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DESIGN AND IMPLEMENTATION OF SMART STREET LIGHT SYSTEM FOR SMART CITIES

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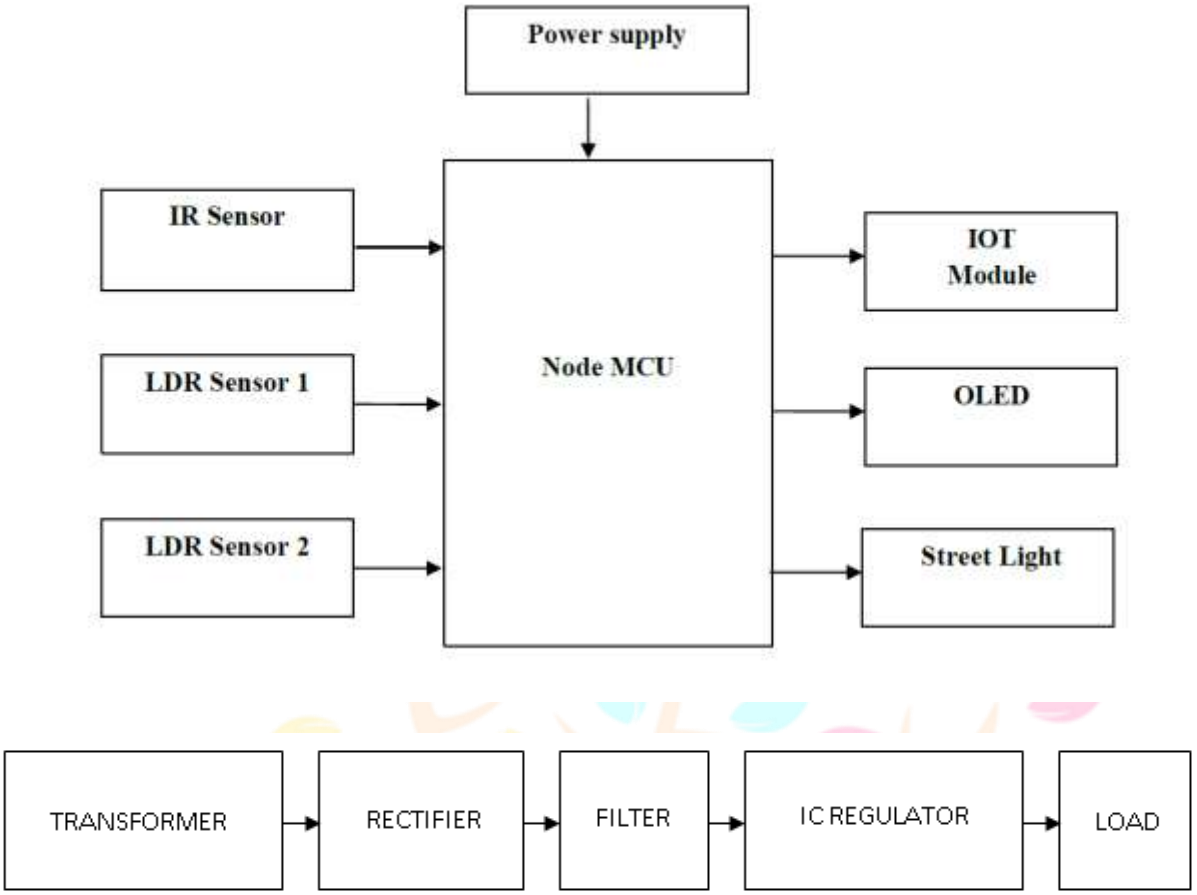
Abstract : **The aim of the project is to save energy by reducing the amount of electricity and the number of workers. This solution uses light-emitting diodes (LEDs), which are bulbs that use less energy and can distribute light in specific directions, thus improving the quality of illumination on the road. Intensity can be controlled using LDR and LED lamps. Infrared sensors used on the road know the speed and movement of the vehicle and send a signal to the LED to light the next section of the road. The proposed system is more efficient than existing systems.**

IndexTerms **- LED, LDR, Node MCU.**

INTRODUCTION

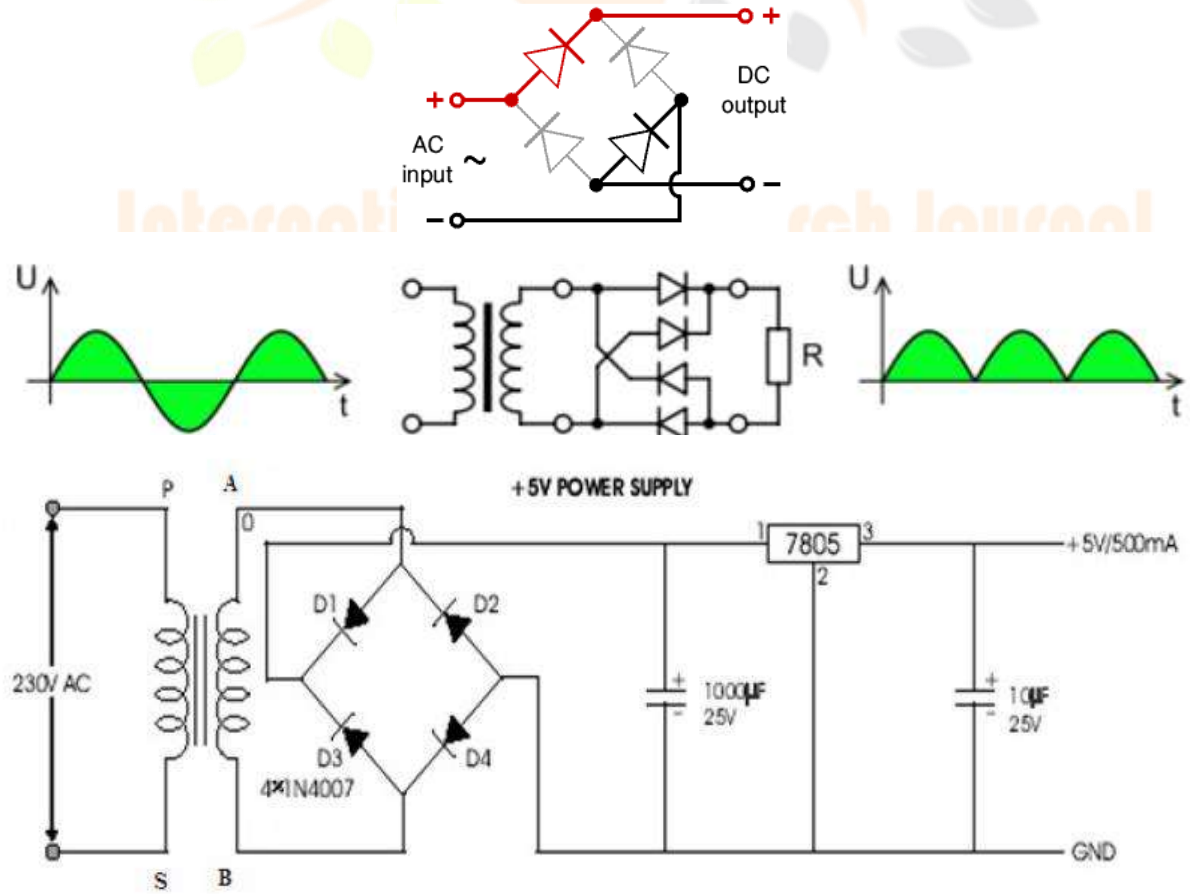
Global energy problems, especially in street lighting, show that energy saving efforts need to be improved. Currently 18-38% of all energy costs are used for lighting. In many cities, lighting equipment is inadequately used, and lighting is often done unnecessarily due to scheduling rather than meeting the lighting needs. To solve this problem, a smart light sensor using a photoresistor (LDR) and a microcontroller has been proposed. The system automatically turns the lights on when pedestrians and vehicles are present, adjusts the brightness or turns off when there is no activity. It is recommended to switch to LED lamps as they have significant energy savings (50-80% more energy than incandescent lamps), long life (50,000+ hours) and brightness. This change is not only financially beneficial but also environmentally friendly. The problem of inadequate lighting caused by inadequate maintenance in some areas can be solved with sensors and communication. The technology provides uniform and efficient lighting throughout the city by detecting poor lighting conditions and sending alerts to the city for timely repairs

BLOCK DIAGRAM.



Block Diagram of Power Supply

The power supply is the power supply that provides +5V to the work equipment. IC LM7805 is used to provide constant +5V power.



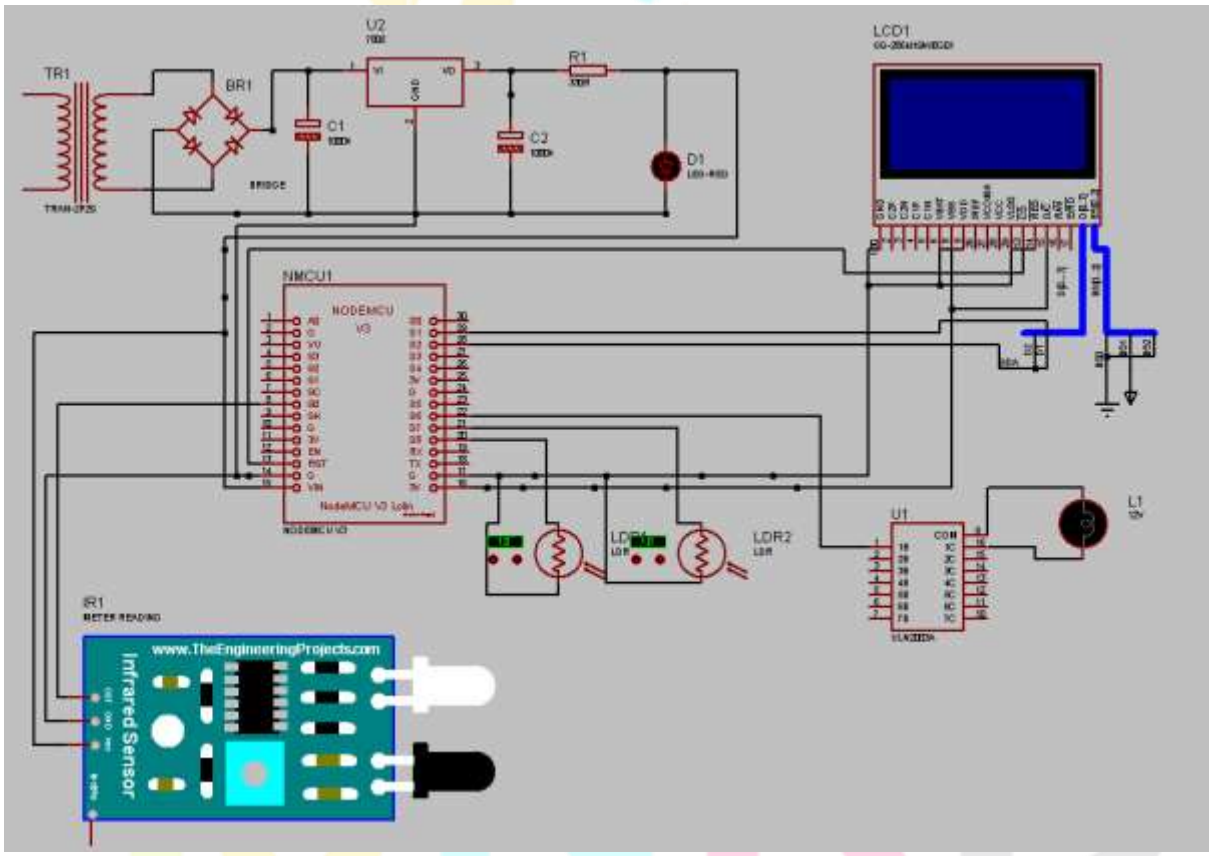
3.1Population and Sample

Transformers convert current from one source to another with virtually no power loss. Transformers can only run on AC, which is one of the reasons why the main power source is AC. Rectifier There are many ways to connect diodes to create a rectifier that converts current to direct current. Bridge rectifier is the most important, it produces full wave change of DC Bridge Rectifier When four diodes are connected as shown in the picture, the circuit is called bridge rectifier. The inputs of this circuit are used for

the corners of the network and the outputs are taken from the remaining two corners 4Bridge Rectifier. The main advantage of this bridge circuit is that it does not need a special positioning transformer, thus reducing its size and cost. ii. A second winding is connected to one side of the diode bridge network and the load is connected to the other side as showing. The result is still a pulsating DC, but at twice the frequency. Voltage Regulators Voltage regulators have a wide range of IC classes. The voltage regulator IC unit includes reference circuits, comparator amplifier, controller and overload protection; all of these are integrated into a single IC Power Supply Circuit Diagram< 5Design and description

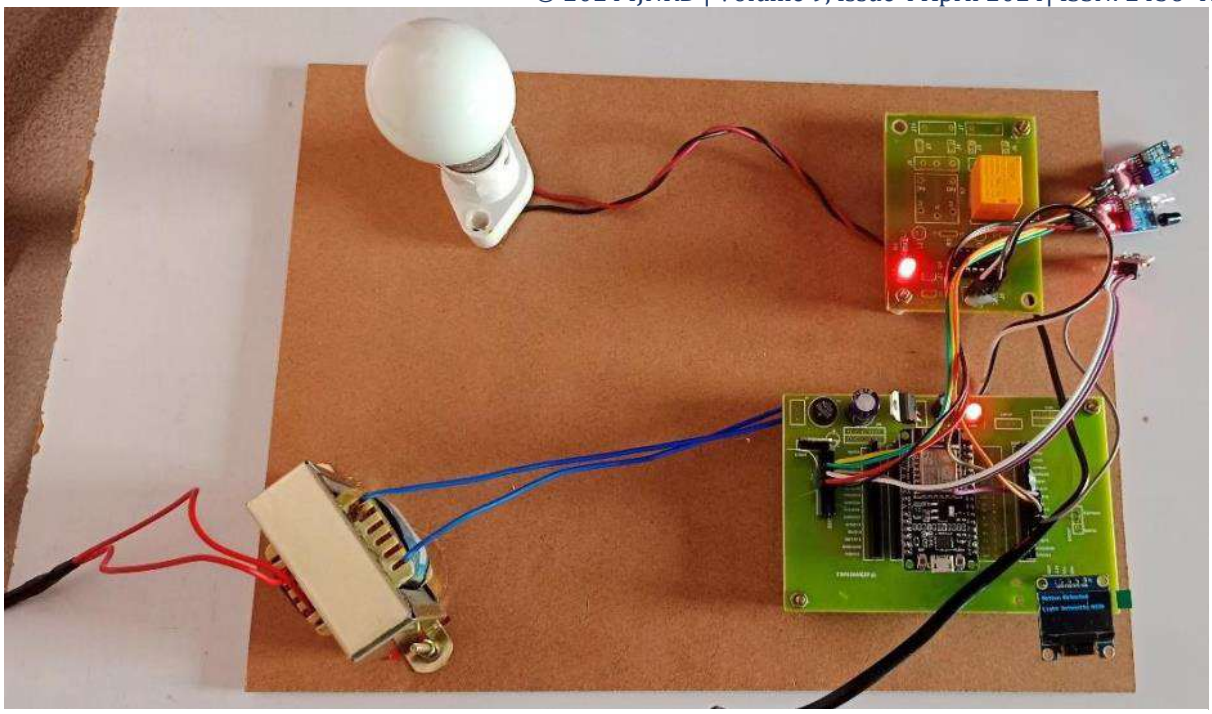
DESIGN AND EXPLANATION

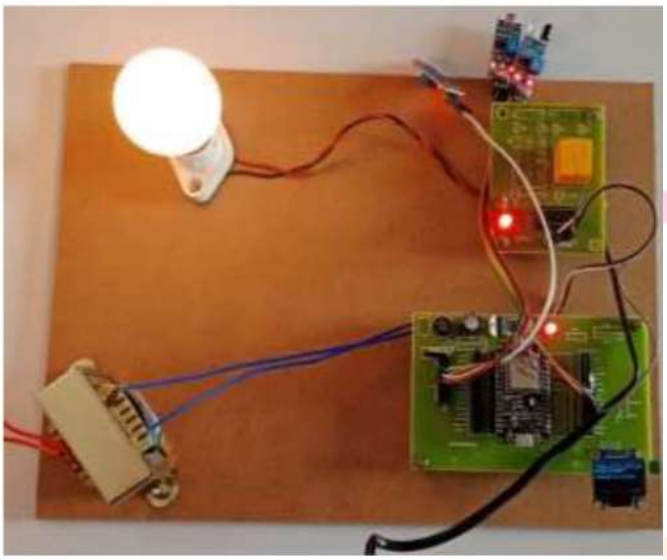
In this design the Main LDR sensor is used to determine the ambient light, if the light is weak the LDR will generate pulse pressure on the NodeMCU and The lighting will turn on and enter the front view of the car. path. If a vehicle is detected, the NodeMCU activates a relay that will turn on the AC power to the light and the light will turn on. When the vehicle detects another infrared sensor, the NodeMCU activates the second relay and the light turns on. In this project, condition monitoring LDR sensors are installed in each lighting system, if a particular lighting system is not working, the relevant lighting system will send the light information. Problem solution for centralized monitoring from cloud server application. Fault sensors send status information to Wi-Fi nodes connected to the local Wi-Fi network and the cloud network. The cloud network sends the data to a companion device, which can be a computer or smartphone, for monitoring purposes. Another feature of the system is that it can be controlled from the cloud and via Wi-Fi. These features provided by cloud developers mean that when the main lighting of the lighting is not working, the technician or supervisor can turn off the weather forecast light from the Blynk app installed on the Android or iOS smartphone.



IV. RESULTS AND DISCUSSION

The system consists of some simple electronic components such as LDR, IR sensor, Wi-Fi module, cloud, LED and LED. Breadboard, resistors, connection cable etc. One system can control four lamps. WIFI module board works with cable. Here two sensors IR sensor and Light Dependent Resistor (LDR) sensor are connected to the circuit board.





CONCLUSION

This article explains the concept of smart street lighting. This suggests that traditional street lights can be replaced with microcontrollers that measure movement and communication to improve energy efficiency. The microcontroller is used for automatic control of street lighting, the sensor is used to detect the movement of pedestrians and vehicles, and the communication system is used to communicate the lights with the system. The lighting system is controlled by Arduino UNO. When infrared sensors detect the movement of pedestrians and vehicles, the lights on the moving surface brighten. We use LED instead of fluorescent, CFL, high pressure sodium or metal halide bulbs. The maintenance impact of smart street lighting is often underestimated. For example, being able to detect poor lighting conditions from a central location and dispatch crews to correct specific lighting conditions can save significant time and money compared to traditional methods. Try sending guards to take care of all the lighting. Do these routinely, one by one. This allows workers to independently control and monitor street lighting in an area.

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