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Automatic Smart Street Light Control System Using Node MCU and BLYNK App

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ABSTRACT: The electricity wastage is the major issue faced during the maintenance of the street lights, which also leads to environmental pollution. It has been observed that it takes a lot of time to solve any kind of working issues related to the street lights in the existing system. This paper presents the alternative approaches to avoid these drawbacks. Firstly, the LDR sensor checks whether the surrounding environment is light or dark then the street lights turns ON with minimum intensity if the surrounding is dark. If a person or a vehicle enters the surrounding then the intensity of street lights increases from minimum to maximum level. A person or a vehicle detection happens with the help of IR sensor and the microcontroller used is NodeMCU. If the street light found to be OFF during night then it is identified as fault using Blynk Cloud and the working of street lights can be monitored through mobile using Blynk App.

KEYWORDS: NodeMCU, LDR Sensor, IR Sensor, Blynk App

I.INTRODUCTION

It has been observed that sometimes though the environment become dark in the evening, the street lights does not turn ON. In this situation, when the environment is dark the street lights needs to be turn ON but because of manual mode of operation, sometimes the street lights does not turn ON. This leads to disturbance to the daily activities of people. It has been observed that the street lights are ON with high intensity from this day evening to the next day morning even in those areas where the density of population is low or approximately zero. This leads to lot of electricity wastage and it also causes light pollution. It also been observed that it takes a lot of time to solve the issues related to the working of street lights.

The main aim of this project is to propose a smart street light system which reduces the electricity wastage caused due to the maintenance of the street lights and also to solve the working issues related to the street lights in less time.

The technology used in doing this project is Internet of Things. Internet of things is the technology in which the group of physical components like sensors are connected to each other through internet. IoT is one of the establishing technologies using which one can easily monitor and exchange information via internet. The microcontroller which supports and most suitable for IoT applications is NodeMCU. NodeMCU has inbuilt wifi feature and this feature makes it more suitable for IoT applications. Internet of Things is the most suitable technology for smart street light applications.

Smart street lights are very helpful in maintaining the pollution free environment, to reduce the electricity consumption and also reduces the maintenance cost of street lights when compared to the existing system.

II.LITERATURE SURVEY

1. Mahesh Boda, RajuAthe[1]: IoT Based Smart Street Light System published in International Journal of Scientific Engineering and Research (IJSER). In this paper, the authors proposed a smart street light system which works based on the environmental brightness. That is, the street lights turns ON automatically when the environment becomes dark and also turns OFF automatically in the day time. The limitation of this proposed system is there is no reduction of electricity consumption and fault detection implementation.

2. Ananth.A, DhanushVenkatesh.S[2]: IoT Based Street Lighting Control System proposed in International Journal of Emerging Trends in Engineering Research(IJETER). In this paper, the authors proposed a street light system where the

street lights will be ON automatically from 6:00pm to 6:00am with high intensity and when a fault occurs indication is given immediately to the user. The limitation of this proposed system is there is no method implemented to reduce the electricity consumption.

3. Ashok Kumar Nanduri, Siva Kumar Kotamraju[3]: IoT based Automatic Damaged Street Light Fault Detection Management System published in International Journal of Advanced Computer Science and Applications(IJACSA).In this paper, the authors proposed a street light system where the street lights will be ON if there is no sunlight available i.e., during the night time lights will be ON and OFF during day time. If fault is identified then the message will trigger through GSM and also location through GPS. The limitation of this proposed system is it just focuses on fault. There is no power saving implementation.

4. Anjaly Rajesh, AlenAntony[4]: IoT Based Smart Street Light System published in Asian Journal of Applied Science and Technology (AJAST). In this paper, the authors proposed a smart street light system where the street lights turns ON automatically when the movement of vehicle is detected and turns OFF automatically when the vehicle moves away. The limitation of this proposed system is that there is no solution is provided in case of occurrence of fault.

5. J.Arthi, W.Lydiapreethi[5]: IoT Based Smart LED Street Lighting System published in IJRTI. In this paper, the authors proposed a smart street light system where the street lights glow in brightest mode when the object is detected and when the object goes away, the street lights glow in dim mode. The limitation of this proposed system is that there is no detection implementation.

6. ParkashTambare, PrabuVenkatachalam[6]: Internet of Things Based Intelligent Street Lighting System for Smart City published in International Journal of Innovative Research in Science, Engineering and Technology. In this paper, the authors proposed Smart Street Lighting System for Smart City where the street lights turns ON when the object is detected and turns OFF as soon as the object goes away. The limitation of this proposed system is there is no alternative if the street light does not glow when the object is detected and also there is no solution is provided in case of fault detection.

III.PROPOSED SYSTEM

In the proposed system, the operating of street light is automatic and the street lights are ON with minimum intensity initially, in the evening. When a person or a vehicle enters the intensity of street light increases and as soon as the vehicle or person goes away, the intensity is same as initial intensity level. The working condition of street lights are monitored from anywhere and can detect and solve the fault issue of the street light within less time. Since the street lights will be ON in minimum intensity throughout the night, there is an alternative even the street light does not increase the intensity level on object detection.

BLOCK DIAGRAM

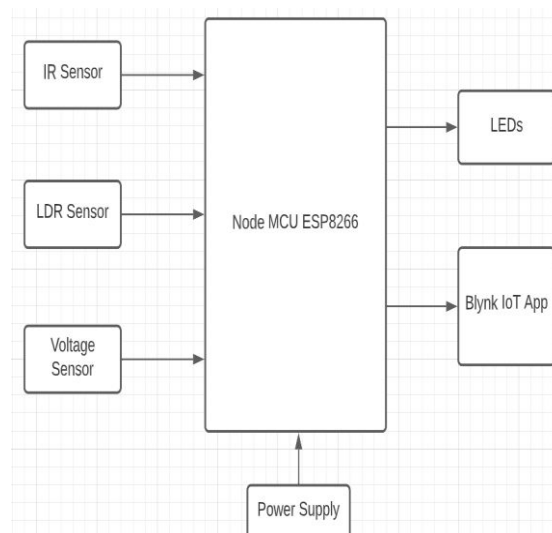


Figure 1: Block Diagram of Automatic Smart Street Light Control System

In the proposed system, all the street lights are made to glow with minimum intensity only during night time with the help of LDR.

The basic principle of LDR is that it changes its resistance value based on light it senses. With this, the lights are automatically turned ON during night time without manual operation.

But in the proposed work, IR sensors are used which detects the presence and movement of object. IR sensor is used to detect vehicles by transmitting IR rays and detecting the reflected rays from the vehicle. The sensors are made to work only during night time and these sensors starts their work based on LDR detection.

All the components are controlled by microcontroller. Based on the illumination value detected by LDR, the lights are turned ON with minimum intensity level.

When sensors detect any movement caused by vehicle or human then the light glow with maximum intensity.

When no object is detected, lights automatically switch over to minimum intensity level. This reduces power consumption when no vehicle is detected.

Fault is detected using Blynk Appand rectified immediately.

FLOWCHART

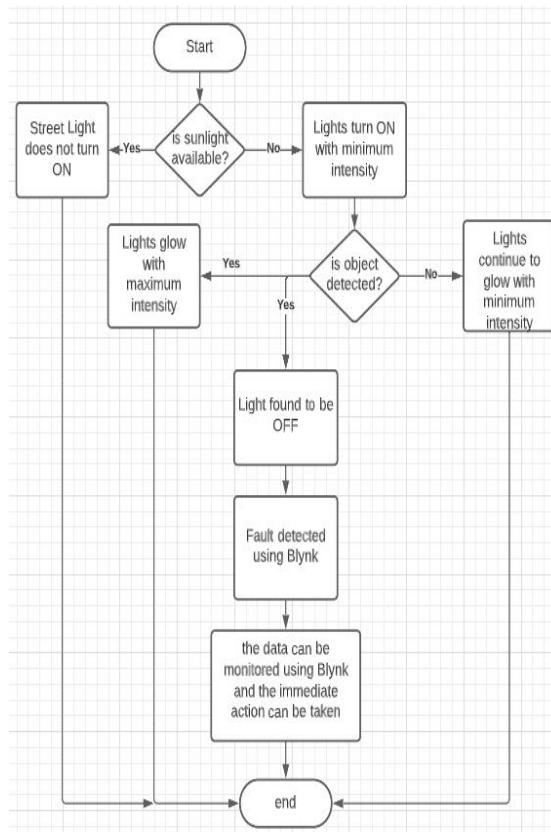


Figure 2: Flowchart of Automatic Smart Street Light Control System

The street lights will turn ON with minimum intensity initially in the evening as soon as the sunlight goes away. When a person or a vehicle enters the intensity of street light increases from minimum to maximum and as soon as the vehicle or person goes away, the intensity of light will be same as initial intensity level. Even if a person or a vehicle enters and if the street lights found to be OFF then it is detected as fault using Blynk App.

IV.RESULTS

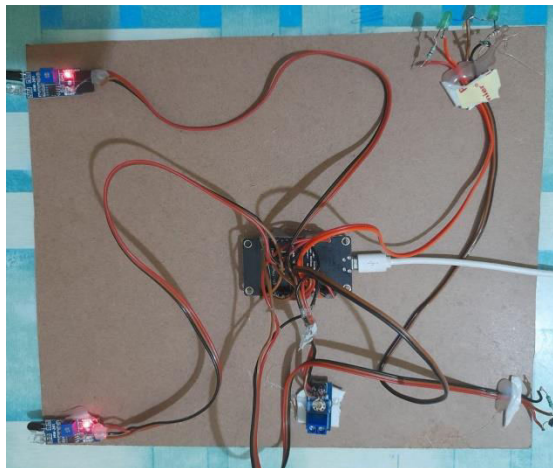


Figure 3: Hardware View of the project Automatic Smart Street Light Control System

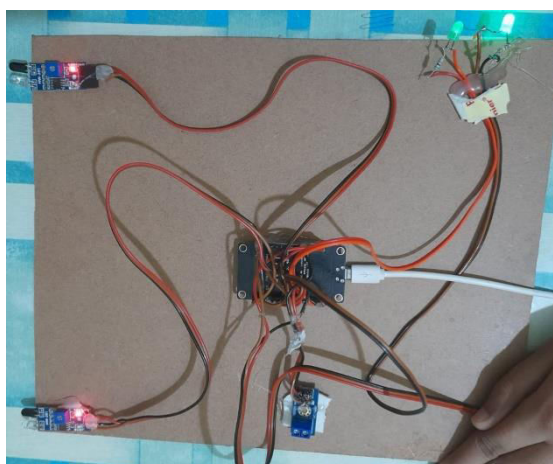


Figure 4: LEDs turning ON with low intensity when the surrounding is dark

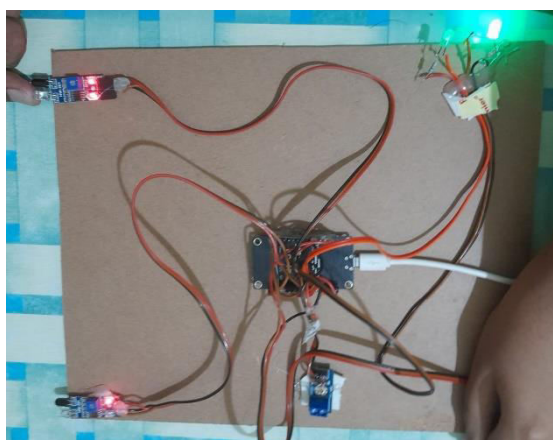


Figure 5: LED1 turning ON with high intensity when IR sensor1 activated

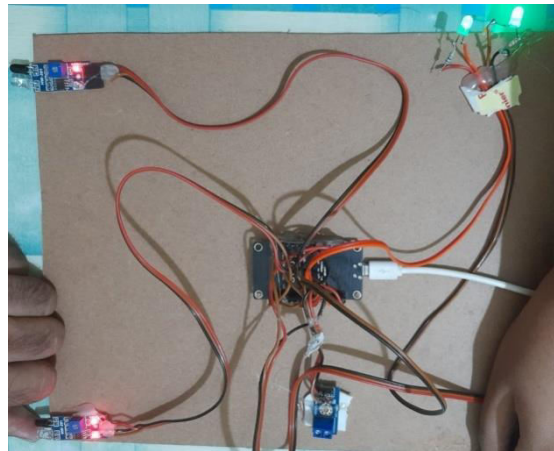


Figure 6: LED2 turning ON with high intensity when IR sensor2 activated

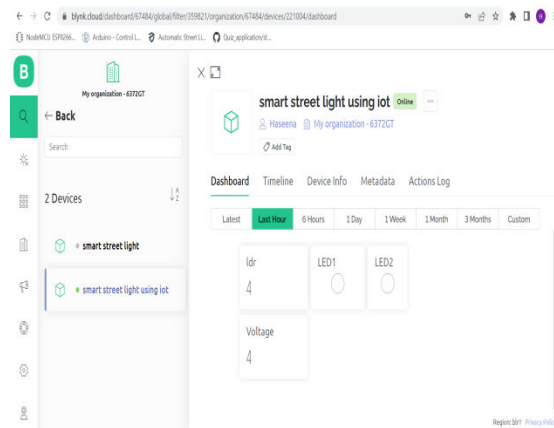


Figure 7: Screenshot showing the readings of LDR, Voltage Sensor in the Blynk App and indicating fault as the LEDs are not turn ON

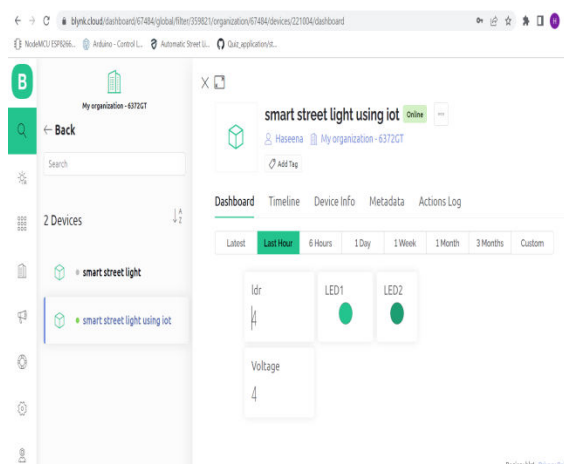


Figure 8: Screenshot showing the readings of LDR, Voltage Sensor in the Blynk App and indicating the LEDs are turn ON

V.CONCLUSION

All the disadvantages of existing street light system like more consumption of power, polluting environment and taking much time to solve the issues related to the working of street lights are overcome in this proposed system. In this proposed system, the street lights are ON with minimum intensity initially, in the evening. When a person or a vehicle



enters the intensity of street light increases and as soon as the vehicle or person goes away, the intensity is same as initial intensity level. The working condition of street lights are monitored from anywhere and can detect and solve the fault issue of the street light within less time. Since the street lights will be ON in minimum intensity throughout the night, there is an alternative even the street light does not increase the intensity level on object detection.

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