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IoT Based Smart Street Light and Faulty Light Location Status Indicator System

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ABSTRACT: IoT Based Smart Street Light and Faulty Light Location Status Indicator System is an automated device which uses the electronic circuit to make the street light automated and a microcontroller is used to sense the working and faulty light and send the signal to the server so that quick action can be made and the street doesn't need to stay without light for long in Urban and Rural area.

This system operates on two separate circuit one for Automating the street light so as to make the street light work after sunset and till sun rises reducing the need of man power to operate the lights.

The second circuit is used to sense the activation and de-activation of street light and send to the web with live status on site.

The system supports wide number of microcontrollers which help in sending the data to the server.

An IoT-based automatic street light management system is designed to conserve energy by reducing electricity wastage and manpower.

The system uses Light Emitting Diodes (LED) that consume less electricity than traditional HID lamps. LEDs are directional light sources, they can emit light in specific directions, thereby optimizing the efficiency of the streetlights. The purposed of work has achieved better performance compared to the existing system.

I. INTRODUCTION

An automatic street light is a lighting system that automatically turns on when it detects darkness and turns off when it detects light. It is designed to save energy and reduce the cost of electricity bills. The system uses a sensor circuit that gets activated when the darkness rises to a certain level and switches on the light. When there is another source of light, such as daylight, the street light gets turned off. The sensitivity of the street light can also be adjusted.

The system uses two circuits:

First circuit for controlling the street lights by sensing the presence of sun light and Activates and De-activate the street light.

Second circuit for collecting the data of activating and de-activating of street light and sending the data to the cloud service showing the real time result.

II. SYSTEM CONCEPT

The system incorporates a cluster of streetlight lamps that can communicate with each other and provide lighting data to a local concentrator. It allows facility managers to remotely control street lights while keeping track of electrical power consumption in the lamps and in the driving circuits.

Basic and most important components are:

LDR Input,

IR Sensor,

Light Switching Circuit,

Microcontroller to communicate with cloud.

The system will help in pinpointing the locution of faulty street light as soon as the street light fails and notifying at the website of the fault.

System units:

Street Light Controller: The core circuit is Street Light Controller this will control the activation of light with the help of basic circuit.

Data Collection unit: This collects the data of activation of street light and send to the cloud in this we can use various types of microcontrollers as per requirement and interface the microcontroller with the **WIFI** module or a **WIFI** enable microcontroller.

IoT Alert System: The **WIFI** module is use the send the alert and site live data.

System Workflow:

1. The **Sun Light Sensor** (Photo Diode) is used to detect the presence of **UV Light** and produce the signal.
2. A circuit is used to send the data from the Sun Light Sensor to the **Electronic Switch** (Relay) to activate and de-activate the Street Light.
3. The **LDR** is used the scene the light from **Street Light**.
4. The LDR signal will be directly send to the **microcontroller**.
5. The Microcontroller will show the activated and de-activated street light on the **WEB PAGE**.

Key Features:

1. Real Time Monitoring/Status Report.
2. Automatic Control.
3. Reduce man power.

Feature Enhancement:

1. Install of power consumption indicator.
2. Use GSM module for areas where internet is not available.
3. Use of Battery packs and Solar charging system.

Block Diagram:

A basic block diagram of Automatic Street Light controller: -

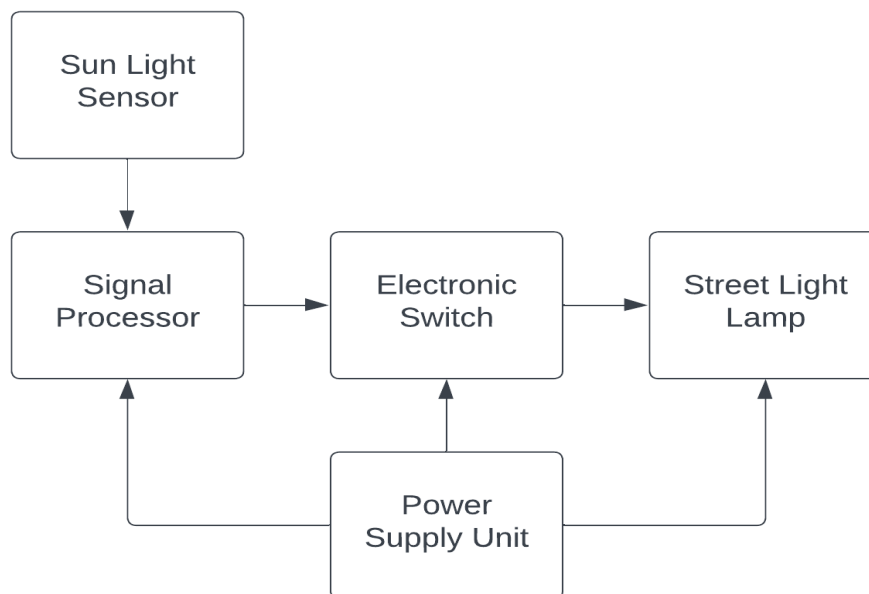


Fig.1. Block diagram of Street Light Automatic Controller.

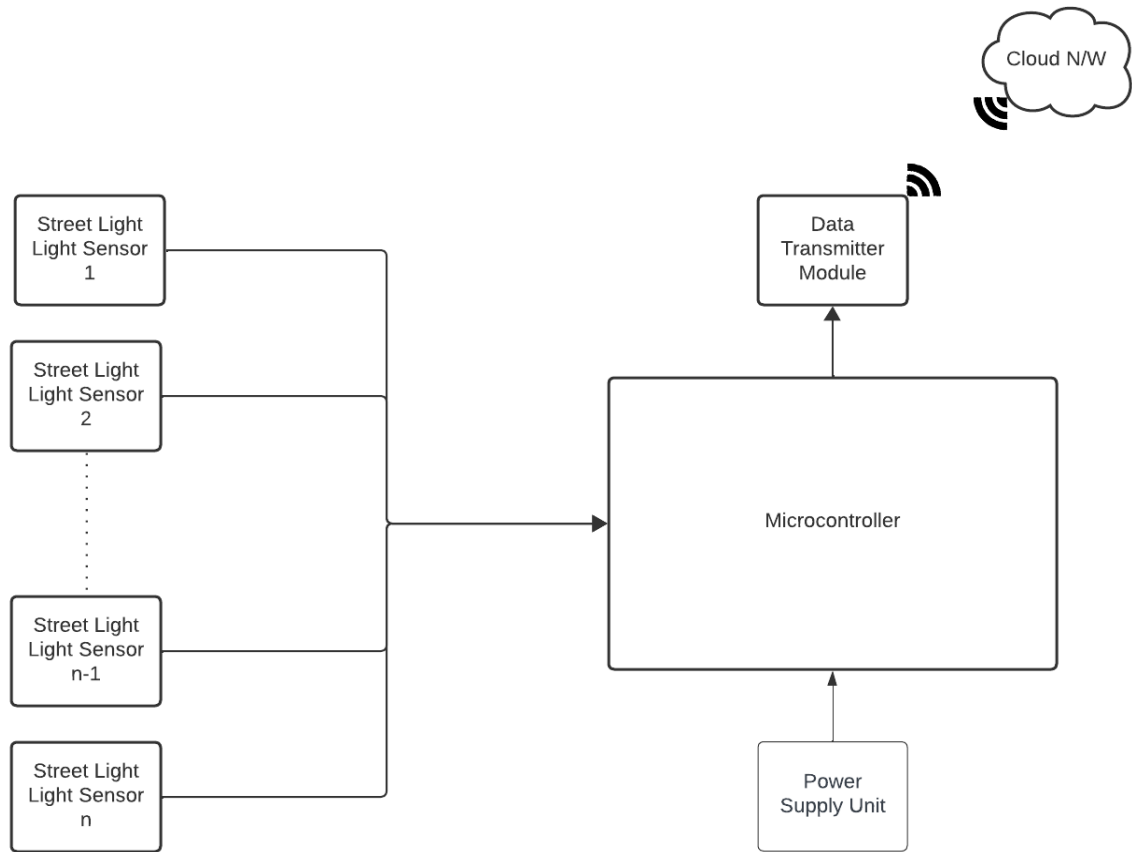


Fig.2. Block diagram of Microcontroller interface and WIFI module with street light.

Circuit Diagram: -

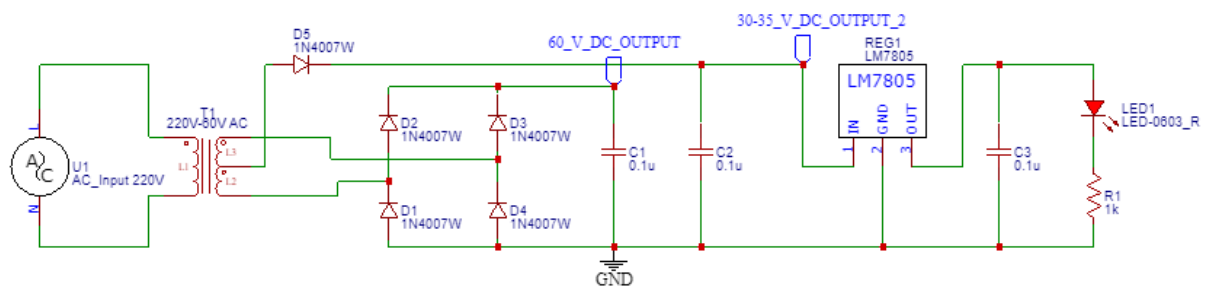


Fig.3. Circuit diagram of Street Light Power Supply Unit.

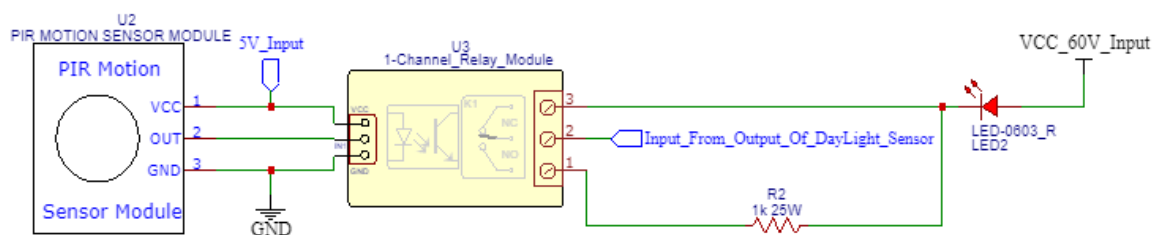


Fig.4. Circuit diagram of Street Light Motion Detector.

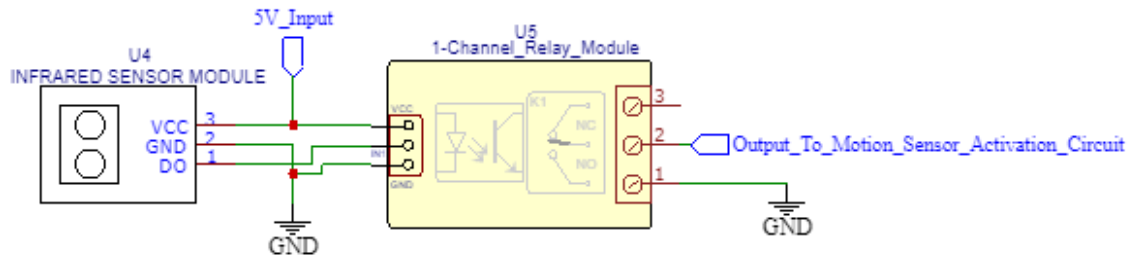


Fig.5. Circuit diagram of Street Light Automatic Controller.

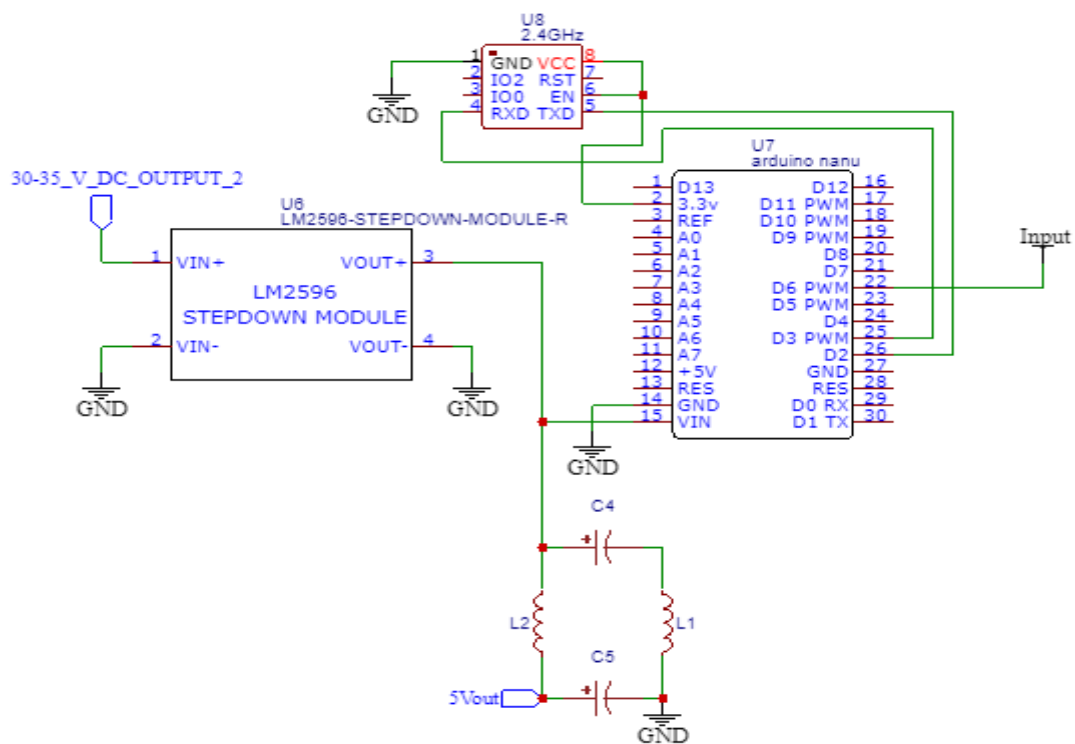


Fig.6. Circuit diagram of Microcontroller interface and WIFI module with street light.

Prototype Photos: -

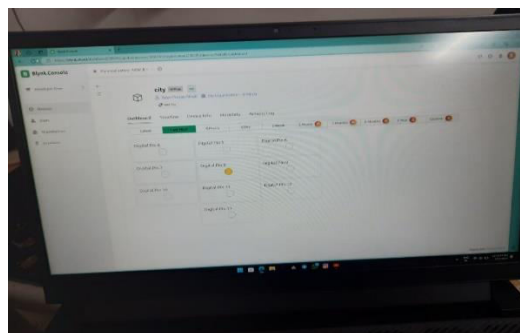


Fig.7. Website Photo.



Fig.8. From Back Photo.



Fig.9. From Front Photo.

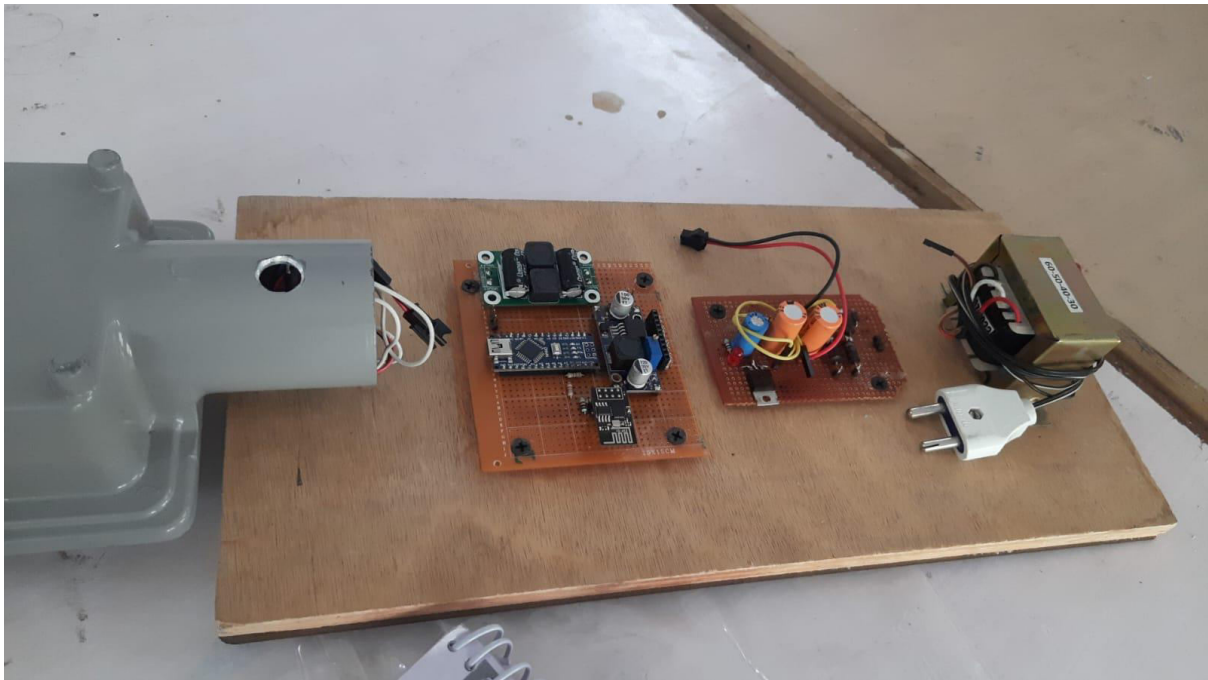


Fig.10. Final Project.

COMPONENTS USED:

1. LDR – Light Dependent Resistor.
2. Photo Diode.
3. Arduino Uno.
4. ESP 8266.
5. Node MCU ESP 8266.

III. CONCLUSION

The system will automatically control the activation and de-activation, reducing the man power to operate.
The system will automatically report the error occurred, reducing the blackout.
The system will also send the exact location where the street light has failed.

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