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Street Light Automation using WiFi Module

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Abstract: *In public applications, it is frequently necessary to conserve energy in order to lessen the strain on distribution towers and maximize the use of automated street lights. Because automated street lights use less energy because they are off throughout the day, power consumption is also reduced. A robotized structure called a "smart street light" automates traffic. The main goal of smart street lighting is to use less energy when there are no vehicles on the road. When there are vehicles on the road, the Smart Road Light will turn ON; otherwise, the lights are off.Today, everyone in the globe has it easier and simpler thanks to technological advancement. By using IR sensors to detect a moving vehicle and turning on a block of road lights in front of the vehicle, the Smart Road Light provides a solution for energy conservation and saving. The street lights naturally go out as the car passes by.*

Keywords: Smart Street Light, Cloud Server, Wifi , GPS

I. INTRODUCTION

1. Street light automation is required, with each street light being automatically turned on and off based on the sunrise and sunset.
2. There is a requirement to remotely check on the status of street lights based on actual events.
3. Determine the power usage based on the street light's ON period. 4.Bypass automation - There must be a way to disable the automation system so that local switches can be used to turn on and off street lights.

II. LITERATURE SURVEY

Paper :IOT Based Street light controller and monitoring system
Author : Perry Etornam lartsoy, Ronald.
Description : As it provides lighting in cities, towns, and particularly on roadways to lower the danger of accidents at night, street lighting has evolved into an essential resource for human life. Streetlight systems must be maintained effectively or there is a risk of accidents, excessive energy loss, monetary losses, and customer unhappiness. This study suggests a sensor-based and internet-of-things-based smart streetlight management system. The hardware and software designs for the suggested smart streetlight system were included.While the software was an online application that allowed for remote monitoring and control, the hardware utilized sensors, an Arduino board, and GPS devices to create an integrated system capable of reporting the status of the street light through the wireless network that was available. The smart streetlight was designed, created, and put to the test. The operation was effective, resulting in less energy being used by the streetlight, a corresponding decrease in carbon emissions, effective defect detection, effective fault locating thanks to GPS sensors, and reduced downtime. The system can be further expanded to encompass a country's or town's whole streetlight network.
Paper : An Intelligent System for monitoring and controlling of street light using GSM Technology
Author : Swati Parekar, ManojDongre.
Description : When the area grows dark, street lights, which are elevated sources of light, are frequently employed along sidewalks and roadways. The majority of street light systems in use today are wired, which are not only challenging to build but also have limited adaptability. Wireless technology is necessary to solve this problem. In this study, we use GSM technology, which efficiently uses power by monitoring and operating the system from a distance. The defect identification and maintenance will be made easier by this technology. By using a system, we are able to power street lights with the sun's energy in the most effective way possible. Street lights are powered at night by solar

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energy that is captured during the day using solar panels and batteries that are charged.Real-time clock, developed intelligence system, and light intensity all work together to determine when to turn the light ON and OFF. Short Message Service (SMS) technology is used by the microcontroller to process data from the sensors and send it to a nearby control terminal (Base station with a Raspberry PI as a compute module) to track the status of the street lamp (SMS). The designed system is made visible through a graphic user interface (GUI). Hence, the deployment of such a system will lead to energy savings, decreased maintenance costs, an extended lifespan, and improved system performance.

Paper : Development of street light controller using wifi mesh network.

Author : Rifki Muhendra, YudhaArzi.

Description : In order to reduce the energy consumption of the streetlight system, this study outlines the construction of controller street lights using wifi mesh networks. The light-emitting diode (LED), which has a high energy output and variable light intensity, is the type of road light used in this study. This wifi-based light controller equipped with LEDs allows for remote monitoring and control. In order to monitor environmental conditions, the sensor nodes are additionally installed with a number of sensors, including light sensors, humidity sensors, temperature sensors, and current sensors. We constructed a prototype and set some miniature road lights in the lab to realize the suggested system. Experiments conducted there show that this system can remotely regulate on-off and dimmers using android applications. The maximum distance in actual development between the sensor nodes and the other nodes is 19 m.

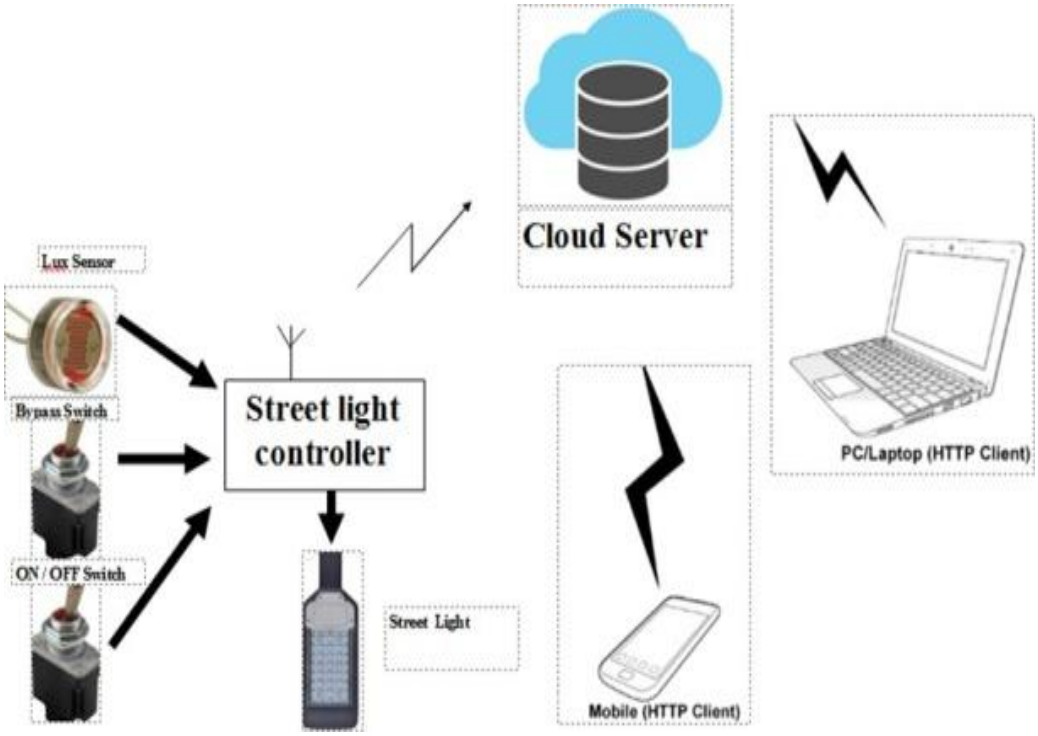
III. PROJECT METHODOLOGY

As shown in the image below, a light sensor such an LDR will be used by the street light controller to measure lux. The LUX level of the Sun's ascent and descent must be set in the controller; the controller must then monitor the LUX level in real time and turn on or off the street light based on the specified level.

Two ON/OFF switches will be connected to the street light controller; one of the switches will be used to bypass automation so that the controller won't detect the lux level and won't turn the street light ON or OFF. After avoiding automation, it is possible to control the street light's ON/OFF status locally by the switch.

The cloud server must be informed of the street light's status, which might be either ON or OFF.

To compute power consumption and track the condition of the street light, the ON or OFF status of the street light must be sensed and sent to a cloud server.



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A high level implementation of the street light controller is given in the diagram below. The resistance changes as a result of variations in the lux level when the sensor converts the sensed lux level into an electrical characteristic. The signal must be signal-conditioned before being fed to the ADC (analog to digital), which converts it into a digital lux level, after being converted into an electrical parameter. In essence, this will function as a lux meter and switch on or off a street light dependent on the configured level of lux.

The On/Off toggle switch must be connected to the controller via the GPIO of the controller. The controller will periodically check the status of this switch and, depending on demand, will bypass automation. If automation is disregarded, the controller must turn the light ON or OFF based on the status of the nearby ON/OFF switches.

The controller sends the status to the cloud after checking the status, whether it is ON or OFF. Street lights can be remotely checked for status. The power consumption at the cloud server side will be determined based on the ON time of the street light.

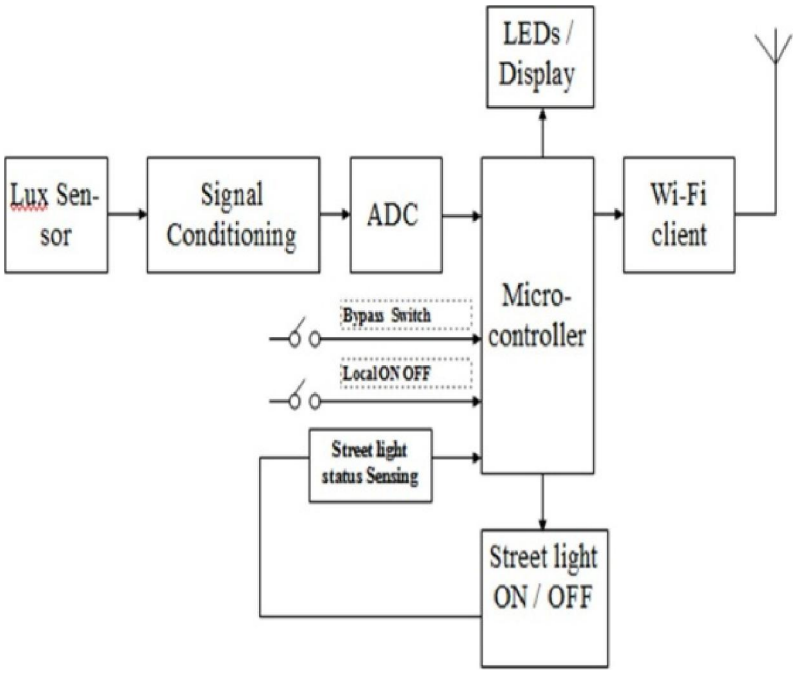
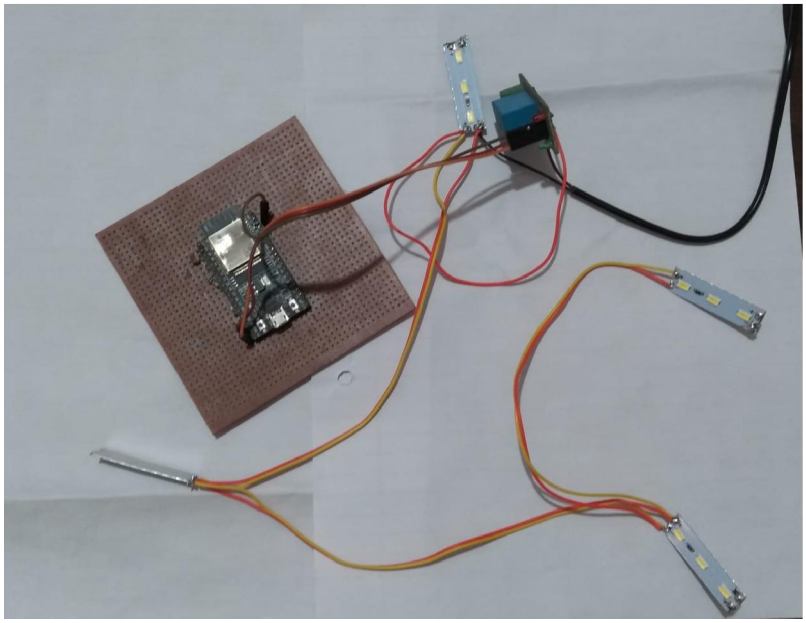


Fig Block Diagram



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IV. CONCLUSION

The most secure, practical, cost-effective, and environmentally beneficial method of energy conservation is this project of AUTOMATIC STREET LIGHTS. It effectively addresses the two issues that the world is currently facing: energy conservation and the disposal of incandescent bulbs. Statistics show that we can reduce the amount of electricity now used by motorways by more than 40%. The project's disadvantages may include initial expense and ongoing maintenance. The cost of the project can be decreased thanks to technological advancements and wise resource allocation. By using high-quality equipment, maintenance requirements can also be minimized in terms of routine inspections.

The LEDs can be utilized for quick switching, emit cool light, don't contain any harmful materials, and have a long lifespan. Due to these factors, our project offers significantly more benefits than it does drawbacks. Since the investment return period is so short, balancing the initial expense with the long-term rewards will never be an issue. The project has potential for a number of additional purposes, such as providing lighting for campuses, industry, and large shopping center parking lots. Surveys on corporate campuses and factories can also be conducted using this.

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