



FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER ENGINEERING AND INFORMATICS
FINAL YEAR PROJECT REPORT
SMART REAL-TIME ACCIDENT DETECTION AND
ALERT SYSTEM

By

LUBEGA ISAAC PATRICK
REG.NO: BU/UP/2021/1289
TEL: +256761153046
EMAIL: lubegap132@gmail.com

&

ATIBUNI CANAL
REG.NO: BU/UP/2021/1275
TEL: +256782379101
EMAIL: atibuni101@gmail.com

SUPERVISOR: DR. GODFREY ODONGTOO

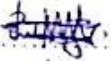
This Final Year Project Report submitted to the Department of Computer Engineering and Informatics in a partial fulfillment of the requirement for the award of the degree of Bachelor of Science in Computer Engineering of Busitema University

May, 2025

DECLARATION

We Lubega Isaac Patrick and Atibuni Canal declare that this report is ours. It is our 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.

Lubega Isaac Patrick

Signature: 

Date: 19/05/2025

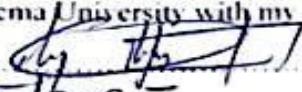
Atibuni Canal

Signature: 

Date: 17/05/2025

APPROVAL

This is to certify that this project report under the title "*Smart Real – Time Accident Detection and Alert system*" was carried out under my supervision. It is now ready for submission to the Board of Examiners of Busitema University with my due approval.

Signature: 

Date: 19/05/2025

Dr. Godfrey Odongtoo

Supervisor

Department of Computer Engineering and Informatics

Faculty of Engineering and Technology

Busitema University

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ABSTRACT

Road traffic accidents remain a major public safety concern, particularly in regions where emergency response times are slow due to poor infrastructure, communication barriers, or delayed reporting. To address this challenge, this project presents the design and implementation of a **Smart Real-Time Accident Detection and Alert System** that leverages **Internet of Things (IoT)** technologies to improve the speed, accuracy, and reliability of accident detection and emergency response.

At the core of the system is the **ESP32 microcontroller**, a highly capable IoT device equipped with built-in Wi-Fi connectivity. It serves as the primary control unit, interfacing with several key sensors to collect critical data. An **accelerometer and gyroscope module** (such as the MPU6050) is used to detect sudden movements, shocks, or abnormal motion patterns that typically occur during a vehicle collision. Alongside this, a **GPS module** (such as NEO-6M) is used to capture real-time location data, ensuring that the exact position of an accident is accurately identified.

Upon detecting an accident event, the ESP32 processes and packages the data, including impact readings and GPS coordinates. This information is then transmitted wirelessly using the **RA01 LoRa module**, which operates on low power while supporting long-range communication. LoRa is ideal for remote or rural deployments where traditional internet or mobile networks may be unreliable or unavailable.

On the receiving end, a **LoRa gateway (receiver node)** captures the transmitted data and forwards it to a cloud-connected **PHP-MySQL web server**. The server stores the incoming data and displays it on a **web-based monitoring dashboard**. This interface allows relevant authorities to view accidents in real time, analyze incident trends, and make informed decisions for improving road safety.

To enhance responsiveness, the system integrates **IoT-based API services** for alerting emergency contacts. Upon accident detection, SMS alerts are automatically sent via platforms like **Collecto (Cissy Technologies)**, notifying emergency responders and family members with vital details such as the vehicle's location and time of the accident.

This project effectively demonstrates how **IoT components**—including sensors, microcontrollers, wireless modules, cloud servers, and APIs—can be seamlessly integrated to create a **low-cost, efficient, and scalable accident detection and alert system**. It is especially suited for areas with limited infrastructure but also urban areas are catered for and offers a practical approach to enhancing emergency communication, reducing response times, and ultimately saving lives.

By combining real-time data acquisition, wireless transmission, cloud-based storage, and automated alerts, the system represents a significant advancement in smart transportation and public safety technology.

LIST OF ACRONYMS

AI	Artificial Intelligence
API	Application Programming Interface
CSS	Cascading Style Sheets
GSM	Global System for Mobile Communication
GPS	Global Positioning System
HTML	Hypertext Markup Language
IoT	Internet of Things
I/O	Input Output
IDE	Integrated Development Environment
LoRa	Long Range
LCD	Liquid Crystal Display
PHP	Hypertext Preprocessor
RTI	Road traffic Injuries
RF	Radio Frequency
SQL	Structured Query Language
UI	User Interface
URL	Universal Resource Locator
WHO	World Health Organization

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