



**MAKERERE UNIVERSITY**

**COLLEGE OF ENGINEERING, DESIGN, ART AND  
TECHNOLOGY**

**DEPARTMENT OF ELECTRICAL AND COMPUTER  
ENGINEERING**

**BACHELOR OF SCIENCE IN COMPUTER ENGINEERING  
PROJECT PROPOSAL**

**DESIGN AND IMPLEMENTATION OF A LOW BUDGET TIME-  
SAVING SEMI AUTOMATIC ALARM RESPONSE SYSTEM  
UNDER LEGIT SYSTEMS LTD UGANDA**

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**A FINAL YEAR FULL PROJECT PROPOSAL SUBMITTED IN  
PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER  
ENGINEERING.**

## DECLARATION

This is to declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of our knowledge and belief, it contains no material previously published or written by another person except where due reference is made in the proposal itself.

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## **ACKNOWLEDGEMENT**

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Lastly, we would like to deeply thank our parents for their dedication in helping us achieve this accomplishment in our academic journey.

## **DESCRIPTIVE ABSTRACT**

A semi-automatic alarm response security system to combine both human and automated elements to respond to potential security breaches. Potential risks will be identified and analyzed by the system, which will then warn human operators so they may take appropriate action. A number of sensors, including motion detectors, cameras, and door and window contacts, can activate the system. When the system is activated, it first assesses the environment and applies sophisticated algorithms to gauge the hazard. Following this analysis, the system may launch a sequence of automated responses to warn human operators of the potential hazard, such as sounding a siren or flashing lights. The system offers manual overrides in addition to automated responses, enabling operators to manually activate particular responses or change the system's parameters as necessary. To offer a complete security solution, the system can also be connected with other security systems like access control and intrusion detection. A semi-automatic alarm response system, in general, provides a high level of protection and adaptability, enabling quick and efficient reactions to possible threats while simultaneously lowering the chance of false alerts.

## **LIST OF ACRONYMS AND ABBREVIATIONS**

**API** – Application Programming Interface

**BSG** – Bary Security Group

**GPRS** – General Packet Radio Service

**GPS** – Global Positioning System

**GSM** – Global System for Modules

**LED** – Light Emitting Diode

**SMS** – Short Messaging Service

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# CHAPTER ONE: INTRODUCTION

## 1.1 Background

In Uganda today, there are various private security firms providing top security services such as surveillance, dog services and alarm response systems. Some of these security firms include SGA, BSG, Magnum and G4S (nellions.co.ug, n.d.). The primary emphasis of this project is alarm response systems that can be activated by different emergency situations such as fire outbreaks, sudden medical concerns, robberies and burglary attacks. Many Ugandans are unable to afford private security services because of their cost which leaves majority of the population vulnerable to robberies and burglary attacks. According to Mazawo, the Journal of Faculties of Arts and Sciences (Ssamula, 2007), it appears that people in lower and middle residential areas face a higher risk of being victims of burglary than people who reside in high class areas. A total sample size of 1000 respondents yielded the largest portion as 498 (49.8%), residing in low class residential areas while 306 (30.6%) were of middle class and 192 (19.2%) were of high-class residential area. Furthermore, poverty may be a contributing factor to the differences in the victimization rates occurring in the three residential status areas. For example, out of 152 (15.2%) victims of robbery, 79 (52.0%) were residing in lower status areas, 39 (25.7%) from middle class and 33 (21.7%) were from high status areas. The implication of this study was that those in high class areas could easily afford crime preventive measures to avert crime more than those in lower class residential areas. The results of these analyses are consistent with previous studies that examined victimization by locality of occurrence (Detis, 1998).

Regarding the matter of fire outbreaks, Uganda loses over an estimated 30 billion in fire outbreaks alone annually. With reference to Statistics from the Directorate of Fire Prevention and Rescue services at fire brigade Kampala from the month of April to June 2017, revealed that Central division had the highest total of 19 fire outbreaks, followed by Makindye with 16 fire outbreaks, then Nakawa and Rubaga had 12 fire outbreaks and then Kawempe had 11 fire outbreaks (Hassan, 2017). Some of the recent fire outbreaks include the following:

- The fire at Mary Stuart Hall in Makerere University on Saturday, May 26th 2018 that injured three (3) students.
- The Sunday, September 30th 2018 fire at Toyota Showroom in industrial area (along Jinja road) that destroyed vehicles worth millions of dollars.
- The fire that gutted a hostel at UCU (Uganda Christian University) on the 13th April 2001 and later at another hostel on Thursday, November 4th 2010 claiming the lives of two students.
- Other fires were at Valley Courts Hostel Nakawa, Salabed building in Kisenyi, Kaswampa New Female Hostel at Islamic University in Uganda (IUIU) Mbale, among others.

The strong correlation between the increased incidence of crime and the rise in the standard of living suggests that the situation will not easily be reversed, and the problem can only get worse. Therefore, policies will be needed to reverse this type of scenario.

Legit Systems is a Uganda-based technology start-up that develops affordable and reliable security technologies. Its flagship product is the Askari product line which consists of general-purpose alarm panels and DC backup units. A variety of sensors such as smoke detectors, motion sensors, magnetic sensors, panic buttons are integrated into the system purposefully to trigger an alarm in the event of fire outbreaks, robberies and burglary attacks, and health emergencies respectively. This company is looking to provide alarm response services to urban dwellers in Uganda on top of alarm system hardware. These services are common in certain parts of developed nations, and available in developing nations like Uganda. However, only large establishments like banks and high-income households can afford them.

Standard alarm response systems rely on a command center model where command personnel receive alarm calls using desktop alarm response software. Upon receipt of an alarm call from a customer's alarm system, the type of emergency is systematically determined. The software then retrieves and displays the customer's address to which a suitable response team is sent to take care of the situation (sgasecurity.com, n.d.) (rocksecurity.co.ug, n.d.).

## **1.2 Problem Statement**

The current mode of alarm response system operation is costly due to the requirement of setting up a command center physical space, computers and personnel. The resources required to set up a sound command center round off to approximately UGX 30 million majorly comprising rent, salaries and equipment maintenance. This highly contributes to the reason why alarm response services are not affordable in Uganda.

In addition to high cost, the coordination between receiving alarm calls and actual response is difficult to maintain because it relies on communication between humans. An instance of this issue in the current system is that the location of security responders in different areas basically relies on a hunch by an individual at the command center. This means the command personnel is not aware of the actual location of the security personnel. This is a disadvantage to the industry because it leaves room for delay and miscommunication on emergencies.

## **1.3 Project Objectives**

### **1.3.1 Main Objective**

Our main objective is to design and implement a low budget time-saving semi-automatic alarm response system by leveraging technology in order to increase access to such services for small businesses and more households.

### **1.3.2 Specific Objectives**

To automate the delivery of response services to customers by dispatching incoming alarm calls to the nearest responders in real-time.

To integrate real-time location of security responder teams by employing GPS Technology to keep track of their exact locations during work hours.

To improve flexibility of both the responder and the monitoring personnel by eliminating the need for a command center.

## **1.4 Significance**

An essential tool for security and emergency management is a semi-automatic alarm response system. It enables prompt and effective response to alarms, cutting down on response time and raising success rates.

The ability to respond to alarms more quickly and effectively is one of the key benefits of our main project objective. In traditional manual alarm systems, human operators are required to receive and handle alarms, which very possibly causes delays and mistakes. As per our system design, we propose automatic processing of the alarms which are then routed to the right individuals, and this in turn significantly lowers the possibility of delays and human error.

A semi-automatic alarm response system also has the benefit of improving resource coordination. Coordination of a response might be challenging with a manual system since different individuals may have varying degrees of knowledge about an alarm. This proposed system should be such that it automatically routes alarms to the appropriate employees, who may then plan a reaction based on the data the system has provided. Additionally, for enhanced security, semi-automatic alarm response systems can be connected with other systems like CCTV and access control and provide real-time monitoring of the situation.

In conclusion, the proposed system design offers to deliver a quicker and more effective reaction to alerts, lowering the likelihood of delays and errors and enhancing resource coordination while putting into account the issue of affordability.

## **1.5 Justification of Problem in Uganda**

With reference to 2019 statistics (Uganda Poverty Rate 1989-2022, n.d.), the Uganda poverty rate is 89.00%, a 1.4% increase from 2016. Persons in households with an annual income under US\$7,500 were more likely to be victims of robbery and assault than members of households with income greater than US\$25,000 (Ssamula, 2007). Lower income and social status areas generally experience higher rates of criminal victimization than the middle and high-class residential areas. This finding places individuals without a substantial income at a higher risk of being victims of robberies and burglary attacks because they do not have the money to afford preventive measures such as installing burglar alarms, etc.

Furthermore, the existing mode of delivery of these services is unable to track the real-time location of security responders after they have been informed of an alarming call, which leads to less effective service delivery. Without knowing the actual location of the responder team, it is impossible to tell if in fact the emergency is being dealt with accordingly or if there are any maneuvers. Altogether, this is time-wasting and could be dangerous for the customer.

Lastly, after an emergency has been dealt with by a responder team, they are required to update an individual at the command center who then documents these records for purposes of monitoring progress. The main disadvantage here is that since the responders are tasked with reporting each emergency, some of the feedback provided may be inaccurate simply because there is no real-time monitoring which leaves room for incorrect updates. Given that this problem is not dealt with, alarm response services will only be available to large establishments and high-income households.

## **1.6 Scope of the Project**

Essentially, the project intends to reduce command center space to an android tablet/personal computer that can be monitored by a single individual anywhere in the country. The project will therefore not have an exact location, as security services will be ably mobilized as compared to the existing systems. Our application system should be able to be work 24/7 in order to monitor security responder teams on different shifts. Keeping track of their real-time locations will enable more effective service delivery and reliable record keeping as we intend to create a provision for the responders to leave soft copy reports after a response operation as opposed to record keeping using books. With future advancements, we hope to be able to involve law enforcing personnel to work hand in hand with this system for more effective service delivery.

## **1.7 Organization of the Proposal**

This project proposal flows from Chapter 1, a brief project background on alarm response systems and their existing mode of operation. It then proceeds to thoroughly explain the problem statement that lies within these very means of service delivery. Relevantly, it also provides statistics based on security in Uganda within the last few years. From this information we clearly state our project objectives. In comparison to the documentation of similar systems, Chapter Two comprises the literature review which critics the methodology used to design these systems and compares its functionality to our proposed system design. Reviewing existing literature helps us explore many design options and technologies used. With this prior knowledge, the software engineering cycle becomes easier. Agreed upon methodologies are then selected to implement each of our project objectives listed above under system design and implementation in Chapter Three. Our expected results are clearly stated, as all reference journals, newspapers, proposed budget and Gantt chart follow immediately after in the appendix.

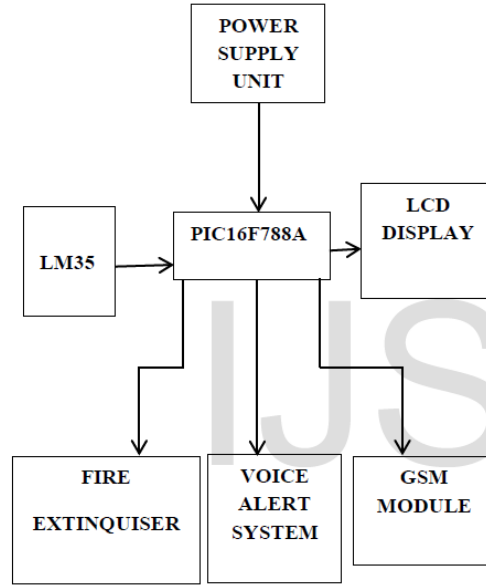
## **CHAPTER TWO: LITERATURE REVIEW**

### **2.1 Introduction**

In recent years, real-time monitoring of fire danger and remote automatic alarms has become a reality, due to advancements in sensor technology, computer network technology, and modern communication technology. In the literature, there are several approaches proposed to alarm response systems, some examples are provided below.

### **2.2 Automatic Fire Detection using SMS and Voice alert system**

(R.Sathishkumar , M.Vinothkumar , Devaraj Varatharaj , S.Rajesh ,S.M.Gowthaman, 2016) The review of current fire-detector kinds has been done in this paper, coupled with the creation of an automatic fire voice warning system based on a PIC microcontroller that is affordable, portable, and reliable technology for remotely alerting anyone to any fire events in commercial buildings. This paper, potentially solves the issue of fire outbreaks but specifically for commercial buildings such as banks and hotels. Our proposed system design entirely focuses on making these types of alarm response systems available for small businesses and more households in Uganda, hence the low-budget factor for a wide range of emergencies such as fire outbreaks, burglaries, robberies and health extremities. This paper's approach intends to warn its system users by delivering short messages (SMS) via the GSM network and voice, efficiently and quickly. The use of GSM technology is advised in these project types because of its fast and reliable communication as compared to the GPRS communication module which requires an internet connection. Communication over the internet may be fast however unreliable because a customer needs an uninterrupted subscription to data bundles in order to receive alarm alerts. This is typically not the case in GSM communication because the customer simply subscribes to monthly text messages which can efficiently be used throughout the subscription period. As per this study, we draw the conclusion that the proposed system can offer a secure, safe, and effective means of preventing accidents. A voice recorder, fire extinguisher, GSM module, PIC microcontroller unit, and LM35 fire sensor make up the suggested system, which is deployed on an industrial basis. It employs additional functionality such as voice recorder alerts and instructions on how to operate fire extinguishers in the event of a fire emergency. This idea is brilliant as it caters for people that may not know how to operate fire extinguishers within the building, by making it possible for anyone to follow instructions and put out the fire if possible. While this project is based on fire outbreak emergencies, some ideas such as voice recorder alerts may be extremely useful for the illiterate and we hope to integrate a voice recorder alert system into our design as we start to update and upgrade its functionality. In comparison to (Kong, 2016), this approach integrates a voice recorder system that is used along with a GMS wireless communication module. The GMS module sends an alert message to a respective user's mobile phone while the voice recorder alerts and instructs employees to operate the use of fire extinguishers when the LM35 sensor detects a fire. Attached is a block diagram of the system's functionality.



*Figure 1: Block diagram of the components of the proposed system in the paper*

### 2.3 Remote Fire Automatic Alarm System Based on Zigbee Technology and TC35i Module

In view (Kong, 2016), a type of remote fire automatic alarm system based on the Zigbee system-on-chip CC2530F256 and the GSM wireless communication module TC35i was presented. In this work, the system is able to perform the dual functions of indoor fire danger information monitoring and remote alarm message automatic transmission. As a result, the use of Zigbee networking technology can lay a solid foundation for multipoint fire danger information real-time acquisition and wireless transmission. As per this paper, we still observe a fire emergency outbreak solution. Many of the existing works focus mainly on fire outbreaks, however other emergencies such as robberies, burglaries and medical emergencies also need to be tended to. Our proposed system design is such that it caters for most of the common emergencies listed above using sensors readily integrated into the alarm panel systems. Signals such as fire and motion are detected using smoke detectors and motion detectors respectively while health emergencies are activated using panic buttons. According to the above article, the remote fire automatic system provides real-time monitoring of a household and automatic message transmission to a client in the event that the sensors detect signs of a fire outbreak such as gas. Below is a simple graphical presentation of how this system works.





Figure 2: Transmission process of Fire Alarm short message



Figure 3: Reception result of fire alarm short message

## 2.4 Automatic Intrusion Response System Based on Aggregation and Cost

One of the most significant issues in intrusion detection is automation of responses to intrusions however it has so far mostly been ignored, necessitating more research in and of itself. A major drawback is the fact that existing intrusion detection systems frequently provide too many identical or similar alerts for a single intrusion and system immune alerts, whereby responding repeatedly takes a lot of time. (Yu Sun, Rubo Zhang, June 20-23, 2008, Zhangjiajie, China) Therefore proposes, using aggregation to classify the alerts and response cost to reduce system immune alarms as a better solution to the acknowledged problem. This journal details the implementation and provides a prototype of an automatic intrusion response system. The concept of aggregation basically involves clustering alerts to display an organized alert system. (Yu Sun, Rubo Zhang, June 20-23, 2008, Zhangjiajie, China) suggests an effective method to deal with customer alerts in our system given an occurrence of the problem scenario described above.

## **2.5 A Web-based Communication Module Design of a Real-time Multi-Sensor Fire Detection and Notification System**

This research project (Robert Sowah, Abdul R. Ofoli, Selase Krakani, Seth Fiawoo, 2014 IEEE) was aimed at addressing the frequent fire outbreaks and associated emergency response issues. It presents the design and implementation of a web-based communication module for a multi-sensor fire detection and notification system. Real-time fire alerts are sent to building owner(s) and the web-based fire notification subsystem via a SIM900 Global System for Mobile Communication (GSM) module. It's design also provides the fire and rescue services with a map-assisted navigation system to aid in the location of a fire outbreak, which is especially useful when there is poor house and street addressing within a neighborhood. This invention shares a similar concept with our system design as we intend to provide security responder teams with navigation assistance as they respond to incoming calls. This concept is brilliant because it helps us to track their exact location while providing them with maps to easily get to the alarming location.

In the field of health, the work done on these systems is mostly based in health facilities where medical personnel are able to monitor patients. For example, (Sulima Mohamed Fati, Amgad Muneer, Dheeraj Mungur, Ahmad Badawi, 2018, Malaysia) proposed a health monitoring system for a coma-based patient where the measurement of four health parameters temperature, heartrate, blinking rate and physical activity is implemented using sensors.

## **2.6 Summary of Literature Review**

Referencing the above journals, we observe that quite a number of attempts have been made at designing alarm response systems. Many of these attempts are based on fire outbreaks, intrusion and notifying the associated people. Affordable and reliable technology has been employed in these systems, we therefore plan to systemically integrate some concepts such as navigation assistance into our prototype design to cater for real-time tracking and faster delivery of responses.

# **CHAPTER THREE: METHODOLOGY**

## **3.1 Introduction**

As per the Global Economy (theglobaleconomy.com, n.d.), Uganda currently has a 6.6 security threat index value, on a scale of 0 (low) – 10 (high). While this value has gradually reduced over the years, it is still above average. The majority of the population manages businesses that are vulnerable to fire outbreaks and security attacks due to lack of affordable and reliable security services. A possible solution to the challenges associated with the standard alarm response technology is a low-budget semi-automatic integrated alarm response platform that comprises an ecosystem of software applications that support alarm response operations. The software applications include a command mobile app, a master web application and a response app. With the implementation of this project, private security services can be delivered to an appreciable percentage of the population.

## 3.2 System design and implementation

### 3.2.1 Main Objective

To design and implement a low budget time-saving semi-automatic alarm response system by leveraging technology in order to increase access to such services for small businesses and more households.

The current mode of operation of alarm response services involves a command center at which incoming calls are received through desktop software. This software retrieves and displays the customer's address is given to a group of armed security personnel on dispatch. A physical space, adequate desktop personnel and computers are required to manage incoming alarming calls.

To solve this issue, this project proposes an ecosystem of software applications across which all parties involved can cooperate. This platform would comprise the following;

**Command application** - an android application that runs on a cellular tablet PC. It receives alarm calls and relays them to the master web application. It can also be used to monitor response operations in real time.

**Master web server** - a web application that runs on a remote server. It has a database of all customers and associated data. The app receives response requests from the command app, identifies the nearest responder and dispatches it. The master web app monitors the location of each responder phone and also receives response reports from the responders.

**Response application** - an android mobile application that runs on an android smart phone. Every responder must carry a smartphone that runs the response app. The app receives dispatch requests from the master app. The dispatch request contains the alarming customer's location information. Below is an illustration of the proposed system architecture.

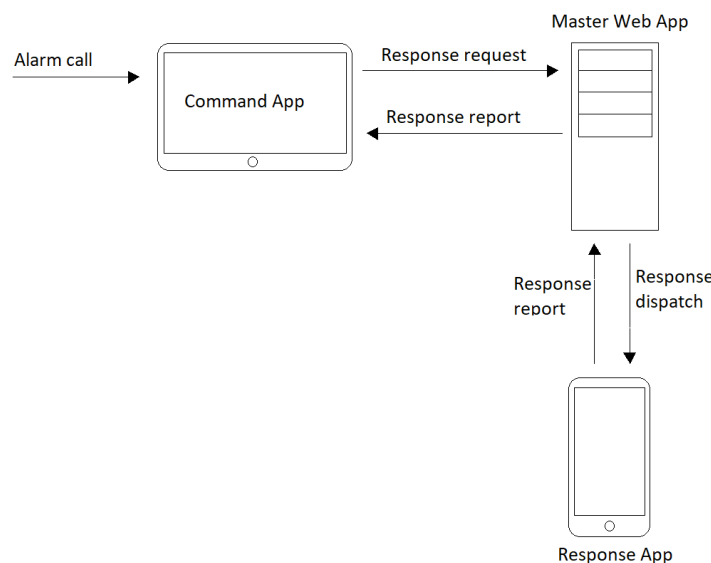
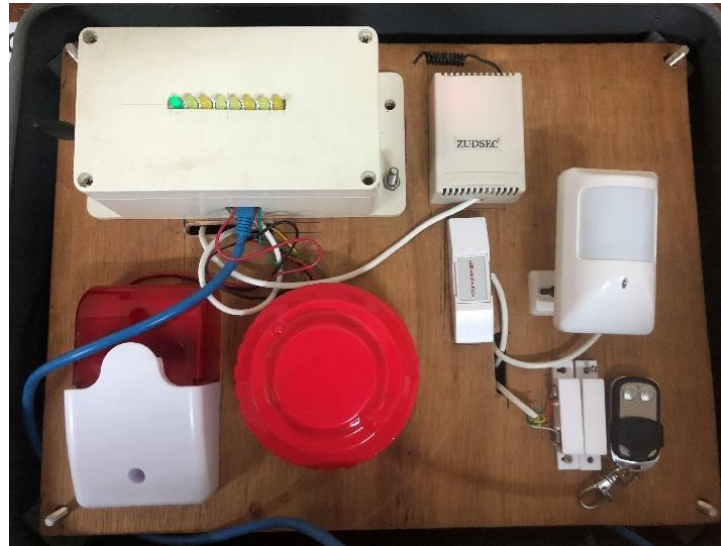


Figure 4: Proposed system architecture

The above eco system of applications is to be integrated into an existing module of the Askari product under Legit Systems Uganda. The image below displays a simple product prototype of for demonstration and testing purposes.



*Figure 5: Askari product prototype*

The sensors are systematically wired to the alarm panel, which, when activated, sets a unique LED light for each sensor. The system design is such that the alarm panel is activated when a sensor reading goes above the preferred set threshold. A brief window of 10 seconds is given before the sounding siren goes off. This is to cater for scenarios where a particular sensor is inadvertently engaged. Depending on the type of alarm purchased by a customer, ranging from fire alarms, burglary alarms and medical emergencies, after this period has passed, the alarm panel triggers the siren and simultaneously sends an alert SMS to the emergency personnel using its GSM module.

With this current mode of operation, the command personnel receive the SMS from the triggered alarm and reach out to the nearest possible security responder team to handle the emergency. This project is looking to eliminate the need for a command center space and instead bounce the incoming emergency alarm straight to the nearest security responder team in the area through the response application. The command app is simply to be used to monitor response operations in real time and receive feedback reports from responder teams. Communication between the command and response applications is done through the master web server.

### **3.2.2 Specific Objective**

To improve flexibility of both the responder and the monitoring personnel

By introducing this platform, the command center is reduced to a single tablet PC that can be monitored from anywhere in the country. Similarly, the responders are able to report the feedback

of an operation using the responder application. The main advantage of this function is that it generates data that can be used for improving the service.

### 3.2.3 Specific Objective

To automate the delivery of response services to customers

Our system design is such that it provides the real-time location of the responders during work hours. This makes it easier to locate and monitor the responders during an operation

Altogether, this increases efficiency of response operations and also shifts the focus of the security industry from funding a command center to equipping the response teams with more resources to take on different emergency situations.

Summary of proposed methodology to be used.

*Table 1: Expected deliverables of the proposed methodology*

OBJECTIVE	METHOD	TOOL	DELIVERABLES
<ul style="list-style-type: none"> <li>To provide real-time location of security responder teams</li> </ul>	<ul style="list-style-type: none"> <li>Employing GPS Technology to keep track of their exact locations during work hours</li> </ul>	<ul style="list-style-type: none"> <li>Google Maps API</li> <li>ReactNative</li> <li>JavaScript</li> <li>Fire Base</li> </ul>	<ul style="list-style-type: none"> <li>Higher accuracy in dispatching of incoming requests to responder, therefore time-saving.</li> </ul>
<ul style="list-style-type: none"> <li>To automate the delivery of response services to customers</li> </ul>	<ul style="list-style-type: none"> <li>Dispatching incoming alarm calls to the nearest responders in real time.</li> </ul>	<ul style="list-style-type: none"> <li>Java Script</li> <li>Microprocessor (ATMega)</li> <li>React Native</li> <li>Google maps API</li> </ul>	<ul style="list-style-type: none"> <li>Web-based portal that provides customers with real-time access to their alarm status, response history.</li> </ul>
<ul style="list-style-type: none"> <li>To improve flexibility of both the responder and the monitoring personnel</li> </ul>	<ul style="list-style-type: none"> <li>Eliminating the command center to reduce it to a single tablet PC</li> </ul>	<ul style="list-style-type: none"> <li>Fire Base</li> <li>React Native</li> <li>Java Script</li> </ul>	<ul style="list-style-type: none"> <li>Significant reduction in cost of setting up a command center</li> <li>Software based feedback reports from responder teams.</li> </ul>

### **3.3 Expected Results**

On completion of this project, we expect to have a fully functional semi-automatic alarm response system with the ability to receive incoming calls, dispatch them to the nearest responders while monitoring their real-time location and, store information reports on their daily activities.

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## APPENDIX

### A: Project Timeline

Below is an estimated schedule for project implementation.

*Table 2: Estimated project timeline*

NO.	TASK	START DATE	END DATE	DURATION
1	Literature Review	3/11/2022	7/07/2023	246 days
2	Proposal Writing and Submission	18/11/2022	1/12/2022	13 days
3	Mid-term Oral Presentation	8/02/2023	9/02/2023	2 days
4	Final project proposal report submission	24/02/2023	24/02/2023	1 day
5	Design and Implementation of the system	20/02/2023	7/07/2023	132 days
6	Testing functionality, performance and error rectification of the system	1/06/2023	7/07/2023	36 days
7	Final project Oral Presentation	21/06/2023	22/06/2023	2 days
8	Final Report Writing and Submission	23/06/2023	7/07/2023	14 days



## B: Gantt Chart

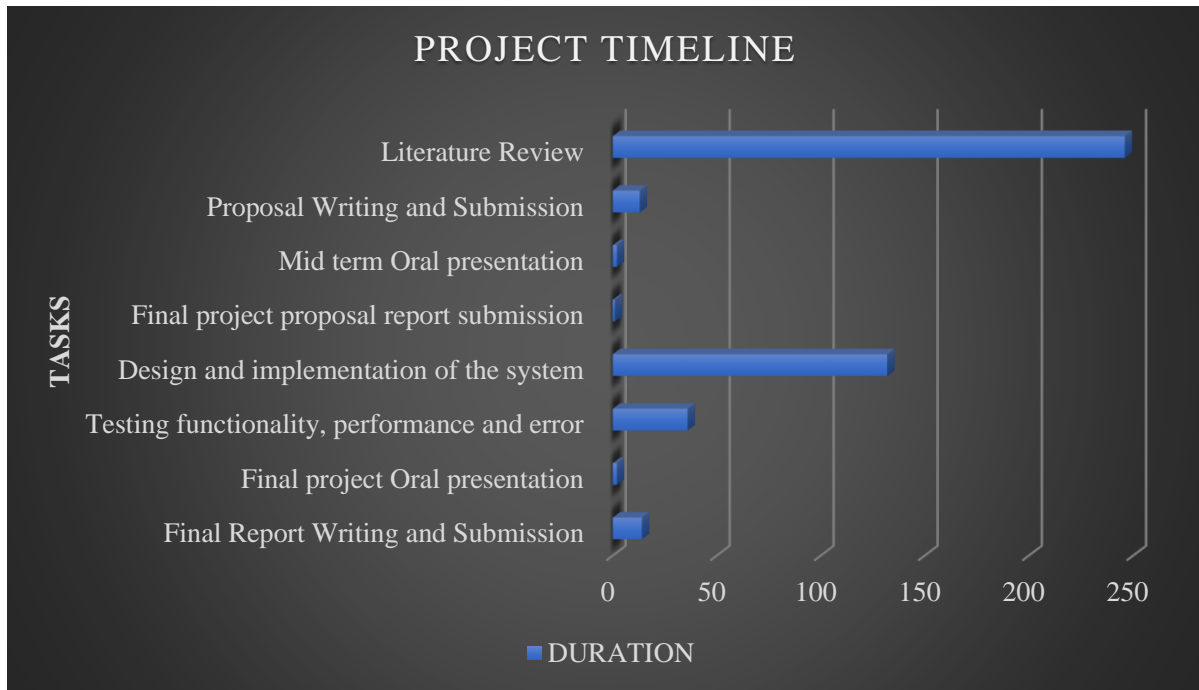


Figure 6: Gantt chart for project timeline

## C: Budget

Below is Legit Systems Alarm System Catalogue. The application software is to be systemically integrated into these modules to perform alarm response services.

Table 3: Legit Systems Catalogue

ITEM	DETAIL	PRICE(UGX)
Askari B1 Panel	<ul style="list-style-type: none"> <li>General-purpose alarm panel</li> <li>Up to 7 zones</li> <li>Normally closed</li> <li>12v 5A power adapter</li> <li>GSM (call &amp; amp; SMS)</li> <li>2-year warranty</li> </ul>	300000
Indoor motion sensor	<ul style="list-style-type: none"> <li>Normally closed</li> <li>12m range</li> <li>110 degrees angle</li> <li>12V DC</li> </ul>	50000
Magnetic sensor	<ul style="list-style-type: none"> <li>Normally closed</li> </ul>	20000

Strobe light	<ul style="list-style-type: none"> <li>• 12V DC</li> <li>• LED-based</li> <li>• 7cm diameter</li> </ul>	20000
Remote set	<ul style="list-style-type: none"> <li>• 30m range</li> <li>• 2 remotes</li> <li>• 2 switches</li> <li>• Learning code</li> <li>• 12V DC</li> <li>• 27A(12V) dry cells</li> </ul>	100000
Panic button	<ul style="list-style-type: none"> <li>• NO/NC</li> </ul>	10000
Smoke detector	<ul style="list-style-type: none"> <li>• Conventional</li> <li>• 2 wire/4 wire</li> </ul>	80000
Miscellaneous expenses		300000
<b>TOTAL</b>		<b>880000</b>

## D: Data Collection Form

*Table 4: Data Collection Form*

MODULE EXPLORED	OPERATION	DATA COLLECTED
<p>1) <b>BSG (Bary Security Group) Company.</b></p> <p>We visited this site and interacted with their current mode of system operation.</p>	<p><b>Software Used.</b> Cell Secure Software, an existent alarm response system.</p>	<p>Moderately efficient as the delivery of SMS to appropriate personnel lags by an average of 2 minutes.</p>
		<p>It requires personnel to oversee its operation. It is purely a web-based software Record keeping is done using books</p>
	<p><b>Pricing.</b> Alarm response services</p>	<p>We faced a challenge in this sector as they would not conveniently share their pricing unless their services were being purchased. They however mentioned that it was affordable without an exact price range.</p>