

IoT Streetlight Controller System

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Abstract: In day today life, the maintenance of streetlight is one of the major problem for electricity boards in India. The various techniques that are currently used to maintain and control the streetlight is more complex and not economical. In this paper, we present a new method to control the intensity of LED Street lights using LDR, and to automate street lights using PIR sensors, resulting in power saving. The Implementation is done using Arduino UNO its monitoring the voltage level in IOT

Keywords: IoT, Streetlight

1. Introduction

Automatic Streetlight glows based on day and night effect and it does not require a person to switch it ON and OFF. But it requires a person to check fault. In our project IOT Streetlight Controller System also provide Power consumption, Fault Detection, and Switch ON and OFF of a Streetlight.

2. User requirements

The accurate feature of the system is to ON and OFF based on the darkness and to indicate fault in light. The human can be able to view the amount of power is used by the light. In Additional they can be able to switch it ON and OFF using a mobile application. The variety of sensors are used to calculate the brightness and also the ability of the light to glow. It also has an additional option to view the accurate value of power consumed and the mobile application contains separate button for each features.

3. Arduino UNO architecture

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). In our system, it contains everything needed to support the microcontroller and simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. The Atmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer. A Software Serial library allows for serial communication on any of the Uno's digital pins. The Arduino software includes a Wire library to simplify use of the

I2C bus.

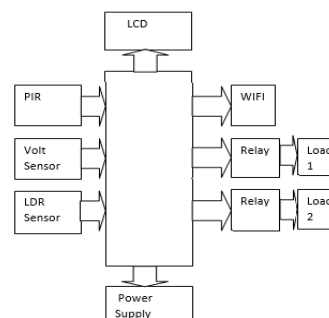


Fig. 1. Block diagram

4. Relay

The Relay is the device that opens or closes the contacts to cause the operation of the other electric control. It detects the intolerable or undesirable condition with an assigned area and gives the commands to the circuit breaker to disconnect the affected area. Thus protects the system from damage. It works on the principle of an electromagnetic attraction. When the circuit of the relay senses the fault current, it energizes the electromagnetic field which produces the temporary magnetic field.

5. Construction of relay

The relay operates both electrically and mechanically. It consists electromagnetic and sets of contacts which perform the operation of the switching. The construction of relay is mainly classified into four groups. They are the contacts, bearings, electromechanical design, terminations and housing.

6. Light dependent resistor (LDR)

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a function of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are made up of semiconductor materials having high resistance. LDR works on the principle of photo conductivity. Photo conductivity is an optical phenomenon in which the materials conductivity when light is absorbed by the material. When light falls i.e., when the photons fall on the device, the electrons in the valence band of the semiconductor material is excited to the conduction band. These photons of the incident light should have energy greater than the band gap of

the semiconductor material to make the electrons jump from the valence band to the conduction band. Hence when light having enough energy strikes on the device, more and more electrons are excited to the conduction band which results in large number of charge carriers. The result of this process is more and more current starts flowing through the device when the circuit is closed and hence it is said that the resistance of the device has been decreased.

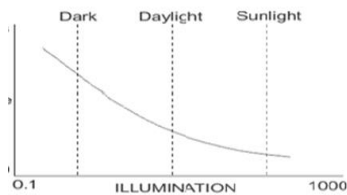


Fig. 2. Illumination

7. Voltage sensor

This is a simple but very useful module which uses a potential divider to reduce an input voltage by a factor of 5. The Voltage Detection Sensor Module 25V allows us to use the analog input of a microcontroller to monitor voltages much higher than it capable of sensing. For example, with a 0-5V analog input range, we are able to measure a voltage up to 25V. The module also includes convenient screw terminals for easy and secure connection of a wire.

8. PIR sensor

PIR sensors allow us to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. PIRs are basically made of a Pyro Electric sensor, which can detect levels of infrared radiation. Everything emits some low level radiation, and the hotter something is, the more radiation is emitted.

9. Conclusion

In many countries, mainly power wastage occurs in street lights and also manpower is very less. The proposed system can be installed to automate as well as save power. As the proposed system uses wireless based closed loop automation of street light control using PIR. It is a low cost remedy for remote controlling and monitoring of the street-lights. It provides an effective measure to save energy by preventing unnecessary wastage of electricity, caused due to manual switching or lighting of street-lights when it is not required. This concept can also be used to control lighting system of industrial areas, college or university campus.

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