

---

**FACULTY OF ENGINEERING**  
**DEPARTMENT OF COMPUTER ENGINEERING**

**FINAL YEAR PROJECT REPORT**

**TITLE: MOBILE PHONE USAGE MONITORING AND CONTROL  
SYSTEM WHILE DRIVING**

**BY AINEMBABAZI**

**AMBROSE REG N0:**

**BU/UG/2019/0114**

**Email: [ainembabaziambrose662@gmail.com](mailto:ainembabaziambrose662@gmail.com)**

**Tel: +256-756209174**

**SUPERVISOR: Dr. MATOVU DAVIS**

**Final Year Project Report Submitted to the Department of  
Computer Engineering in Partial Fulfillment of the requirements  
for the Award of Bachelor of Computer Engineering Degree.**

**September, 2023**

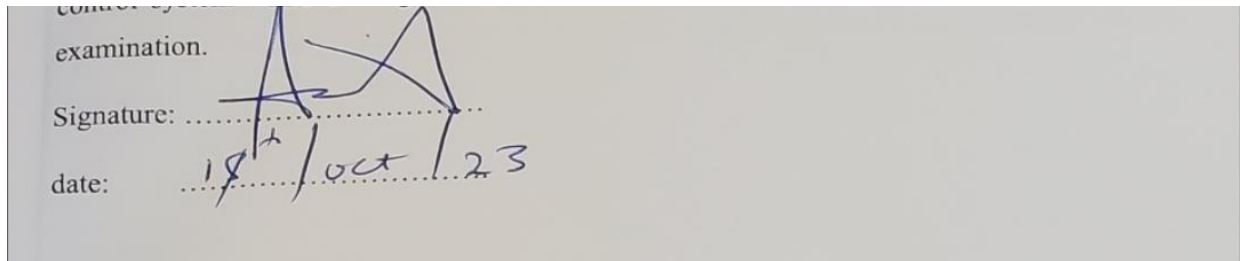
## DECLARATION

I **AINEMBABAZI AMBROSE**, declare that this project report is my original work and has never been submitted to any institution of learning for the award of degree.

Signature:	..... <i>Amb</i> .....
Date:	..... <i>26.09.2023</i> .....

## APPROVAL

This is to certify that the project proposal under the title “Mobile phone usage monitoring and control system while driving” has been done under my supervision and is now ready for examination.



**Supervisor: Dr. MATOVU DAVIS.**

Department of computer engineering.

Faculty of Engineering

Busitema University

## **DEDICATION**

I dedicate this project to God Almighty, my creator, my source of inspiration, wisdom, knowledge, and understanding. A special feeling of gratitude to my loving parents, Bayenda Bonifence and Monday Rosette for the continuous support especially spiritually, financially, morally and all aspects of life.

## **ACKNOWLEDGEMENT**

My Supervisor, Dr. MATOVU DAVIS. who has guided me throughout this project proposal preparation, My parents Mr. Bayenda Bonifence and Mrs. Monday Rosette for the continuous support especially spiritually, financially, morally and all aspects of life. All my friends who encouraged me tirelessly in my academics. Above all the almighty God who has given me life, strength and for providing me with the right people and information toward the completion of this project.

## **ABSTRACT**

This project outlines the development of a Mobile Phone Usage Monitoring and Control System While Driving designed to enhance road safety by curbing distracted driving caused by mobile phone usage. With the advent of smartphones, distracted driving cases have gone up where many drivers are fond of texting while driving. Police records indicate that at least five in 10 motorists use their phone while driving. Despite regulations and awareness campaigns, many drivers continue to use mobile phones while driving, posing a risk to themselves and others. Existing solutions such as text message auto-reply, call blocking, or manual activation require driver intervention, which can be ignored or overridden, thus not providing effective monitoring and control. The project addresses this problem through the implementation of an innovative system that leverages advanced technology such as mobile sensing and control mobile phone usage while driving, with the goal of improving road safety and reducing accidents caused by distracted driving. This project discusses the hardware as well as the software modules involved in the mobile phone usage monitoring and control system while driving. The system uses a camera to monitor the use of a mobile phone by a driver while the vehicle is in motion. The system typically consists of sensors, microcontroller, and communication devices that are connected to a network. The sensors can detect the movement of the vehicle and the use of the mobile by the driver. The system has a user interface (a web-based dashboard) to allow administrators monitor and manage mobile phone usage data, set preferences, and configure system settings.

## **A LIST OF ABBREVIATIONS AND ACRONYMS**

**USB** -Universal Serial Bus

**IoT** - Internet of Things

**CISC** - Complex Instruction Set Computer

**RISC** - Reduced Instruction Set Computer

**ALU** - Arithmetic Logic Unit

**CMOS** - Complementary Metal-Oxide-Semiconductor

**EEPROM** - Electrically Erasable Programmable Read-Only Memory

**SRAM** - Static Random Access Memory

**IDE** - Integrated Development Environment

**I/O** - Input/Output

**PHP** - Hypertext Preprocessor

**IR sensor** – Infrared sensor

# TABLE OF CONTENTS

DECLARATION .....	.....
i APPROVAL .....	.....
ii	DEDICATION
.....	.....iii
ACKNOWLEDGEMENT .....	.....iv
ABSTRACT .....	.....
vA LIST OF ABBREVIATIONS AND ACRONYMS	.....vi
.....	TABLE OF CONTENTS
.....	.....vii
.....	CHAPTER ONE:
INTRODUCTION.....	1
1.1 Background .....	1
1.1 Problem statement .....	2
1.2 Main objective .....	3
1.1.1 Specific oobjectives.....	3
1.3 Justification and significance.....	3
1.4 Scope .....	3
1.4.1 Technical scope .....	3
1.4.2 Geographical scope .....	4
1.4.3 Time scope .....	4
CHAPTER TWO: LITERATURE REVIEW.....	5
2.1 Introduction .....	5
2.2 Existing systems and their weaknesses .....	5
➤ Automated text messages.....	5
➤ Call baring .....	5
➤ CellControl .....	5
➤ weaknesses.....	5
➤ LifeSaver.....	6
➤ TextBuster .....	6
➤ SafeDrivePod.....	6
➤ DriveSafe Mode.....	6
2.3 Comparison table for the existing systems.....	7
2.4 Proposed system .....	8
CHAPTER THREE: METHODOLOGY .....	9
3.1 Introduction .....	9
3.2 Requirement collection (data gathering).....	9



➤ Literature review:.....	9
➤ Interviews: .....	9
➤ Observation: .....	9
3.3 Requirement analysis.....	9
3.4 Functional requirements.....	9
3.5 Non-functional requirements.....	10
3.6 System design .....	10
3.6.1 Hardware tools.....	10
3.6.2 Software tools.....	11
3.7 Proposed conceptual design for the system.....	11
3.8 System implementation .....	11
3.8.1 Testing and Validation .....	11
3.8.2 Unit testing .....	12
3.8.3 Integration testing.....	12
3.8.4 System testing.....	12
3.8.5 Validation .....	12
CHAPTER FOUR: SYSTEM DESIGN AND ANALYSIS.....	13
4.1 Introduction .....	13
4.2 Functional Analysis.....	13
4.3 Requirements analysis .....	13
4.3.1 Functional requirements.....	13
4.3.2 Non-functional requirements.....	14
4.4 System design and analysis .....	15
4.4.1 Hardware analysis .....	15
4.4.2 Software analysis .....	15
4.4.2.1 Arduino .....	15
4.4.3 Logic design.....	17
Table 4.1 Flow chart symbols description .....	17
Figure 4.4.3.1. Dataflow diagram for the system .....	18
4.4.4 Physical design(hardware).....	18
4.4.4.1 At mega 328p-pu Microcontroller .....	18
4.4.4.2 ESP32-CAM Camera Module .....	20
4.4.4.3 Resistors .....	21
4.4.4.6 Capacitors .....	21
4.4.4.7 Power supply.....	22
CHAPTER FIVE .....	23

IMPLEMENTATION AND TESTING .....	23
5.0 Introduction .....	23
5.1 Design and Development platforms.....	23
5.1.1 Arduino .....	23
5.1.2 Proteus.....	23
5.1.3 Visual studio.....	23
5.1.4 Xampp server .....	23
5.2 Testing.....	24
5.2.1 Unit Testing .....	24
5.2.2 Integration Testing .....	24
5.2.3 System Testing.....	24
5.2.4 System Verification and Validation.....	24
CHAPTER SIX .....	25
DISCUSSION AND RECOMMENDATIONS .....	25
6.1 Summary of the work done .....	25
6.2 Appraisal of the project.....	25
6.3 Recommendations for future work .....	25
Conclusion .....	25
Referencing .....	26
APPENDICES.....	27
Appendix A: Circuit diagram.....	27
Appendix B: Web plat-form interfaces .....	27
Appendix C: Arduino Code .....	28
Appendix D: Working of the web application.....	42

List of tables

Table 1 Flow chart symbols description ..... 17

List of figures

Figure 1 Proposed conceptual design for the system..... 11  
Figure 2 the flow chart..... 18  
Figure 3 Physical design of the system ..... 18  
Figure 4 .4.4.1. Physical design of the system ..... 19  
Figure 5 .4.4.2. ESP32-CAM Camera Module ..... 21  
Figure 6 .4.4.3 Resistors ..... 21  
Figure 7 .4.4.6 Capacitors..... 22

## CHAPTER ONE: INTRODUCTION

### 1.1 Background

A mobile phone is a wireless handheld device that allows users to make and receive calls. While the earliest generation of mobile phones could only make and receive calls, today's mobile phones do a lot more, accommodating web browsers, games, cameras, video players and navigational systems.[1]

Distracted driving has led to loss of many lives in fatal accidents in not only in Uganda but also across the world.

With the advent of smartphones, distracted driving cases have gone up where many drivers are fond of texting while driving. Police records indicate that at least five in 10 motorists use their phone while driving. Whereas many think that the law only penalizes driving while speaking on the phone, according to Faridah Nampiima, the Traffic Police spokesperson, even talking on WhatsApp while driving could also land you into paying a shs100,000 fine.[2]

Using mobile phones can cause drivers to take their eyes off the road, their hands off the steering wheel, and their minds off the road and the surrounding situation. It is this last type of distraction – known as cognitive distraction – which appears to have the biggest impact on driving behaviour. Evidence shows that the distraction caused by mobile phones can impair driving performance in a number of ways, e.g., longer reaction times (notably braking reaction time, but also reaction to traffic signals), impaired ability to keep in the correct lane, and shorter following distances. Text messaging also results in considerably reduced driving performance, with young drivers at particular risk of the effects of distraction resulting from this use.[3]

Distracted driving behaviours are closely related to crash risk, with the use of mobile phones during driving being one of the leading causes of accidents. This attempts to investigate the impact of cell phone use while driving on drivers' control behaviours. Given the limitation of driving simulators in an unnatural setting, a sample of 134 cases related to cell phone use during driving were extracted from Shanghai naturalistic driving study data, which provided massive unobtrusive data to observe actual driving process. The process of using mobile phones was categorized into five operations, including dialing, answering, talking and

## Referencing

- [1] “What is a Mobile Phone? - Definition from Techopedia.” <https://www.techopedia.com/definition/2955/mobile-phone> (accessed Apr. 25, 2023).
- [2] “Traffic offences: That WhatsApp message while driving could land you into shs100,000 fine - Nile Post.” <https://nilepost.co.ug/2022/08/21/traffic-offences-that-whatsapp-message-while-driving-could-land-you-into-shs100000-fine/> (accessed Apr. 05, 2023).
- [3] “Mobile phone use”, Accessed: Apr. 06, 2023. [Online]. Available: [www.who.int/violence\\_injury\\_prevention/publications/road\\_traffic/distracted\\_driving/en/index.html](http://www.who.int/violence_injury_prevention/publications/road_traffic/distracted_driving/en/index.html)
- [4] “Effect of Using Mobile Phones on Driver’s Control Behavior Based on Naturalistic Driving Data - PMC.” <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6518206/> (accessed Apr. 06, 2023).
- [5] “Automated Text Messages | Automated Texting Service Guide.” <https://messagedesk.com/blog/automated-text-message-service/> (accessed Apr. 25, 2023).
- [6] “What Is Call Barring And How To Activate/Deactivate It? | Yoodley.” <https://yoodley.com/call-barring/> (accessed Apr. 25, 2023).
- [7] “Cellcontrol Provides a Solution to Distracted Driving.” <https://www.consumerreports.org/car-safety/cellcontrol-provides-a-solution-to-distracted-driving/> (accessed Apr. 25, 2023).
- [8] “TextBuster review: Text- and app-blocker helps keep eyes on the road - CNET.” <https://www.cnet.com/roadshow/reviews/textbuster-review/> (accessed Apr. 25, 2023).
- [9] “Drive Safe Mode | Tracxn.” [https://tracxn.com/d/companies/drive-safe-mode/\\_5TLNm52SOncyVsCRMPwNaQsaaMpB2g7yCiC7yz4AHkE](https://tracxn.com/d/companies/drive-safe-mode/_5TLNm52SOncyVsCRMPwNaQsaaMpB2g7yCiC7yz4AHkE) (accessed Apr. 25, 2023).
- [10] “What is Arduino? | Arduino Documentation.” <https://docs.arduino.cc/learn/starting-guide/whats-arduino> (accessed Jun. 30, 2023).