



FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL ENGINEERING

BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING

FINAL YEAR PROJECT REPORT

ACADEMIC YEAR 2024/2025

**DESIGN AND CONSTRUCTION OF LINE MONITORING AND ALERTING SYSTEM
ON A LOW VOLTAGE POWER DISTRIBUTION NETWORK**

By

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This Final Year Project Proposal Report is submitted to the Department of Electrical Engineering in partial fulfillment of the requirements for the award of the Bachelor of Science in Electrical Engineering degree of Busitema University.

MAY, 2025

ABSTRACT

This project presents the design and implementation of an automated low-voltage power distribution line monitoring and alerting system aimed at improving fault detection, reporting, and response time in Uganda's power distribution network for the underserved regions. The system leverages an Arduino-based microcontroller integrated with current sensors (ACS712), a voltage divider circuit, and a SIM800L GSM module to detect and report key anomalies such as outages, short circuits, and phase imbalances in real time. Transformer loading and efficiency were also calculated periodically to assess performance and support preventive maintenance. Alerts were displayed locally using a 16x2 LCD and remotely via SMS. The system was simulated in Proteus and validated through hardware testing under various fault conditions. It offers a low-cost, scalable solution to enhance grid reliability in underserved areas, aligning with national electrification goals.

DECLARATION

I, Odongo Peter, hereby declare that this final year project report, is my original work, submitted in partial fulfillment of the requirements for the award of a Bachelor of Science in Electrical Engineering at Busitema University. To the best of my knowledge, this work has not been submitted to any other institution for academic credit. All sources of information, including literature and consultations, have been duly acknowledged in the references section. I take full responsibility for any errors or omissions in this report.

Signature: 

Date: 04/07/2025

APPROVAL

This final Year Project Report has been done under our supervision and submitted to the faculty of engineering for examination with our approval.

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ACKNOWLEDGMENT

I take this opportunity to thank the Almighty God for the gift of life and good health and for enabling me to gather the information in this report. I'm truly grateful.

I extend my heartfelt gratitude to all who supported me throughout this project. I am deeply indebted to my supervisors, Prof. Okou Richard and Ms. Patience Tusiimire, for their unwavering guidance, insightful feedback, and encouragement, which were instrumental in shaping this work. I also thank the Department of Electrical Engineering at Busitema University for providing the resources and environment to conduct this research. My appreciation goes to the technical staff and engineers from local utilities who offered practical insights during consultations, enhancing the project's relevance to Uganda's power sector. I am grateful to my family and friends for their constant support and motivation, especially during challenging phases of this project.

Finally, I acknowledge the authors of the referenced works, whose research provided a foundation for this study, enabling me to address critical gaps in power distribution monitoring.

DEDICATION

This work is dedicated to my beloved mother and family for their endless support, prayers, and encouragement throughout my academic journey. Your belief in me has been a constant source of motivation.

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LIST OF ACRONYMS

AC	Alternating Current
DC	Direct Current
GSM	Global System for Mobile Communications
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LV	Low Voltage
SMS	Short Message Service
SCADA	Supervisory Control and Data Acquisition
SIM	Subscriber Identity Module
UEDCL	Uganda Electricity Distribution Company Limited
IEEE	Institute of Electrical and Electronics Engineers
ANSI	American National Standards Institute
VRMS	Root Mean Square Voltage
IoT	Internet of Things
AI	Artificial Intelligence
PF	Power Factor
kVA	Kilovolt-Ampere
kW	Kilowatt

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