BUSITEMA UNIVERSITY
Pursuing Excellence

P.O. Box 236, Tororo, Uganda
Gen: +256 - 45 444 8838
Fax: +256 - 45 4436517
Email: info@adm.busitema.ac.ug
www.busitema.ac.ug

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER AND ELECTRICAL ENGINEERING

FINAL YEAR PROJECT REPORT

TITLE: COLLISION AND OVERTURNING DETECTION AND ALERTING SYSTEM IN PUBLIC VEHICLES

PRESENTED BY:

MWARISI BRIAN ARTHUR

BU/UP/2018/2920

Email: *brianarthurm@gmail.com*

Tel. +256755330967

SUPERVISOR: DR. ODONGTOO GODFREY

A PROJECT PROPOSAL SUBMITTED TO THE DEPARTMENT OF COMPUTER ENGINEERING IN PARTIAL FULFILLMENT FOR THE AWARD OF A BACHELOR'S DEGREE IN COMPUTER ENGINEERING OF

BUSITEMA UNIVERSITY

December, 2022

DECLARATION

I **MWARISI BRIAN ARTHUR**, hereby declare that this report, written in partial fulfilment of the requirement of the award of a Bachelor of Computer Engineering degree at Busitema University, is my very own authentic work and the content of this document has never been submitted before to the Department of Computer Engineering of Busitema University and any another institution of high education.

Signature.....  ..... **Date**.....31A/Jan/2023.....

MWARISI BRIAN ARTHUR

APPROVAL

This final year project report under the title **"COLLISION AND OVERTURNING DETECTION AND ALERTING SYSTEM IN PUBLIC VEHICLES"** is under my guidance and is now ready for examination

Signature .....

Date 26/01/2023

SUPERVISOR: DR. ODONGTOO GODFREY

Department of computer engineering

ACKNOWLEDGEMENT

I thank the almighty God for providing me with life and knowledge that helped me up to the completion of this project as well as my parents for their financial support and encouragement.

Appreciation also goes to all my colleagues most especially Masika Jackline, Lukwago Robert, and Beteise Richmond for their support through group discussions and advice when needed, my supervisor Dr. Odongtoo Godfrey, the Department of Computer Engineering for guidance and insight into concepts of research and project management as well as technical knowledge applicable in the design of the system.

ABSTRACT

Road transport is the most used type of transport in Uganda where the majority use public means like buses, taxis among others. Security in travelling is a primary concern for everyone. Rising demand for automobile has increased the traffic, thereby causing more accidents on the road. People often lose their lives because of poor emergency facilities in the case of delayed or unattended accidents.

Predicting of the accidents taking place on the roads is not possible but at least the after effects can be minimized. The proposed system ensures making emergency facilities available to accident victims as early as possible by letting the police and the vehicle office headquarters know the accident spot with the help of this system embedded in the vehicle.

Sensors are attached to the microcontroller. In case there is a collision or over turning is detection with the help of adxl335 accelerometer and vibration sensor, the location of the vehicle is got with the help of a GPS and an SMS with containing the location of the vehicle in form of a google map link is sent to the Police and headquarter offices of the vehicle.

Table of Contents

LIST OF ABBREVIATIONS

GSM	Global System for Mobile Communications
IDE	Integrated Development Environment
GPS	Global Positioning System
SMS	Short Message Service
Adx335	Accelerometer
L298N	H-Bridge Motor driver
CPU	Central Processing Unit
RAM	Random Access Memory
LCD	Liquid Crystal Display
GPRS	General Packet Radio Service
VS	Vibration Sensor

CHAPTER ONE

1.1 BACKGROUND

An accident is an unfortunate incident that happens unexpectedly and unintentionally, typically resulting in damage, injury, or death.

Public vehicles are those that carry a number of passengers and their property from one place to another as a source of income to the vehicle owners. These vehicles specifically include taxis, coasters and buses.

Road Transport is the most used means of transport in Uganda. Public roads that connect to different destinations have been constructed and rehabilitated making transport to all parts of the country so easy. More so road transport crosses borders to nearby countries like Rwanda, Kenya, and Tanzania. Road transport involves the use of public buses that are meant to be used for long travels like the whole day. These buses carry a big population of people like 70 and always drive at a terrible speed due to the long distances to be covered[1].

The taxis are meant to carry only 14 passengers transferring from the city to the nearby villages. These matatus always take people from one site to another and they always set off when they are full, drop and pick more people on the way. These Matatus carry a specific number of people in the city but normally exceed the carrying capacity when they reach the areas outside the city[1].

Traffic accidents are a major public issue worldwide. A huge number of injuries and death as a result of road traffic accident uncovers the story of the global crisis of road safety. This can be attributed to: unsafe practices of road contractors, bad driving, overloading of vehicles, lack of critical road signs and warnings, poor condition of vehicles, bad weather, failure by police to enforce road discipline, etc.

According to a statistical analysis of traffic fatalities, the most obvious reason of a person's death during accidents is the unavailability of the first aid provision, due to the delay in the information of the accident being reached to the ambulance or to the hospital.

Every year, nearly 1.25 million people are killed and over 50 million people injured on the world’s roads[2]. Highway road accidents are the eighth cause of death in the world since the 1990s, and it is estimated to become the fifth cause of death in the world by 2030[3]. Regrettably, nearly 1.25 million people are killed annually and up to 50 million people injured on the world’s roads [4]. An

4.0 REFERENCE

[1] M. Ntambi, “Common Means Of Transport Used In Uganda | The Africa Channel,” *Online*, 2020. https://www.theafricachannel.co.uk/transport-means-used-in-uganda/ (accessed Aug. 22, 2022).

[2] B. B. Smith, E. G. Pearson, and J. Leon, “Evaluation of normal triiodothyronine and tetraiodothyronine concentrations in llamas (Lama glama).,” *Am. J. Vet. Res.*, vol. 50, no. 8, pp. 1215–1219, 1989.

[3] E. Bonnet, L. Lechat, and V. Ridde, “What interventions are required to reduce road traffic injuries in Africa? A scoping review of the literature,” *PLoS One*, vol. 13, no. 11, pp. 1–20, 2018, doi: 10.1371/journal.pone.0208195.

[4] A. Jindal and S. Mukherji, “World report on road traffic injury prevention,” *Med. J. Armed Forces India*, vol. 61, no. 1, p. 91, 2005, doi: 10.1016/s0377-1237(05)80135-2.

[5] J. White, C. Thompson, H. Turner, B. Dougherty, and D. C. Schmidt, “WreckWatch: Automatic traffic accident detection and notification with smartphones,” *Mob. Networks Appl.*, vol. 16, no. 3, pp. 285–303, 2011, doi: 10.1007/s11036-011-0304-8.

[6] “Causes of accidents on Ugandan roads | Monitor.” https://www.monitor.co.ug/uganda/oped/letters/causes-of-accidents-on-ugandan-roads-3297096 (accessed Jul. 25, 2022).

[7] “What is GSM (Global System for Mobile communication)?” https://www.techtarget.com/searchmobilecomputing/definition/GSM (accessed Aug. 04, 2022).

[8] “GPS | Definition, Types, Uses, & Facts | Britannica.” https://www.britannica.com/technology/GPS (accessed Aug. 04, 2022).

[9] “Definition of Sensor and Sensing Technology | Yokogawa Electric Corporation.” https://www.yokogawa.com/special/sensing-technology/definition/ (accessed Aug. 04, 2022).

[10] “(PDF) ACCIDENT DETECTION AND ALERT SYSTEM.” https://www.researchgate.net/publication/360620242_ACCIDENT_DETECTION_AND_ALERT_SYSTEM (accessed Jul. 29, 2022).

[11] J. Zaldivar, C. T. Calafate, J. C. Cano, and P. Manzoni, “Providing Accident Detection in Vehicular Networks Through OBD-II Devices and,” *5th IEEE Work. User Mobil. Veh. Networks On-Move*, pp.

817–823, 2011.

[12] I. J. Mrema and M. A. Dida, “A Survey of Road Accident Reporting and Driver’s Behavior Awareness Systems: The Case of Tanzania,” *Eng. Technol. Appl. Sci. Res.*, vol. 10, no. 4, pp. 6009–6015, Aug. 2020, doi: 10.48084/etasr.3449.

[13] M. S. Roobini, S. Mulakalapally, N. Mungamuri, M. Lakshmi, A. Ponraj, and D. Deepa, “Car Accident Detection and Notification System Using Smartphone,” *J. Comput. Theor. Nanosci.*, vol. 17, no. 8, pp. 3389–3393, 2020, doi: 10.1166/jctn.2020.9192.

[14] M. S. Amin, M. A. S. Bhuiyan, M. B. I. Reaz, and S. S. Nasir, “GPS and Map matching based vehicle accident detection system,” *Proceeding - 2013 IEEE Student Conf. Res. Dev. SCOReD 2013*, no. December, pp. 520–523, 2013, doi: 10.1109/SCOReD.2013.7002645.