

**BUSITEMA
UNIVERSITY**
Pursuing Excellence

FACULTY OF ENGINEERING

**DEPARTMENT OF COMPUTER ENGINEERING AND
INFORMATICS**

**AN AUTOMATIC STREETLIGHT SYSTEM WITH FAULT
DETECTION, ENERGY CONSUMPTION REDUCTION AND
SECURITY ALERT FEATURES.**

FINAL YEAR PROJECT REPORT

By

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**A final year Project Submitted to the Department of Computer Engineering
in Partial Fulfillment of the Requirements for the Award of a Bachelor's
Degree in Computer Engineering from Busitema University**

MAY 2024

DECLARATION

I **Ssali Lawrence**, BU/UG/2020/2757 a student of Busitema University, hereby declare that the presented final year report is uniquely prepared by me after thorough research work at Busitema University. I also confirm that this final year report has been written by me and has never been submitted to any academic institution.

SIGNATURE..........

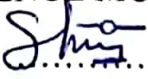
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APPROVAL

This is to certify that this final year report has been compiled by **Ssali Lawrence** Registration Number **BU/UG/2020/2757** under the supervision and guidance of the University supervisor. It is now ready for submission to the Department of Computer Engineering and Informatics.

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ACKNOWLEDGEMENT

I thank GOD for His immeasurable and unfailing love upon the gift of life and the providence throughout all this period, it was not by my own power and support to still have lived upto now.

I have also taken efforts in this final year project report. But however, it would not have been possible without the kind support and help of many individuals and staff of Busitema University's computer engineering department. I would like to extend my sincere thanks to all of them especially Dr.Mirondo, Dr Matovu, Mr Alunyu and others.

First and foremost, I would want to thank my mother Mrs Nakate Girades, and my sister Nabisenke Teddy Aisha, Mr. Katabira Yusuf plus all my BCT commrades who have supported me financially and socially through the guidance they gave me throughout my final year project report writing and implementation.

DEDICATION

I dedicate my final year project work to my family and many friends. A special feeling of gratitude to my loving parents and siblings, Nakate Girades and Nabisenke Aisha Teddy, brother Benard whose words of encouragement and push for tenacity ring in my ears. My sister Gloria and Father-in-law, Mr. Ssali have never left my side and are very special.

ABSTRACT

Street light provides a great support and benefit to the people that use the roads at night. It also can enhance safety for drivers or pedestrians to prevent accidents because they can see upcoming obstacle towards them with the support of light and increase the vision of them on the road. But if the street light is broken, it's dangerous for the drivers and pedestrians because the probability of accidents and crimes to occur extremely increases. Streetlights are also left to lit at maximum brightness even when there is no motion in the vicinity, which wastes/consumes a lot of energy.

So, this final year Project report presents the design and development of “an Automatic Streetlight System with fault detection, energy consumption reduction and security alert features”. This system automatically detects the fault in street light and sends a notification to the authorized technicians using a GSM which eases the work of maintenance and repair. This also eliminates manual registration report or report through phone calls by citizens. The system also dims the streetlight bulbs when no activity (motion) is detected in highway road/streets. Incase any activity is detected in the road at night, the dimmed light becomes bright till motion is detected no more. This reduces on the unnecessary wastage of energy.

It also includes a safety button which when pressed, provides a direct and immediate way for individuals to call for help in emergency situations as it sends a message via a GSM, ensuring rapid response from law enforcement or emergency services.

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A LIST OF ACRONYMS

AT - Attention

AU MCU- Automatic Update Microcontroller Unit

GSM - Global System for Mobile Communications

IDE- Integrated Development Environment.

IoT- Internet of Things

IR- Infra-red Radiations

KCCA- Kampala Capital City Authority.

LDR- Light Dependent Resistor

LED- Light Emmiting Diode

PIR- Passive Infra-red Radiations.

PV- Photovoltaic

PWM- Pulse Width Modulation

RX- Receiver

SIM- Subscriber Identity Module

SMS- Short Message Service

TX – Transmitter

UART- Universal Asynchronous Receiver Transmitter

USB – Universal Serial Bus

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND.

The sun is the biggest natural source of light, however we only receive its light during day time. But we receive its light only during the daytime. But we need to function even during the night time [1]. Streetlights are essential for nighttime visibility ensuring safety and security for pedestrians, motorists and drivers. Inefficient lighting wastes significant financial resources every year, and poor lighting creates unsafe conditions. Energy efficient technologies and design mechanism can reduce cost of the street lighting drastically (often by 25%-60%) [2], [3].

In the past years and upto now, we have been using the traditional streetlights systems [4]. Manual control is prone to errors and leads to energy wastages and manually dimming during midnight is impracticable. Also, dynamically tracking the light level is manually impracticable [3]. And if the operating person was late for duty, then the lights will glow continuously up to morning, this leads to the wastage of electricity.

Today, as far as energy efficiency is concerned, some areas are using Solar- based streetlights systems [5]. As energy-use is so costly in terms of electricity bills, most of the people are using **solar powered** street lighting systems [2], which are cheaper, and energy efficient [6]. However these lights are picking energy from the batteries which can later be drained hence regulating the intensity of these system is needed to make them more energy efficient and reliable. If there is any fault in the street lights, it will be known only if and only if when the technician checks it manually. And in case of any delay in the process of technical check, it may lead to accidents [7], and even increased cases of sexual immorality.

In the [8], 11th Jan 2021, of New Daily Monitor in Uganda, the Jinja town Clerk, Mr Jofram Waidhuuba, said “street lighting has become a challenge and has turned some areas into no-go zones during certain periods, especially at night”. **Case1;**” Ms Sharon Nairubi a resident of jinja municipality said herr colleague was a few weeks ago gang-raped in the middle of the road and left unconscious by unknown thugs due to damaged streetlights that were delayed in repaire and maintenance”.

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