Energy Efficient Automatic Light Controller

Mrs.P.Gokila[1] S.Mugilan[2] R.Subathra[3] N.Sujitha[4] S.Divya[5]
[1]Professor [2,3,4,5]UG Student
[1,2,3,4,5]Department of Computer Science & Engineering
[1,2,3,4,5]Info Institute of Engineering, Coimbatpre, India

Abstract— This paper proposes energy efficient automatic light controller. The main objective is to design an energy efficient ESP32 based system which gets turned on and off automatically depending on the ambient lighting .This system consists of LDR (light depending resistor), IR sensor (infrared sensor) and a set of the light emitting diode (LED) module. The system was programmed automatically turn ON/OFF during the night time or given limited time. Detection of moving bodies that can control the street light efficiently by using sensors ON/OFF whenever it is required. This system is based on the concept of IOT (Internet of Things).

Keywords: IR SENSOR, LCD DISPLAY, LDR SENSOR, ESP32 WROOM 32, LED LIGHT

I. INTRODUCTION

Automation, Power consumption and Cost Effectiveness are the important considerations in the present field of electronics and electrical related technologies. To control and maintain complex street lighting system more economically, various street light control systems are developed. These systems are developed to control and reduce energy consumption of a town's public lighting system using different technologies. They may include sending and receiving instructions via separate data networks, at high frequency over the top of the low voltage supply or wireless.The scope of this work is to design and develop an android based distributed intelligent street light controller for switching ON and OFF street lights such that it provides services with ease and optimum energy utilization.

II. PROPOSED SYSTEM

The proposed system provide a solution for energy saving, Because, In rural sides of India most of the night time human activities are low, in that time the street lights are lightned wastely. It makes more electricity wastage, this project is planned by to conserve the electricity and save man power. During night time ,LDR sensor detect lessthan 50% of light intensity then street light will be automatically ON otherwise greaterthan 50% of light intensity then street light automatically OFF. An automatic system is designed using ESP32 WROOM 32, which will switch ON or OFF the street lights at given time and also depending on the intensity of the ambient light.
In order to switching lights ON, there is one condition to be satisfied:

A. IR sensor detects the presence of an object in the street (vehicle/human). Otherwise, the street lights will be switched OFF.

There are two states odd and even,

- In odd state the street light will be kept ON throughout the given limit or time.
- In even state the intensity of the street light will be glown when the movement of the vehicles/human detects. The real time information of the street light (ON/OFF Status) can be accessed from anytime, anywhere through internet.

III. HARDWARE WORKING

A. ESP32 WROOM 32

The ESP32 is way advanced compared to the ESP-12e.Among several features, the ESP32 packs a CPU core, a faster Wi-Fi, more GPIOs supports Bluetooth 4.2 and Bluetooth low energy. The development board equips the ESP-WROOM-32 module containing Tensilica Xtensa® Dual-Core 32-bit LX6 microprocessor. The 39 pins are there. There are two power pins viz. VIN pin & 3.3V pin. The VIN pin can be used to directly supply the ESP32 and its peripherals, if you have a regulated 5V voltage source. The 3.3V pin is the output of an on-board voltage regulator. This pin can be used to supply power to external components.

B. IR Sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called a passive IR sensor. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation

IV. LDR SENSOR

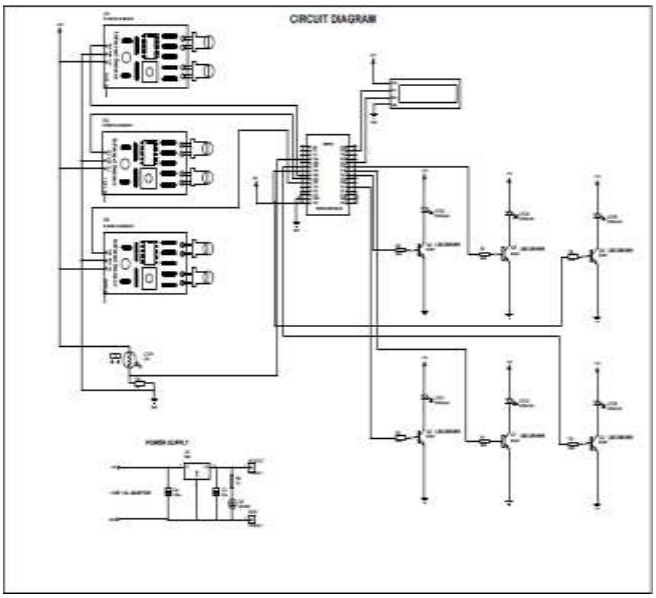
A photo resistor or LDR is an electronic component whose resistance decreases with increasing incident light intensity. It can also be referred to as a light-dependent resistor (LDR), photoconductor, or photocell.

A photo resistor is made of a high-resistance semiconductor. If light falling on the device is of high enough frequency, photons absorbed by the semiconductor give bound electrons enough energy to jump into the conduction band.

A. LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LED

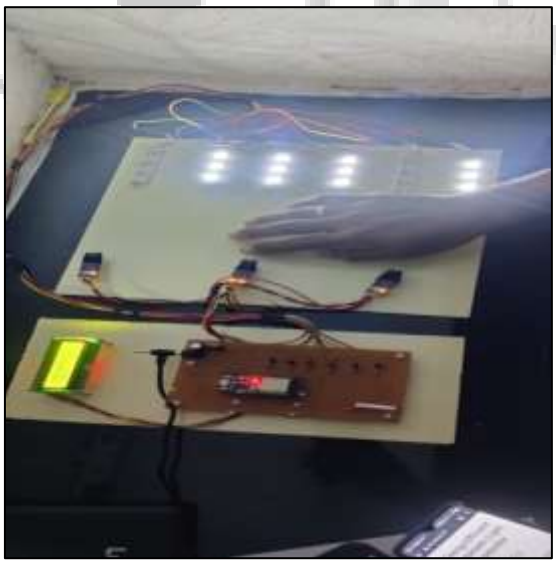
V. BLOCK DIAGRAM

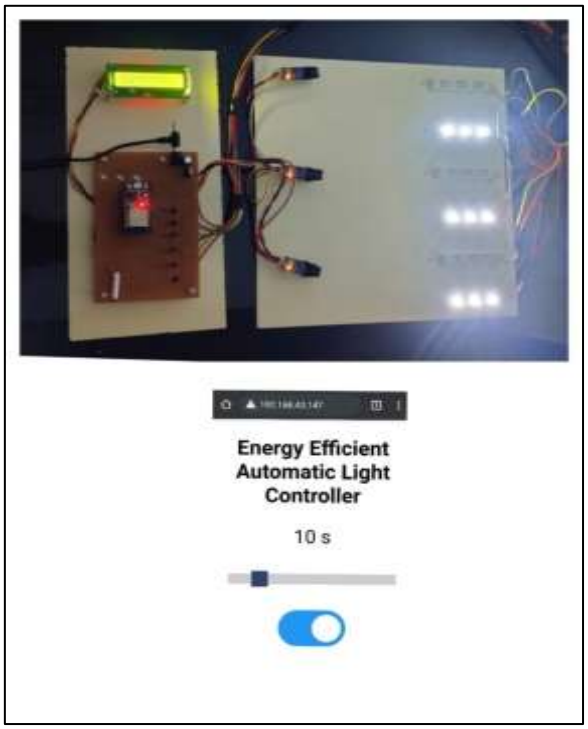


VI. ADVANTAGE

- Automatic Switching ON/OFF Street lights.
- Reduction in CO_2 emission.
- Reduction of light pollution.
- Wireless Communication.
- Energy Saving.
- Reduction of man power.
- It increases safety and provides more efficiency.

VII. SOFTWARE WORKING





VIII. CONCLUSION

Thus the main objective of this proposed system with advanced technology based on IOT will significantly impact the lives of street light which includes IR sensors for other ESP32, WIFI module, LDR,LCD Display and LED light . Hence, this project will be able to consumes the energy efficiently with the help of IR sensors and it also reduces the manual work of controlling the lighting systems. moment detection of the vehicles/human beings is made and the street lights are switched ON and OFF according that.

IX. FUTURE ENHANCEMENTS

We can develop the project by introducing new functionalities like introducing real time operation for online system with using PIR sensor for detection and light ON/OFF to the given limit/time and sensor sense the range of particular range and distance of street light and detecting more parameters for most secure purpose and increase the parameters by addition of PIR sensor. The real time information of the street light(ON/FF status)can be accessed from anytime, anywhere through internet .This design can serve a great social cause. Hence, this project will be Street lights are ON/OFF from 6:30pm to 6:30am for real time application and help fulfill a social cause for the country.

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