module, system can take screte video clip and save it to phone storage and it can be importance evidence for detecting the criminal. In the time of danger, Women needs to take some log for the identification of the criminal but due to lack of proper evidence women and police can't identify the criminal. Hidden camera module act as the evidence. So, this all about our works and developed model of the proposed system. We worked very hard to ensure women safety for our society and country. We have chosen android technology to establish this model. We can say that we render a tittle contributions in the field women safety in Bangladesh.

REFERENCES

- [1] Khan, N. T., Begum, A., Chowdhury, T. M. J., Das, B. K., Shahid, F., Kabir, S., Begum, M., Violence against women in Bangladesh," *Delta Medical College Journal*, vol. 5(1), pp. 25-29, 2017.
- [2] Thakare, Rajani T., and M. R. Shahade, "Review on Android Based SOS Emergency Alert Button," *International Journal of Research in Science & Engineering*, vol. 1, 2015.
- [3] Bhardwaj, Nishant, and Nitish Aggarwal, "Design and Development of "Suraksha"-A Women Safety Device," *International Journal of Information & Computational Technology*, vol. 4(8), pp. 787-792, 2014.
- [4] Chand, Dhruv, et al., "A mobile application for Women's Safety: WoSApp," *TENCON 2015-2015 IEEE Region 10 Conference, IEEE*, 2015.
- [5] Sapna, M., N. Shahana Begum, and S. Thanga Ramya, "SWC (Safety for Women & Child), an Android App." *International Journal of Applied Research*, vol. 4, no. 1, pp. 26-31, 2016.
- [6] Paradkar, Abhijit, and Deepak Sharma, "All in one Intelligent Safety System for Women Security," *International Journal of Computer Applications*, vol. 130(11), pp. 33-40, 2015.
- [7] Singh, Karandeep, et al., "Developing a framework for evaluating the patient engagement, quality, and safety of mobile health applications," *Issue Brief (Commonw Fund)* vol. 5(1), pp. 11, 2016.
- [8] Yarrabothu, Ravi Sekhar, and Bramarambika Thota. "Abhaya: An Android App for the safety of women," *India Conference (INDICON), 2015. Annual IEEE. IEEE*, 2015.
- [9] Viswanath, Kalpana, and Ashish Basu, "SafetiPin: an innovative mobile app to collect data on women's safety in Indian cities," *Gender & Development* vol. 23(1), pp. 45-60, 2015.
- [10] Sarosh, Muhammad Yasir, et al., "Mehfoozaurat: Transforming smart phones into women safety devices against harassment," *Proceedings of the Eighth International Conference on Information and Communication Technologies and Development, ACM*, 2016.
- [11] Jatti, Anand, et al., "Design and development of an IOT based wearable device for the safety and security of women and girl children," *2016 IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), IEEE*, 2016.
- [12] Harikiran G. C., et al., "Smart security solution for women based on Internet Of Things (IOT)," *2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), IEEE*, 2016.
- [13] Akash, Saad Ahmed, et al., "Hearme: A smart mobile application for mitigating women harassment," *2016 IEEE International WIE Conference on Electrical and Computer Engineering (WIECON-ECE), IEEE*, 2016.

BIOGRAPHIES OF AUTHORS



Elias Hossain Studying at Department of Software Engineering Final year first semester, Daffodil International University. His research interested areas are App based security system application with artificial intelligence solution and Internet of Things. Currently he is working with Mobile Application (Android) and Artificial Intelligence. He is very good at doing projects based work in the field of android and IoT. He has received many prizes from many national and international project based competition.



Wahidur Rahman studying at Computer Science and Engineering Department in Mawlana Bhashani Science and Technology University (MBSTU). Currently he is studying in 4th Year 1st Semester. His research interests include automation and controlling, wireless networking, artificial intelligence and android based hardware controlling. In recent years he has been working with IoT based application and general purpose mobile application.



Tarequl Islam is working as a Senior Lecturer in Department of Computer Science and Engineering at Khwaja Yunus Ali University, Sirajgonj, Bangladesh. He completed his B.Sc. (Hons.) degree on Computer Science and Engineering from Rajshahi University, Bangladesh and M.Sc. (Engg.) on Computer Science and Engineering from Mawlana Bhashani Science and Technology University, Tangail, Bangladesh. His main research interest is based on IoT, Blockchain, Cryptography and Network Security, Software Engineering, Image Processing and Pattern Recognition.



Selim Hossain is serving as a Lecturer in Department of Computer Science and Engineering at Khwaja Yunus Ali University, Sirajgonj, Bangladesh. He completed his B.Sc. degree on Telecommunication and Electronic Engineering from Hajee Mohammad Danesh Science and Technology University, Dinajpur, Bangladesh and M.Sc. (Engg.) on Information and Communication Technology from Mawlana Bhashani Science and Technology University, Tangail, Bangladesh. His main research interest is based on IoT, Blockchain, Cryptography and Network Security, Antenna, Algorithm, OFDM, Software Engineering as well as Optical Fiber Communication.