

# A SHORT MESSAGING SYSTEM (SMS) ALERT FOR IDENTIFYING VICTIM LOCATION USING SMARTWATCH TECHNOLOGY

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## ABSTRACT

*The incidence of kidnapping peoples in Nigeria has taken an alarming dimension for reasons not well addressed by successive governments in Nigeria. This unlawful act has increase despite the various legislations prohibiting kidnapping both the international level and at the three tiers levels of government. The law against kidnapping has been passed almost a decade since 2013 by the federal government of Nigeria with some states in the country domesticating law from 2017-2021. The purpose of this paper is to design a software program that uses a smartwatch and is dubbed as **blower**. It can help the users (victim) to alert the security personnel's or relatives for help. When the report button on the smartwatch is clicked, the geolocation and the SMS application interface(API) are triggered, and SMS will generate with details of the current coordinates of the device location and sent to a predefined number. This message is sent continuously whenever the location changes. Is an innovative software suite (Web, Mobile, API, and Database) that can be used to help the victim, in curbing kidnapping issues in our society.*

## 1.1 INTRODUCTION

There are at least 25,000 kidnapping for ransom cases across the world. However, most cases go unreported, so it's likely the real figure is more than 50,000 (Ezemenaka, 2018). Terrorist hostage taking and kidnapping has become an international concern over the last two decades. Since the mid-1990s, hostage taking and kidnapping have dramatically increased as a preferred tactic of political terrorists and resource struggle (Agnes & Henry, 2018)The kidnappers or hostage takers use kidnapping for ransom to finance their activities which constitute treat to peace, security, and development in these regions and to the right to life, liberty, and security of persons.

The rate of kidnapping and hostage taking in Africa has taken an alarming dimension in the last two decades. Africa countries such as Egypt, Cameroun, Ethiopia, Mali, Somali, Chad, Niger Republic, and Nigeria have witnessed its citizens kidnapped for ransom and also for political victimization (Meek, 2020). Since the mid2000s, terrorism, kidnapping and hostage taking has pushed the peripheries of West Africa into the news and the public eye (Agnes & Henry, 2018; Meek, 2020)

Nigeria was globally declared as one of the terrible nations to subsist in the world as a result of the widespread of corruption, injustice, violence and lack of security that exposed many innocent citizens to end up in the hands of kidnapers. As a result of this, Nigeria was ranked in the global index as one of the worst places to dwell in because of frequent kidnapping incident (*Journal of Political Sciences & Public Affairs Causes and Incisive Solutions to the Widespread of Kidnapping in Nigeria Current Administration : Under Scholastic Scrutiny*, 2017). Similarly, Kidnapping is one of Nigerian's biggest challenges, facts and figures show that the kidnapping frequency in the country is high (Ezemenaka, 2018).

In Nigeria kidnapping and hostage taking has been perpetuated by criminal elements for the purpose of ransom collection. The rise of Boko Haram insurgency in 2011 also gave rise to kidnapping and hostage taking by the terrorist who believe that they are fighting the government and western education for the purpose of establishment of Islamic State of Nigeria. On the other hand, there has been a lot of incidence of kidnapping and hostage taking in the North-western region of Nigeria by bandit's groups such as Maiduguri, Zamfara, Niger, and others.

In many of these cases in Nigeria, the search for the victims' location is usually unsuccessful, and many are found after it is too late, some may even lose their lives. These days, almost everybody carries a mobile or hand watches device of some sort which is packed with ever-expanding features. Among those features is the ability to determine the device's location through the use of a Global Positioning System (GPS). This feature is employed in the research project where the location of the victim is determined by the device and is transmitted to a relevant third party in a Short Messaging System (SMS) text message. On the receiving end, the location of the victim will have displayed. The basic operation of the system is shown in Figures 3.1

The paper work aim to design a software application system that can be used by the kidnapped victim to send SMS location details of a victim to the pre-define/registered numbers or security personnel to track the last geo-locations of a kidnapped victim, which could effectively assist the security personnel or relative in curbing the current kidnapping issues in Nigeria.

The specific **objectives** of the study are to:

1. To Improve prompt rescue delivery by minimizing victim casualties;
2. To Minimize average end-to-end delay by depending against unauthorized users;
3. To Reduce route location discovery number, which will be benefit from security personnel and relatives.

## **2.1 REVIEW OF RELATED WORK**

The strategies employed in the literature are summarized in the section below by different authors based on key categories such segmentation, feature extraction, and classification method.

**different approaches used in earlier research.**

Systems and devices were the subject of the research as well. Numerous systems have been discovered to use this research project's technology and algorithms, with the majority of them being tracking and alarm systems. The intelligent security system against harassment is one example of this kind of gadget. The owner of the device will utilize it to report any harassment to the authorities so they can come to the victim's aid. The microcontroller in this kit is activated in any emergency case by pressing the button or by reciting the password, and it delivers the message to the programmed numbers (Preethika et al., 2016).

In a recent development, mobile phone applications that exploit the device features of the phone in the event of kidnapping. The algorithms used by Location Tracker and Location Mapper, two software programs. The Nokia N95 8GB, an S60 3rd Edition Feature Pack 1 development platform, served as the Location Tracker's target device. The J2ME

SDK was installed and incorporated into the application, which was created using Net Beans. The Java Specification Requests (JSR) 179 Location-Based Services API will be used to get location data from the GPS chipset. For the program's SMS messaging-related portion, the JSR 205 Wireless Messaging API 2.0 was used. The Nokia 6630, which falls under the S60 2nd Edition Feature Pack 2 developer platform, served as the Location Mapper target device. For receiving and processing SMS messages, they used the JSR 120 Wireless Messaging API 1.0, and for downloading data through a Hypertext Transfer Protocol (HTTP) connection, they used the Java Specification Requests (JSR) 75 File Connection and PIM API (Zulfarhan et al., 2011).

A GSM modem is used by the Global System for Mobile Communications (GSM) Car Alarm System as the connecting medium between it and the mobile phones of the car owners to send and receive alerts. To locate the vehicle, the majority of these devices, however, employ GSM locating rather than Global positioning system (GPS) technology (Pachica et al., 2017).

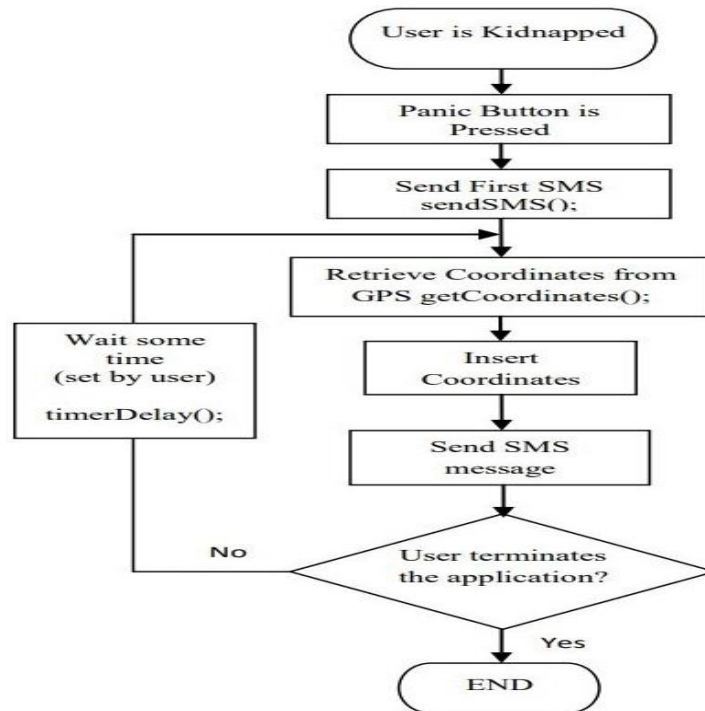
For Location-Based Services (LBS), (Nadesh, et al. 2011) introduced a mobile phone tracking application that uses a mix of Global positioning system (GPS) and Base Stations (BS) information to determine the location of the mobile. To make contact with the next antenna tower close by and locate the phone, it must at least emit the roaming signal. The planned application's client-side system is a MIDlet application that acts as an interface to input content and control commands that are evaluated on the server and implemented appropriately. Due to its reliance on GPS, the application was only designed to function in open spaces. It records a mobile phone's location using radios that the administrator maintains.

The major hindrance to combat Kidnapping, and Banditry are lack of infrastructure and timely information. In the case of kidnapping and banditry, it is perceived that the kidnapped victims in most cases were kidnapped at a time when their handheld digital devices (e.g. mobile phones, tabs, and laptop) are with them, which makes it easy to track using tracking software. However, currently, this tracking software including local digital solutions is lacking in tracking the kidnapping and banditry activities in the region in helping for identifying the last victim location, alerting police or next of kin to come to their rescue.

To combat Kidnapping issues, a lot of Technological solutions including tracking software were deployed but failed, due to the network problem, because most of them use telecom networks while the kidnappers sometimes are living in an area where the Telecom network is fluctuating (not steady), thereby making it hard to track them using software tracker. Due to the rise of kidnapping issues in Nigeria, the ongoing concerns, and the need to provide state-of-the-art solutions to curtail this kidnapping issues.

### 3.1 Propose Methodology

The Software Application (Blower) reports a crime location through a trigger by the user via an SMS channel to a backup phone number. A software Application System updates these endpoints so that security personnel or relatives to have access to track and view a victim's location that can help security personnel or relatives to investigate crimes easily. When the victim trigger system, the pre-define number will receive a SMS with coordinate location about a victim on their registered device application provided for them. Aside from that, periodic updates are being transmitted to the response team. This will share the location and make the monitor request feedback from the user. When the user is quiet about updating the monitor, the monitor can take necessary actions either by reporting to the security personnel or relatives, depending on their decision. The below block diagram shows the system framework:



### 3.2 Global positioning system (GPS) Technology

A 24-satellite constellation is projected to make up the space-based GPS navigation system, which offers location and timing data to both military and civilian users worldwide (Vieth, 2022). Our app leverages GPS technology as a source of strength simply because it has applications outside of those listed below.

1. Location – Determining a position
2. Navigation - Moving from one location
3. Tracking - Monitoring object or personal movement
4. Mapping - Creating maps of the world
5. Timing - informing the world about precise timing

Therefore, we exploit these features as the working principle of our solution. Another important feature that makes this solution promising is the ability to work in the absence of the internet to report criminal activities (Colorado, 2020).

### 3.3 System Requirement

The minimum software requirement for the effective development and implementation of this system are as follows:

1. Microsoft Window 8/7/Vista/2003(32 or 64 bits
2. 400 hard disk space
3. 4GB RAM (4 GB)
4. At least 1 GB for Android SDK, Emulator System, images and catches 5-Java Development Kit (JDK 7)
5. Java programming,
6. Android studio version 4.2.1
7. Google Maps,
8. GPS technology also will be use.

In addition, the JAVA programming language and the android studio will be use to design the apps that are implemented with the android smartwatch and android smartphone  
The minimum hardware requirement for the effective development and implementation of this system are as follow:

1. Android Smartwatch device.
2. Android Smartphone device.

### **3.4 Features Supported by Android Smartwatch**

1. Storage uses SQLite, a lightweight relational database, for data storage.
2. Connectivity: Supports GSM/EDGE, IDEN, UMTS, and Bluetooth (includes A2DP and AVRCP), Wi-Fi, LTE, and WiMAX).
3. Messaging: Supports both SMS and MMS.
4. Web browser: Based on the open-source Web Kit, together with Chrome's V8 JavaScript engine.
5. Media support: Includes support for the following media: H.263, H.264 (in 3GP or MP4 Container), MPEG-4, AMR-WB (in 3GP container), AAC, HE-AAC (in MP4 or 3GP container), MP3, MIDI, WAV, JPEG, PNG, and GIF.
6. Hardware support: Accelerometer Sensor, Camera, Digital Compass, Proximity Sensor, and GPS.
7. Multi-touch: Supports multi-touch screens.
8. Multi-tasking: Supports multi-tasking applications.

9. Flash support: Android 2.3 supports Flash 10.1.

10. Tethering: Supports sharing of Internet connections as a wired/wireless hotspot.

For this Research, we are looking at the possibility of extending this system to communicate with a REST API to provide services to other clients and ensure that the location data is stored in the databases of the smartwatch or smartphone devices are in synchronize with a cloud database. Accordingly, in our current development of an SMS alert system, we want to extend its compatibility and support for iOS devices.

### **3.5 Operating the Application**

After the application has been installed and the mobile phone has been configured for it, it can be executed like any other Java Platform Micro Edition (J2ME) application. Once it is started, the Welcome Screen is presented to the user. This screen is shown on at the start, every time the application is launched.

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### **4.1 Result and Discussion.**

The system was implemented by first designing the software. It was rigorously tested for its proper operation and reliability. Software Testing is an empirical investigation conducted to provide stakeholders with information about the quality of the product or service under test, with respect to the context in which it is intended to operate. Software Testing also provides an objective independent view of the software to allow the business to appreciate and understand the risks at implementation of the software. Test techniques include, but are not limited to the process of executing a program or application with the intention of finding software bugs. It can also be stated as the process of validation or verifying that a software program/application/product meets the business and technical requirements that guided its design and development, so that it works as it is expected and can be implemented with the characteristics. Software Testing, depending on the testing method employed, can be implemented at any time in the development process, however



the test effort is employed after the requirement have been define and coding has been completed.

### Home page

The home activity is the interface that a user sees when he/she launch the application that contains different navigations such as SMS button, exit app., current location, and GPS permission, that allow a user to initiate the application as shown below:

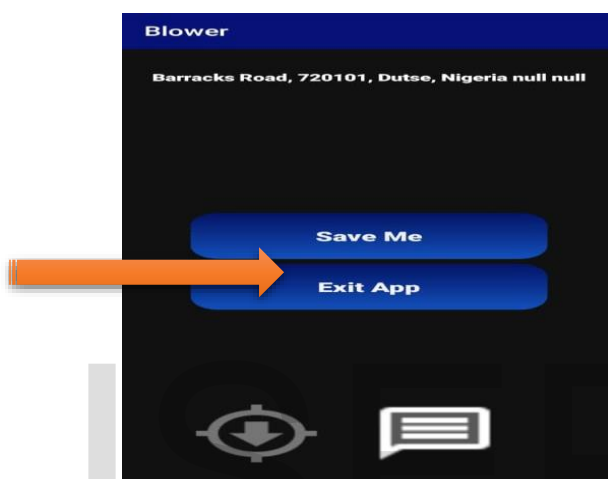
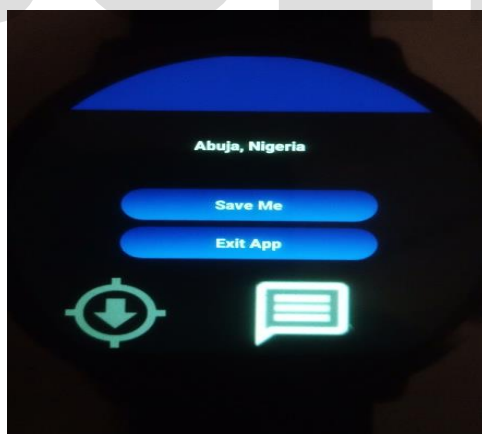
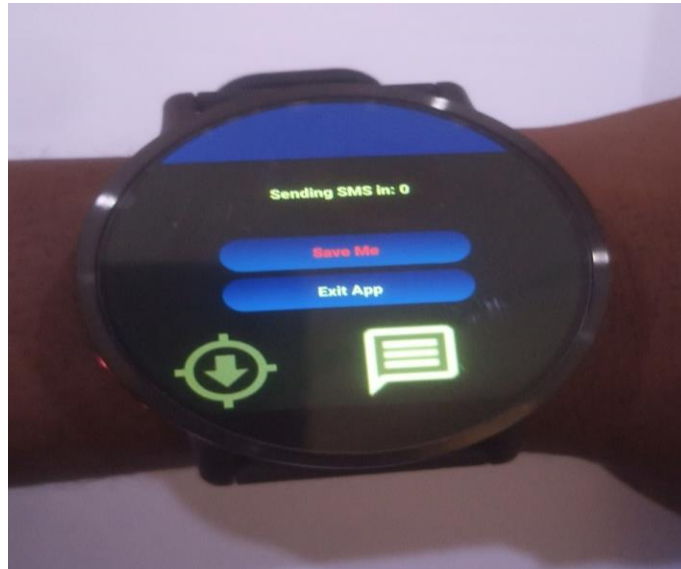


Figure 4.1 Home Screen of the Blower



Home view of the software



**Screen view of the Software (while generating and sending SMS)**



**Normal view of the Smartwatch, after minimizing the software**

#### **4.2 SMS End Point**

The SMS end point is the message send by the application to the appropriate receiving end that contain both the latitude and longitude of the victim as shown below;



Figure 4.2 SMS Receiving End Point.

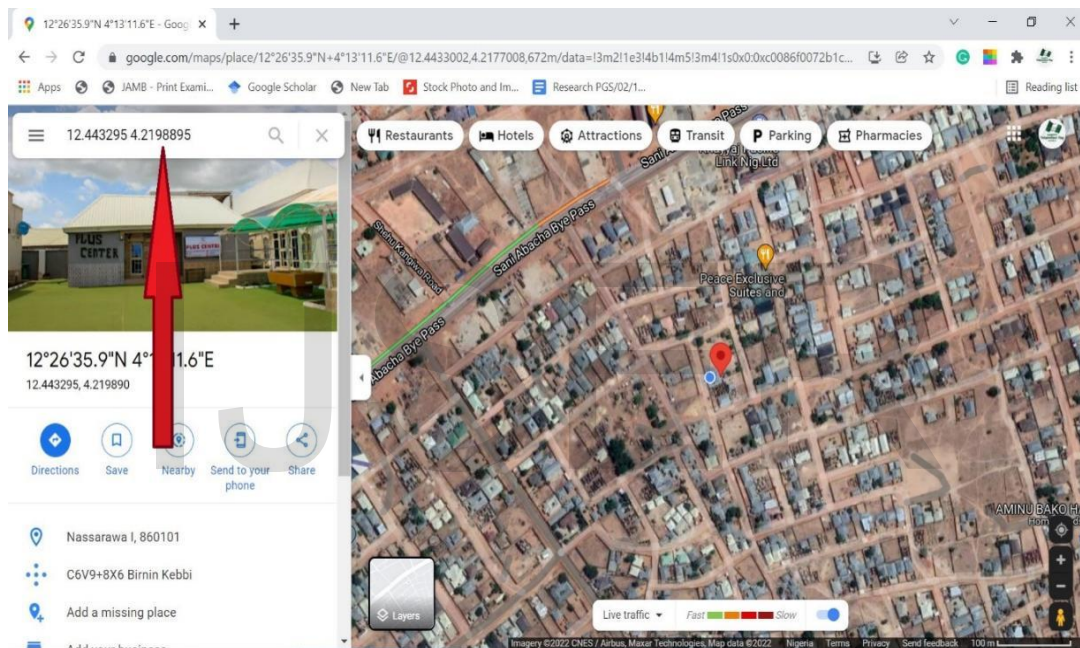


Figure 4.1 Coordinate Map of Gwandangaji site.

### 4.3 Output Testing

The integrated system is testing for the predefined output for the specific input. This testing is done at the unit level. It is ensuring that the system is correctly debug.

### 4.4 Performance Testing

The performance testing serves to validate and verify the quantity attributes of the system, such as scalability and reliability. Performance test is also coupled with stress testing and require both software and hardware instrumentation. It is necessary to determine resource

utilization. The actual runtime performance for the application is tested. The runtime taken to test and locate data is found out. The data conversion accuracy and speed is also tested.

### **5.1 Summary**

In this research work, we have design a system that can curb the kidnapping issues in Nigeria. This is in a bid to ensure a peaceful country for all.

Is a software solution that leverages the Geolocation API of common handheld digital devices (mostly via smartwatches with built-in functionalities of these digital devices)?

This software application system reports a crime when triggered using an SMS channel to the predefined phone number. These updates are sent periodically to cover gaps whenever there is a change of location of the victim.

### **5.2 Conclusion**

This project is implemented to locate the kidnapped victim, a functional application for smartwatch were developed in this research project. The application called 'Blower' can be installed on android smartwatch or smartphone that meets the hardware and software requirements, SMS text messages containing the location information of the victim are consistently sent out during a kidnapping situation. On the receiver side, the application is able to successfully receive the SMS text messages containing location information (coordinates) from the victim device. It is certainly a short term and preventive solution. This system will help its users in difficult situation. This system would be highly smart and easy to handle. Its quick action response will provide safety and security to individual user.

### **5.3 Recommendation**

We hope this system software called 'Blower' will help by minimizing kidnapping issues in Nigeria when properly deployed and utilized. This device will probably be very useful for the people. The setback is some smartwatches could be expensive however; others in the market are relatively cheap. The solution tries to cover many edge cases with compatibility and that is why endpoints are exposed for other app developers to build

extensions around the central application. We really believe that this endeavor will make a difference in the life of many in this world with individuals walking and travel fearlessly.

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