# IOP 2018

*by* Febriansyah Febriansyah

# Voice Based City Panic Button System

# Voice Based City Panic Button System

**Febriansyah, Zahir Zainuddin, M. Bachtiar Nappu**

Department of Electrical Engineering, Faculty of Engineering Hasanuddin University.

E-mail: febriansyahey@gmail.com

**Abstract**. The development of voice activated panic button application aims to design faster early notification of hazardous condition in community to the nearest police by using speech as the detector where the current application still applies touch-combination on screen and use coordination of orders from control center then the early notification still takes longer time. The method used in this research was by using voice recognition as the user voice detection and haversine formula for the comparison of closest distance between the user and the police. This research was equipped with auto sms, which sent notification to the victim's relatives, that was also integrated with Google Maps application (GMaps) as the map to the victim's location. The results show that voice registration on the application reaches 100%, incident detection using speech recognition while the application is running is 94.67% in average, and the auto sms to the victim relatives reaches 100%.

## 1. Introduction

Criminality is a social disorder and a deviating behavior, which is breaking social norms and criminal law, against humanitarian morals, and harmful, thus opposed by society. In the urban area, criminality issues are difficult to overcome as it might happen anywhere instantaneously [1].

Criminality problems obviously contradict to the concept of comfortable and safe life in smart city. Smart city itself is an urban planning concept, which utilizes technological developments that would make life easier and healthier with high level of efficiency and effectiveness. One of the smart city classifications is the smart living, which requires comfortable and safe environment [2].

In anticipating such problems, several protections involving the police in crime-prone locations have already been done yet it is considered less efficient and effective as the crime might occur anywhere instantaneously in urban area while the police is far from the location.

Other anticipation is done by employing technology and smart system where one that has been successfully implemented is the panic button, which utilizes android platform of smart phones. This panic button works with several touched-combinations on smart phone then the danger notification and the user coordinate point would be received by the control quarters then forwarded to the police by the central controller admin. Nevertheless, this method still requires development using any faster and more efficient method.

One possible way to develop panic button is using speech recognition as user identification on the condition of danger. Some previous related researches are as follows: Research on Emergency Call and Location Tracking System with Enhanced Functionality for Android [3]. Review on Android Based SOS Emergency Alert Button [4]. The Framework of Navigation and Voice Recognition

System of Robot Guidance for Supermarket [5]. A Computer Remote Control System Based on Speech Recognition Technologies of Mobile Devices and Wireless Communication Technologies [6]. Zigbee Based Voice Controlled Wireless Smart Home System [7]. An integrated system for voice command recognition and emergency detection based on audio signals [8]. Android Based Emergency Alert Button [9]. A Survey on Speech Recognition [10]. Emergency Panic Button [11]. Voice Recognition using HMM with MFCC for Secure ATM [12].

On the basis of those previous researches, this study focuses on the development of panic button system by using speech as the danger identification of application user then the danger notification, including the incident location, would be sent to the police and victim relatives, whose mobile number already inputted, in the form of location map and SMS.

## 2. Research Method

This is a quantitative research that aims to design and implement the voice-activated panic button application by employing the voice recognition in android system. The data collection method used is accidental sampling. The built-application was tested by direct implementation to the respondents, which are citizen, in several locations. The data taken were the respondents, as victim, coordinate points and the police to measure the accuracy of the program.

The user voice was an input used as the detection when in danger conditions. The voice that was detected by the application would transmitted the coordinates point and auto SMS to the web server while the nearest police coordinates and victim coordinate were compared by using Haversine formula, as illustrated in Figure 1.


**Figure 1.** Application Architecture

### *2.1. GPS Tracking Via Java Programming*

The location coordinate tracking of this panic button application is built with script access mobile device which arranged in java script android. GPS tracking script is useful to capture the location coordinates that are sent to the MySQL Server database.

Location coordinates are represented in the form of longitude and latitude - the height of coordinate system. Latitude is defined as 0-90 degrees north or south of the equator while longitude is defined as 0-180 degrees east or west of the prime meridian, which passes through Greenwich, England. Latitude is represented in meters above sea level.

*2.2. Haversine Formula Application*

This study shows that the application of Haversine formula in determining the closest distance of each coordinate point suggests a fairly high accuracy. The Haversine formula is a significant equation in navigation where it provides the distance between two points in the spherical sphere of any longitude and latitude [13].

The Haversine formula in this study is used in calculating the distance between two GPS coordinate points. Assuming that the earth is perfectly spherical with radius R 6,367.45 km and the location of the two spherical coordinates (latitude and longitude) are lon1, lat1 and lon2, lat2 respectively, then the Haversine formula is as follows:

Haversine formula

$$x = (lon2 - lon1) * cos((lat1 + lat2)/2) \quad (1)$$

$$y = (lat2 - lat1) \qquad d = sqrt(x * x + y * y) * R \quad (2)$$

where the formula x is the longitude, y is the latitude and d is the distance. In this research, the coordinate points that belong to the citizen user and the police user are the primary key for distance comparison in the closest distance determination.

## 3. Results and Testing

*3.1. Result*

The design of this voice-activated panic button has produced an android based application system that provides two levels of user in the application. Figure 2 shows the registration form of both user levels, namely citizen user and police user.

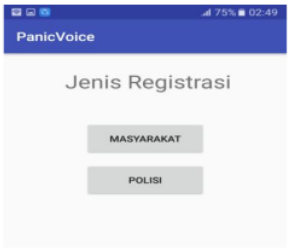


**Figure 2.** Registration Form

The citizen registration menu contains the input column of relatives number that will be used by the system as the destination number of notification which informs that the user is in danger. The notification is sent from victim mobile phone via auto SMS of the application, as shown in Figure 3 below:

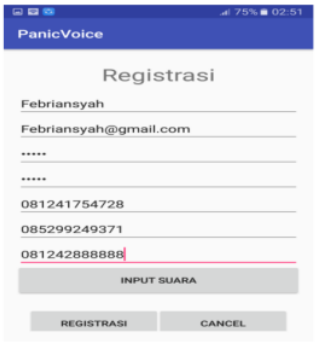

**Figure 3.** Citizen Registration Form

Furthermore, the citizen registration menu requires voice input as an identification of the danger situation experienced by the user when the application is running. The user voice is inputted twice and the system would stop if the first and second voice inputs do not match each other therefore the registration process need to be repeated by input the identical sound twice. The first sound is recognized by using the voice recognition method thus the voice input in citizen registration menu must be done twice. The first voice input would be the data in template database while the second voice input is used for comparison and confirmation of the first data.

When the app is starting, the speaker phone will continually detect the sound. If a voice is detected, the system would automatically process the sound by comparing with the sound in database. When it is recognized as user voice, the data from GPS (Global Positioning System) coordinate point would be sent to the web server.

There would be a notification received by nearest police as shown in Figure 4 below. Anytime the web server receives reporting of coordinate points, it would compare them with the police coordinates that located nearest the victim. The search method is done by comparing the distance within a radius of five kilometers using Haversine formula. If nearest police is not found in first attempt, the search radius will be increased by the multiple of five kilometers in each. The point coordinates search radius is limited to 30 kilometers.

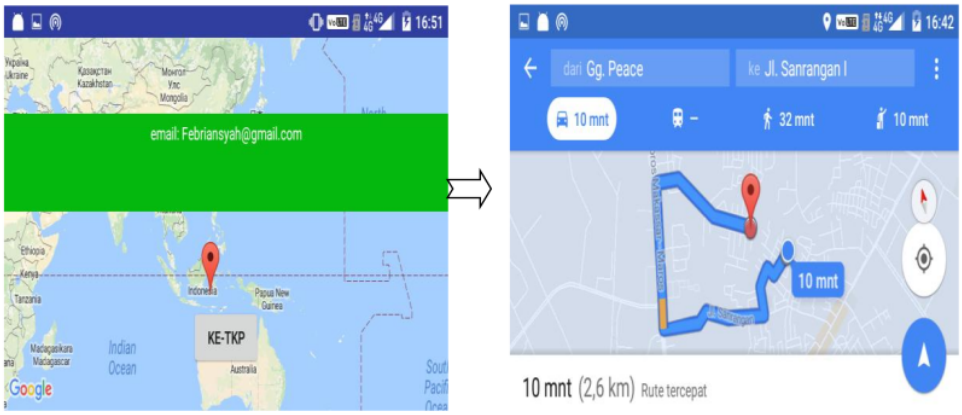


**Figure 4.** Police Notification

Furthermore, the victim relatives would receive a message from the victim phone number simultaneously with the notification received by the police as soon as the web server recognizes the victim coordinate point. The contents of message received by the relatives can be seen in Figure 5 below:

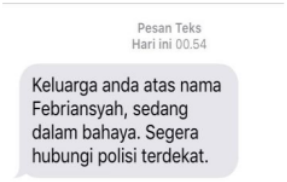


**Figure 5.** The Message Received by The Relatives

*3.2. Testing*

The testing stage was performed through direct implementation of the built system. The test involved 30 random respondents in different locations. Respondents were asked to test the application using variant keywords. This test used 7 test variables. The recapitulation of the system test is shown in table 1 below:

**Table 1.** Test Result Recapitulation

| Num. | Test Variables | Presentation of Test Result (%) | | |
|---|---|---|---|---|
| | | Registration | Detection | Auto SMS |
| 1 | Registration Test Result | 100 | - | - |
| 2 | Incident Detection in Quiet Condition Test Result | - | 100 | 100 |
| 3 | Incident Detection in Crowded Condition Test Result | - | 96,6666667 | 100 |
| 4 | Incident Detection in Quiet Condition Test Result with Less than 1 M in Distance ( 0 to < 1 M) | - | 96,6666667 | 100 |
| 5 | Incident Detection in Quiet Condition Test Result with More than 1 M in Distance ( 1 to < 2 M) | - | 96,6666667 | 100 |
| 6 | Incident Detection in Crowded Condition Test Result with Less than 1 M in Distance ( 0 to < 1 M) | - | 93,3333333 | 100 |
| 7 | Incident Detection in Crowded Condition Test Result with More than 1 M in Distance ( 1 to < 2 M) | - | 90 | 100 |
| | Average | **100** | **94,6666667** | **100** |

The recapitulation above shows significant result that the voice registration in application reaches 100%, the incident detection by using voice when the application is running is 94.67% in average, and auto sms to the victim relatives reaches 100%.

## 4. Conclusion

In accordance with the research results, the discussion and testing stage, it can be concluded that the design and implementation of voice-activated panic button application using voice recognition as user detector and haversine formula as closest data coordinate comparison tool with several additional features such as Gmaps and auto SMS are successfully done. It can be said that this research has contributed in providing alternative solution for criminality problem solving in the urban area to support the smart city program. To be more specific, this research results show that the use of voice registration on the application reaches 100%, the incident detection using voice when the application is running is 94.67% in average, and the use of auto SMS to the victim relatives reaches 100%.

## Acknowledgments

The author would like to thank their colleagues for providing moral support in this research.

## References

[1] Kartini K 2003 *Patalogi Sosial Jilid I. Cet. VIII* (Jakarta : PT RajaGrafindo Persada)
[2] Hendro Muliarto 2005 *Konsep Smart City : Smart Mobility* (Bandung : SAPPK-MPWK Institut Teknologi Bandung)
[3] Dinesh B, Raut and Pragati P 2015 *J. Advance Research in Computer Science and*

*Management Studies* **3** 2321-7782
[4] Rajani T, Thakare and Shahade 2014 *J. Research In Science & Engineering* **1** 2394-8299.
[5] Halim S and Budiharto W 2014 *J. Software Engineering and Its Applications* **8(10)** 143-152
[6] Hae-Duck J, Sang-Kug Y, Jiyoung L, Ilsun Y, and WooSeok H 2014 *J. Computer Science and Information Systems* **11(3)** 1001–1016.
[7] Thoraya O, Haliemah R, Ali A E N, Rehan M, Mussab M S, and Tarique M 2014 Zigbee *J. Wireless & Mobile Networks (IJWMN)* **6**
[8] Emanuele P, Stefano S, Roberto B, Giacomo F and Francesco P 2014 *J. Expert Systems with Applications.* **8**
[9] Dhrubajyoti G and Rupam K S 2013 *J. Innovative Technology and Exploring Engineering (IJITEE).* **2** 2278-3075.
[10] Harpreet S and Ashok K B 2013 *J. Advanced Research in Computer Engineering & Technology (IJARCET)* **2(6)**
[11] Priyanka S, Pranita T, Snehal T and Tejashree W 2012 *J. Scientific & Engineering Research.* **3(3)**
[12] Shumaila I, et al 2011 *J. Computer Science.* **6(3)**
[13] Chopde R N and Nichat K M 2013 *J. Innovative Research in Computer and Communication Enggineering.* **1**

# IOP 2018

ORIGINALITY REPORT

| 13% | 11% | 9% | 7% |
|---|---|---|---|
| SIMILARITY INDEX | INTERNET SOURCES | PUBLICATIONS | STUDENT PAPERS |

PRIMARY SOURCES

| | | |
|---|---|---|
| 1 | www.aast.edu<br>Internet Source | 2% |
| 2 | Emmanuel Abraham, C K Nameer, Roshan Tom, Yedul Ganesh, S S Vidhya. "Pro-Safe: An IoT based Smart Application for Emergency Help", 2019 2nd International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICICT), 2019<br>Publication | 2% |
| 3 | ijsetr.org<br>Internet Source | 2% |
| 4 | journal.uin-alauddin.ac.id<br>Internet Source | 1% |
| 5 | es.revistaespacios.com<br>Internet Source | 1% |
| 6 | pure.manchester.ac.uk<br>Internet Source | 1% |
| 7 | www.arpnjournals.com<br>Internet Source | 1% |

| | | |
|---|---|---|
| 8 | www.mdpi.com<br>Internet Source | 1 % |
| 9 | Md Monsur Hossain, Moushumi Sharmin, Shameem Ahmed. "Bangladesh Emergency Services", Proceedings of the 1st ACM SIGCAS Conference on Computing and Sustainable Societies (COMPASS) - COMPASS '18, 2018<br>Publication | <1 % |
| 10 | www.slideshare.net<br>Internet Source | <1 % |
| 11 | Submitted to Indiana University<br>Student Paper | <1 % |

| | | | |
|---|---|---|---|
| Exclude quotes | On | Exclude matches | < 5 words |
| Exclude bibliography | On | | |