International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 02 | February - 2024 SJIF Rating: 8.176 ISSN: 2582-3930

Centralized Monitoring System for Street Light Fault Detection and Location Tracking

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Abstract - Street lights are an essential part of our infrastructure, providing safety and security for pedestrians and motorists like. However, If any kind of fault occurred in street light that precise message will send to authorized and sub authorized incharge person through the application. In the message we are sending location of light pole and precise fault like damage wire or current flow. We are introducing the application in which administrative login will be provided. Message will send in application. After repairing the fault the incharge person have to scan his be RFID Card. RFID scanner will be mounted on the light pole. RFID reader recharge itself with solar panel. After scanning RFID card the reader will send message in application that fault has been repaired successfully with date and time, name of the person. This project helps to reduce the sloppiness of social workers and it is efficient wat to detect faults. The LDR sensor is a light-dependent resistor that changes its Subject to the quantity of available light, it is exposed to. The GPS module is a device that can determine the location of an object using satellite signals. The Blynk app is a mobile app that can be used to control IoT devices. The RFID reader is a device that can read RFID tags. The RFID tag is a small device that contains a unique identifier.

Key Words: Centralized system, IoT, real-time monitoring, scalability, esp32

1.INTRODUCTION

Street lights are an essential part of our infrastructure, providing safety and security for pedestrians and motorists alike. However, street lights can also be prone to faults, which can lead to dark streets and increased safety risks. Traditional methods for street light fault detection and repair are often inefficient and time-consuming. Manual inspections are required to identify faulty streetlights, and repairs may be delayed due to a lack of resources or coordination. This project proposes a centralized street light fault detection and alert system . The system will be able to automatically detect and report street light faults to a central control center, where maintenance personnel can be dispatched to make repairs quickly and efficiently.
The system will use the following components:

- ESP32: A low-cost, low-power microcontroller with Wi-Fi and Bluetooth connectivity.
- LDR (light-dependent resistor): A sensor that detects the amount of ambient light.
- RFID reader: A sensor that reads RFID tags.
- Current sensor: A sensor that measures the amount of current flowing through a circuit.
- GPS module: A sensor that determines the location of the device.
- Blynk app: A mobile app for monitoring and controlling IoT devices.
- Solar panel: A renewable energy source for powering the system.
- Battery: A backup power source for the system.

The system will work as follows:
1. The ESP32 will use the LDR to detect the amount of ambient light. If the light level is below a certain threshold, the ESP32 will assume that the street light is faulty.
2. The ESP32 will then use the RFID reader to check if the streetlight has been visited by a maintenance worker. If the RFID reader detects a valid RFID tag, the ESP32 will assume that the streetlight is being repaired and will not send an alert.
3. If the RFID reader does not detect a valid RFID tag, the ESP32 will use the current sensor to measure the amount of current flowing through the streetlight 2 circuit. If the current is below a certain threshold, the ESP32 will assume that the streetlight is faulty and will send an alert to the central control center.
4. The ESP32 will also use the GPS module to determine its location and include this information in the alert message.
5. The central control center will then use the Blynk app to notify maintenance personnel of the street light fault.
6. Maintenance personnel can then use the Blynk app to view the location of the faulty streetlight and dispatch a team to make repairs.

The system will be powered by a solar panel and battery, making it self-sufficient and ideal for remote locations. This system will offer several benefits over traditional street light fault detection and repair methods, including:
- Increased efficiency: The system will automatically

detect and report street light faults, eliminating the need for manual inspections.

- Reduced costs: The system will reduce the time and resources required to repair street light faults.
- Improved public safety: The system will ensure that street light faults are repaired quickly and efficiently, reducing the risk of dark streets and accidents. Overall, this project proposes a centralized street light fault detection and alert system that is efficient, cost-effective, and beneficial for public safety.

2. LITRATURE REVIEW

[1] Automated Street lighting using PLC, Street light controlling using PLC is a novel concept using XD26 PLC controller. In this system manual work is not required. Automatic switch ON and OFF of light in response based on sunlight is done by using LDR, which plays a major role. Effect of seasonal variations; increased energy efficiency; low operating costs low maintenance costs are advantages of this method. The testing and analytics of this project with accurate operation of the streetlights is done involving Crouzet Millennium software.

[2] GSM based smart street light monitoring and control system, it is an automated system designed to increase the efficiency and accuracy of an industry by automatically timed controlled switching of street lights they are basically two modules which include the client side and another one is server side. The client side consists of GSM modem which is further connected to the microcontroller. The server side consists of java-based web server.

[3] Automatic Street Light Control System Using Microcontroller, This paper aims at designing and executing the advanced development in embedded systems for energy saving of street light system. These days, human has become too busy, and is unable to find time even to switch the lights wherever not necessary. This paper gives the best solution for electrical power expenditure. Also the manual operation of the lighting system is completely eliminated. In this paper the two sensors are used which are Light Dependent Resistor LDR sensor to indicate a light or dark time and the photoelectric sensors to detect the movement on the street. The microcontroller PIC16F877A is used as brain to control the street light system, where the programming language used for implementing the software to the microcontroller is C language.

[4] GSM based RFID approach to automatic street lighting system; this system proposes a new way of reduced power utilization. With this system, recovering from power failure period can be reduced. Street light maintenance, load maintenance and if there is any complaints concerning power it can be warm through GSM. In future the Electricity department can adopt this system in order to save power as well as time. This system can be extended in such a way that time in use for processing any new power connection request can be minimized by using RFID.

[5] Automatic Street Lights, This project is all about to control the power consumptions at the streets and eliminating manpower. This includes scheming a circuit of street lights with specific Sensors, LDR and Microcontrollers during day and night. This requires three basic components i.e. LDR, Sensors and microcontroller. For the duration of daytime there is no requirement of street lights so the LDR keeps the street light off until the light point is low or the frequency of light is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Thus the streetlights do not glow.

3. BLOCK DIAGRAM

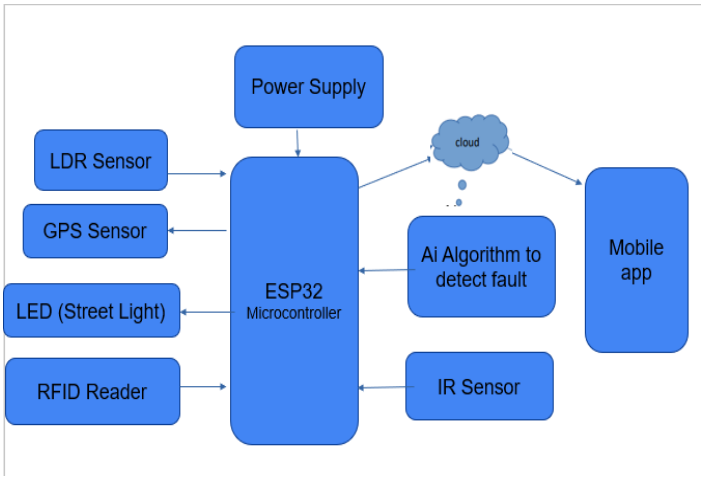


Fig 1: BLOCK Diagram

4. METHODOLOGY

This project proposes a centralized street light fault detection and location tracking using ESP32 microcontrollers, LDR sensors, RFID readers, current sensors, GPS modules, the Blynk app, batteries to address the challenges with traditional street light fault detection and location Tracking.

1.The ESP32 will collect data from the LDR, GPS, and RFID reader.
2.The ESP32 will send the data to the Blynk app.
3.The Blynk app will display the data and allow maintenance personnel to interact with the system.
4.If the LDR detects that a street light is not working, the ESP32 will send an alert to the Blynk app.

5.Maintenance personnel can use the Blynk app to view the location of the street light fault.
6.Once maintenance personnel have arrived at the site of the fault, they can use the RFID reader to verify their visit.
7.The ESP32 will send a confirmation to the Blynk app that the fault has been visited.

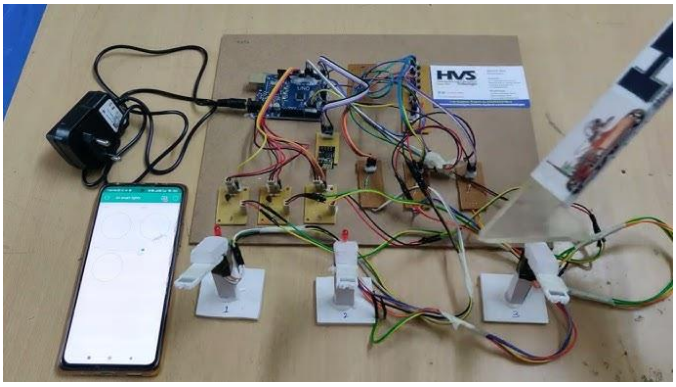
CONCLUSIONS

A centralized street light fault detection and alert system is a viable solution for improving the efficiency and effectiveness of street light maintenance operations. The system can help to reduce costs, improve the reliability of street lighting, and provide several other benefits, such as:

- Reduced response times to street light faults.
- Improved visibility into the status of streetlights
- Reduced workload for maintenance personnel.
- Improved data collection and analysis capabilities
- Enhanced public safety.

Overall, a centralized street light fault detection and alert system is a powerful tool that can help municipalities to improve the efficiency, effectiveness, and reliability of their street light maintenance operations.

RESULT



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