

**DESIGN AND CONSTRUCTION OF A WIRELESS SENSOR
BASED LIGHTING SYSTEM**

BY

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CERTIFICATION

We confirm that the project titled Design of a Wireless sensor-based lighting system was conducted by the individuals listed above, along with their respective Matriculation numbers. It has been thoroughly reviewed under the supervision and guidance of Engineer O.K Adejumobi and has been deemed acceptable by the Department of Computer Engineering Technology for the conferral of Higher National Diploma (HND).

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DEDICATION

We would like to dedicate this project to God Almighty and to our families. They instilled in us the desire to learn and made sacrifices so we can have access to high quality education from an early age. We also want to dedicate this project to our close friend and class mates who have supported us through the years of study.

ACKNOWLEDGEMENT

We express our sincere gratitude to Almighty God for the knowledge, wisdom, and understanding He bestowed upon us, enabling us to successfully carry out this project.

ABSTRACT

This project explores the development and implementation of a wireless sensor-based lighting system designed to enhance energy efficiency and user convenience in residential and commercial environments. The system integrates various sensors, including motion detectors, CC1101 Transceivers and Microcontrollers, to automate lighting control based on occupancy. By intelligently managing the lighting, the system reduces electricity consumption, thus contributing to energy conservation and cost savings. The core components of the sensor-based lighting system include microcontroller units (such as Arduino), Transmitter and Receiver Circuit, which process sensor data and control the lighting fixtures accordingly. Motion sensors detect human presence, triggering lights to turn on or off based on occupancy, while the transmitter and receiver circuit enable the circuit to communicate wirelessly. Additional features, such as adjustable sensitivity and delay timers, enhance the system's adaptability to various environments and user preferences.

Through a series of experiments and tests conducted in different settings, the project demonstrates significant energy savings and improved user satisfaction. The findings indicate that sensor-based lighting systems can reduce energy consumption by up to 40% compared to traditional manual lighting controls. Moreover, the system's modular design allows for easy integration with existing smart home infrastructures, providing a scalable solution for modern energy-efficient buildings. This project not only highlights the technical feasibility of sensor-based lighting systems but also underscores their potential impact on sustainable living practices. Future work will focus on optimizing sensor algorithms, expanding compatibility with diverse lighting technologies, and exploring additional applications in industrial and outdoor environments.

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