



FACULTY OF ENGINEERING

**DEPARTMENT OF COMPUTER ENGINEERING AND
INFORMATICS**

FINAL YEAR PROJECT REPORT

**DESIGN AND IMPLEMENTATION OF A VOICE RECOGNITION
WEARABLE EMERGENCY ALERT DEVICE**

By

NATUHWERA PROSSY

REG. NO: BU/UG/2020/1973

SUPERVISOR: PROF. OCEN GILBERT

This Final Year Project Report is submitted to the Department of Computer Engineering and Informatics in partial fulfillment of the requirement for the award of a Bachelor's Degree in Computer Engineering of Busitema University

JUNE, 2024

DECLARATION

I **NATUHWERA PROSSY** BU/UG/2020/1973 declare that this project report is my original work and has never been published or submitted for any other degree award to any other university or institution of higher learning for any academic award.

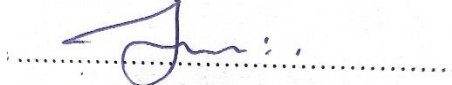
Sign: 

Date: 12/06/2024

APPROVAL

The final year project under the title “**DESIGN AND IMPLEMENTATION OF A VOICE RECOGNITION WEARABLE EMERGENCY ALERT DEVICE**” has been done under my guidance and is now ready for examination.

Signature



Date



PROF. OCEN GILBERT

SUPERVISOR

DEPARTMENT OF COMPUTER ENGINEERING AND INFORMATICS

DEDICATION

I dedicate this report to my lovely Father Mr. Byaruhanga John, my lovely sister and brothers. I am very grateful for the support and endeavors done for me throughout my entire academic journey.

ACKNOWLEDGEMENT

I am thankful to the Almighty God for the protection and provision throughout this project.

I convey my sincere gratitude to my Supervisor, **Prof. Ocen Gilbert** and the entire Department of Computer Engineering and Informatics for the guidance as well as the technical knowledge applicable to the research and design of the system.

I am also grateful to my Lecturers, **Madam Nalwanga Rosemary, Dr. Mirondo Godfrey and all my classmates** who have encouraged and supported me throughout this entire project.

TABLE OF CONTENTS

DECLARATION	i
APPROVAL	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
LIST OF FIGURES	viii
LIST OF TABLES	viii
LIST OF ACRONYMS	ix
ABSTRACT	x
CHAPTER ONE: INTRODUCTION.....	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Objectives.....	3
1.3.1 Main Objective	3
1.3.2 Specific Objectives	3
1.4 Justification/Significance	3
1.5 Scope	4
1.5.1 Technical Scope.....	4
1.5.2 Geographical Scope.....	4
1.5.3 Time Scope.....	4
CHAPTER TWO: LITERATURE REVIEW	5
2.1 Introduction	5
2.2 Main Concepts of the Project	5
2.2.1 Voice Recognition	5
2.2.2 Personal Safety	5
2.2.4 Alert Device.....	6
2.2.5 Sensor	6
2.3 Existing Systems	6
2.3.1 A Raspberry pi based smart women safety using IOT	6
2.3.2 Safety Armband for Women and Children using ARM7	6
2.3.3 Self Defense System for Women Safety with Location Tracking and SMS Alerting Through GSM Network.....	7
2.3.4 Women Security System using GSM and GPS	7

2.3.5 Mobile Application for Women's Safety	7
2.3.6 Summary of existing systems	8
2.4 The Developed System.....	9
CHAPTER THREE: METHODOLOGY	11
3.1 Introduction	11
3.2 Requirements.....	11
3.3 Data Collection Methods.....	11
3.3.1 Literature Review	11
3.3.2 Interviews	12
3.4 Requirement Analysis	14
3.4.1 Functional requirements	14
3.4.2 Non-functional requirements	15
3.5 System Design.....	15
3.5.1 Hardware tools.....	15
3.5.2 Software Tools.....	16
3.5.3 System Block Diagram.....	16
3.5.4 Logical design.....	17
3.5.5 Physical design	17
CHAPTER FOUR: RESULTS	19
4.1 Introduction	19
4.2 Police interventions	20
CHAPTER FIVE: IMPLEMENTATION AND TESTING	22
5.1 System Implementation.....	22
5.1.1 Hardware implementation	22
5.1.2 Software Implementation	22
5.2 Development platforms	22
5.3 Code Designs.....	22
5.4 Testing and validation	22
5.4.1 Unit testing	23
5.4.2 Integration testing	23
5.4.3 System testing.....	24
5.4.4 System Verification	24

5.4.5 Validation	24
CHAPTER SIX: RECOMMENDATION AND CONCLUSION	25
6.1 Introduction	25
6.2 Summary Critical Analysis of work done	25
6.3 Challenges faced	26
6.4 Recommendations	26
6.5 Conclusion.....	26
REFERENCES	27
APPENDICES	29
Appendix A: The code designs	29
Appendix B: Interview Questions	37
Questions for Police Officers	37
Questions for Victims	37
Appendix C: Circuit diagram	40
Appendix D: Developed system.....	41

LIST OF FIGURES

Figure 1 showing Hardware tools used.....	15
Figure 2 showing Perforated Board	16
Figure 3 showing System Block Diagram	16
Figure 4 showing System Logical Design	17
Figure 5 showing System Physical Design.....	18
Figure 6 showing Registered Rape Cases in 2020.....	19
Figure 7 showing Registered Rape Cases in 2022.....	20
Figure 8 showing Registered Rape Cases in 2023.....	20
Figure 9 showing Unit Testing	23
Figure 10 showing Integration Testing.....	23
Figure 11 showing System Testing, Verification and Validation.....	24

LIST OF TABLES

Table 1 showing Existing system	8
Table 2 Showing Rape Cases registered.....	19
Table 3 Showing Murder Cases registered	19

LIST OF ACRONYMS

1. GPS.....Global Positioning System
2. GSM.....Global System for Mobile Communications
3. IDE..... ..Integrated Development Environment
4. LED.....Light Emitting Diode
5. SMS.....Short Message Service
6. VRMVoice Recognition module

ABSTRACT

Today's current global scenario, the basic question in every people's mind, considering the continuous increase of issues on personal safety in the recent past is mostly spoken about their safety and security. Personal safety is an individual's ability to go about their everyday life free from the threat or fear of psychological, emotional or physical harm from others. The only thought haunting every individual is when they will be able to move freely on the streets in the odd hours without worrying about their safety[1]. This project describes a voice recognition wearable emergency alert device for personal safety using GSM. In case of emergency situations, a voice command is input and once recognized by the recognition board, it activates the GPS for location tracking and an SMS is sent to the relatives and authorities for rescue. This document describes a portable, quick responding and cost-effective system for an individual and especially when a person in distress can call for help just with the voice command. The people wearing this device as a watch, in case of any attack or when they sense any danger, they input a voice command through the voice recognition module and a message alert is sent to a few predefined emergency numbers for rescue[1]. By providing the instant location of the victim to relatives and authorities, the incident could be prevented and the culprit apprehended.

Key terms: Wearable, Voice recognition, Emergency, Alert device.

CHAPTER ONE: INTRODUCTION

This chapter includes the background, the problem statement, the objectives, the justification and the scope.

1.1 Background

Personal safety is an individual's ability to go about their everyday life free from the threat or fear of psychological, emotional or physical harm from others. The wearable emergency alert device enhances personal safety by providing a reliable method to call for help without needing to physically interact with the device. This especially important for vulnerable populations such as the elderly, disabled who find might find themselves in situations where they cannot reach a phone or other alert systems [6].

Today's current global scenario, the basic question in every people's mind, considering the continuous increase of issues on personal safety in the recent past is mostly spoken about their safety and security [1].

In Uganda, there are many cases reported about individuals kidnapped and murdered. According to Daily Monitor, Mr. Emilian Kayima, by then (2018) the police spokesperson said 25 cases were reported in three months, five ended up in the murder of the victims. Some of the victims include Charity Kyohirwe, 32, a resident of Masajja Parish in Makindye Division, and a 19-year-old girl, Brinah Nalule. The trend overshot after the infamous kidnap of Suzan Magara, a 28-year-old cashier, whose body was found on the Southern Bypass in Wakiso District after 20 days in captivity [2]. Kidnaps have been motivated by demand for economic gains, vengeance by lovers, extortion or self-gain from relatives and ritual purposes among others. According to the official annual crime report 2020, a total of **207** cases of Kidnap were reported throughout the country compared to **159** cases reported in 2019, giving a **30%** increase. **142** cases were real kidnaps while **65** cases were that of self-kidnap [3].

Following the official annual crime report 2022, A total of 1,623 cases of Rape were reported to Police in 2022 compared to 1,486 cases reported in 2021, giving an increase of 9.2%. Out of the 1623 cases, a total of 1,439 Female Adults and 184 Female Juveniles were victims of rape [4].

Following the official annual crime report 2023, a total of 1,577 cases of Rape were reported to Police compared to 1,623 cases reported in 2022, giving a decrease of 2.8%. By the end of 2023,

REFERENCES

- [1] L. C. Karunya, P. Harini, S. Iswarya, and A. Jerlin, “Emergency Alert Security System for Humans,” *Int. J. Commun. Comput. Technol.*, vol. 7, no. SP01, pp. 1–5, 2019, doi: 10.31838/ijccts/07.sp01.02.
- [2] “Unsolved:Killings by Motorcycle Hitmen and Serial Murders of Women in Uganda. Andrew Otine 1,” pp. 1–32.
- [3] Uganda Police, “2020 Report Annual,” *Sap*, p. 201, 2021.
- [4] UPF, “OFFICIAL ANNUAL CRIME REPORT 2022_compressed,” *Report*, p. 106, 2022, [Online]. Available: <https://www.upf.go.ug/download/the-2022-annual-crime-report/>
- [5] R. Wolkomir, “Protect serve,” *Smithsonian*, vol. 29, no. 8, 1998.
- [6] S. Bhagwat, M. Funde, R. Sonawane, S. Deore, and S. Ingale, “Survey on ‘Woman Safety and Alert System,’” *Int. Res. J. Eng. Technol.*, no. May, pp. 453–456, 2021, [Online]. Available: www.irjet.net
- [7] M. Pradeep, R. Abinya, S. S. Anandhi, and S. Soundarya, “Dynamic Smart Alert Service for Women Safety System ,” *Int. J. Commun. Comput. Technol.*, vol. 5, no. 2, pp. 58–66, 2019, doi: 10.31838/ijccts/05.02.05.
- [8] R. Yadav, D. P. Raut, and R. Vighne, “A Mobile Application for Women ’ s Safety : WoSApp,” vol. 5, no. 1, pp. 64–69, 2017.
- [9] B. Cusack, B. Antony, G. Ward, and S. Mody, “Assessment of security vulnerabilities in wearable devices,” *Proc. 15th Aust. Inf. Secur. Manag. Conf. AISM 2017*, pp. 42–48, 2017, doi: 10.4225/75/5a84e6c295b44.
- [12] <https://www.elgonfm.com/news/details/439/police-are-hunting-for-unknown-assailants-who-kidnapped-and-murdered-the-bugiri-district-inspector-of-schools>
- [13] <https://www.monitor.co.ug/uganda/news/national/two-arrested-over-murder-of-police-officer-4492286>

[14] <https://nilepost.co.ug/uncategorized/192063/scholars-concerned-by-increasing-cases-of-rape-defilement>

[15] <https://www.kfm.co.ug/news/ubos-moves-to-strengthen-security-of-enumerators-following-attacks-that-claimed-a-life.html>