



**BUSITEMA UNIVERSITY**

**FACULTY OF ENGINEERING**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**FINAL YEAR PROJECT**

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**DESIGN AND DEVELOPMENT OF AN OVERHEAD TRANSMISSION LINE FAULT  
DETECTION SYSTEM INTEGRATED WITH A GSM MODULE.**

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**BU/UP/2020/1241**

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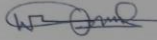
**Final Year Project Report Submitted to the Department of Electrical Engineering in Partial  
Fulfillment of the requirements for the Award of Bachelor of Science in Electrical  
Engineering Degree.**

# DECLARATION

## DECLARATION

I WANYAMA JULIUS, Registration Number BU/UP/2020/1241 under the supervision and guidance of the University supervisors, declare that this report is my original work and the information gathered and used has not been utilized in the acquisition of any academic award in any other learning institution.

Signature:



Date:

07.07.2024

## APPROVAL

### APPROVAL

This is to certify that this report has been compiled by **WANYAMA JULIUS** and been submitted for examination. With my approval as a university supervisor, it is now ready for submission to the Department of Electrical Engineering.

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Date: 24/06/2024

## **DEDICATION**

I dedicate this report to my beloved parents **Mr Ojambo Romano** and **Mrs Namusoke Scovia** who have made significant sacrifices, with or without my knowledge, to help me get to this point. I can never repay them, so all I can do is express my thanks. May God abundantly bless them.

## **ACKNOWLEDGMENT**

First and foremost, I would want to thank the Almighty God for enabling me progress to this point in my academic path despite several difficulties.

Secondly, I would like to thank my supervisors, Dr. Mirondo Godfrey and Mr. Rwendeire Andrew, for their constant supervision, support, and guidance, which has resulted in the completion of this study report.

Finally, I'd want to express my gratitude to my parents, who have always been financially supportive and never disappointed me.

## **ABSTRACT**

This project aims to improve the reliability and efficiency of Uganda's power transmission networks by developing an enhanced fault detection system. This project seeks to alleviate frequent power outages and inefficiencies in fault management by providing a system capable of detecting problems in overhead transmission lines and reporting the results via GSM technology. The system uses sensors, microcontrollers, and GSM modules to monitor transmission lines for defects such as line breaks, short circuits, and grounding difficulties. Fault detection units are strategically located along transmission lines to continuously monitor electrical parameters and environmental conditions. When a malfunction is identified, an embedded microprocessor processes the data and activates the GSM module, sending an SMS alert to the maintenance crew. This warning contains detailed information about the fault's location and nature, allowing for timely and targeted maintenance interventions.

The project involves both hardware and software development. The hardware design includes the selection and integration of sensors, microcontrollers, and GSM modules suitable for the environmental conditions in Uganda. On the software side, programming the microcontroller for efficient data processing and fault detection, as well as developing the communication protocol for the GSM module, are critical components.

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## **LIST OF ACRONYMS**

AC	Alternating current
BTN	Button
DC	Direct Current
FPI	Fault Passage Indicator
GSM	Global System for Mobile Communication
L-G	Line to Ground
L-L	Line to Line
LCD	Liquid Crystal Display
RF	Radio Frequency
SIM	Subscriber Identity Module
SMS	Short Message Service

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## **CHAPTER ONE: INTRODUCTION**

### **1.1.BACKGROUND**

For the previous number of years now, power supply networks are developing continuously and their reliability getting more significant than ever. The complexity of the whole network comprises a number of components that can fail and interrupt the power supply to the end user. For most of the worldwide low voltage and medium voltage distribution lines, overhead cables have been used for many decades, however they are being influenced frequently by heavy rains, storm, and pollution causing electric faults. Faults in overhead lines can be classified into open circuit fault, over voltage faults, under voltage faults

### **1.2 PROBLEM STATEMENT**

The overhead lines are exposed in air, they become susceptible to physical damages caused by wind or birds which turn into electrical faults. On other hand the end user may lead to the faults for example over loading or poor connections. Theses faults may cause the overhead line to burn, burn the fuse and the fuse dropout links leading to massive damage if not earlier detected.

In order to tackle the above problem, I designed a system that can detect a fault and send a message to the service line for the fault to be easily solved hence reducing massive damages. The message will entail the type of fault and the coordinate of that place as predetermined by the service provider.

### **1.3 OBJECTIVES**

#### **1.3.1 General Objective**

To design and develop an overhead transmission line fault detection system with GSM for communication alerts.

#### **1.3.2 Specific Objectives**

- To design the hardware components of the overhead transmission fault detection system.
- To develop the software algorithm for the overhead fault detection system.
- To integrate the GSM into the fault detection system to enable SMS alerts.
- To test and validate the proper functionality of the system.

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## **APPENDIX**

Device configurtion