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Street Light Intensity Optimizer and Pollution Moniotoring Using IoT

A.Tamilselvi[1*], Pavithra S[2] , Pooja D[3], Deepika S[4]
[1,3,4]*Department of Electronics and Communication Engineering*
Chennai Institute of Technology, Chennai, Tamilnadu, India.
[2]*Department of Computer Science and Engineering*
Chennai Institute of Technology, Chennai, Tamilnadu, India.

Abstract

The main concept of scheming an innovative system for the street light that do not set away an enormous quantity of electrical energy and ignite big area with the highest intensity of light is pertaining to in the operational area. At present we have maintained a manual system where the street lights will be ON/OFF and due to this system the most of the power will be wasted and also it emits high carbon dioxide. This project mainly focussed on reducing power wastage with increasing the light intensity during the movement of vehicles only. The proposed system give a result for power saving and also reduce the carbon dioxide emission. Lighting control systems are projected from saving outlook and the relation to reduce the carbon dioxide emission is been consign. In this project Light Dependent Resistor is used to indicate a sunlight hours/hours of darkness and the Infrared sensors used to sense the progress of vehicles on the street. The lightning source is LED considering its photometric such as effectiveness, life span, cost, efficiency and power consumption. This will be help in monitor and control the street light system and also this will help in monitor and controlling of street light system and imperfection recognition of the lights through IoT module. Whenever the vehicle is recognised on the road immediately infrared sensor sends the message to server and it increases the light intensity at the specified duration only. Once if the vehicle crosses the street light automatically light intensity will decrease during only the night time. During sunlight hours the system will automatically switched OFF. The existent period data (on/off) of the street light will be access from anytime, everywhere through IoT and also it observes the CO2 emission through the IoT.

Keywords: *Street light, LDR, Relay, IR sensor, Energy saving, IoT.*

1. INTRODUCTION

This paper aims at execute the sophisticated enlargement in IoT for the power saving of street lights. Energy resourceful technology and design system can shrink expenditure of the street lightning significantly. Providing the street light is the expensive responsibilities of the cities. Moreover, by replacing the common bulb consisting of energy saving LED lamps which can reduce the energy consumptions by 80% and it is also responsible of Co2 emission. Life quality which comprises the prevention of human behaviour, traffic safety measurements. Design methodologies of a well-groomed street light methodology optimize the light intensity by overprotective the turn ON/OFF at the estimated time gap or when the light strikes at a particular light intensity. In the real time have power over unit which is assimilate to grip the street lights ON for the definite period of time based on the frequencies of transporting vehicles on the roads.

The disadvantages of Existing module is

- Physical switching ON/OFF of Street Lights is Compulsory
- Supplementary power Consumption is essential
- High expensive

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- Additional manpower is required

The advantages of proposed street light system is

- Energy saving
- Safety measurements
- CO2 less emission
- Reduction of light pollution
- Less expensive
- Reduced power

2. LITERATURE SURVEY

The street light is ON when sensor detects the movement of vehicle and it will turn OFF after the certain period. In this system the provides street light routinely switched ON/OFF during the dark and the daylight hours. In this paper the GSM technology former implement in which the instruction manual switching can be ON/OFF of the street lighting using GSM [1].

The automatic street light system and the atypical way of operation with embedded system technology. Here the piezo electric sensor is used to sense the progress of the entity on the street. This paper gives a result to the domineering the strength of the light taking into account the progress of the street light on the road [2].

To detect the object progress on the street only the some block of lights are switched ON and remaining will switch OFF and it will helps to reduce the light intensity and also saves power consumption[9]. In development of street light photo electric and radiance sensors are used to estimate the power consumption [3]. In most of the street lighting systems the relay can be used as a automatic switch ON / OFF and also it releases the manpower. LDR can be used to sense the progress of dark and daylight hours [4]. The street lighting system is created for automatic street light protection and to trim down energy expenditure [5].

3. PROPOSED SYSTEM DESIGN

In most of the highways where the street lights is the one of the enormous power outflow for a city. At present we are maintained manual system where the light will be switched ON/ OFF with the help of manpower during both dark and day hours. Hence a most of energy will be wasted during ON / OFF period. The proposed system will help us to save lot of energy during both dark and daylight hours and it will help us to monitor the CO2 emission. In this system relay can be used to switch ON/OFF the street light automatically. The figure 1 shows the block diagram of proposed system.

The proposed system of the street light intensity optimizer and pollution monitoring module consists of IR sensors, LDR sensor, node MCU with microcontroller and ESP8266, Relay, UART (Universal Asynchronous Receiver/Transmitter) and Wi-Fi Module with IoT (Internet of Things) data. LDR sensor is a resistor whose resistivity changes when light falls on it. The relationship between light intensity and resistance of LDR is inversely proportional. The means of transport that are crossing that particular street light can be identified using the IR sensor and it sends the light intensity and CO2 emission details to the PC or mobile. These sensors connected with the microcontrollers through an node MCU unit. To switch on/off the street lights, relay switches are utilized. A UART is used to interface the street lights with node MCU.

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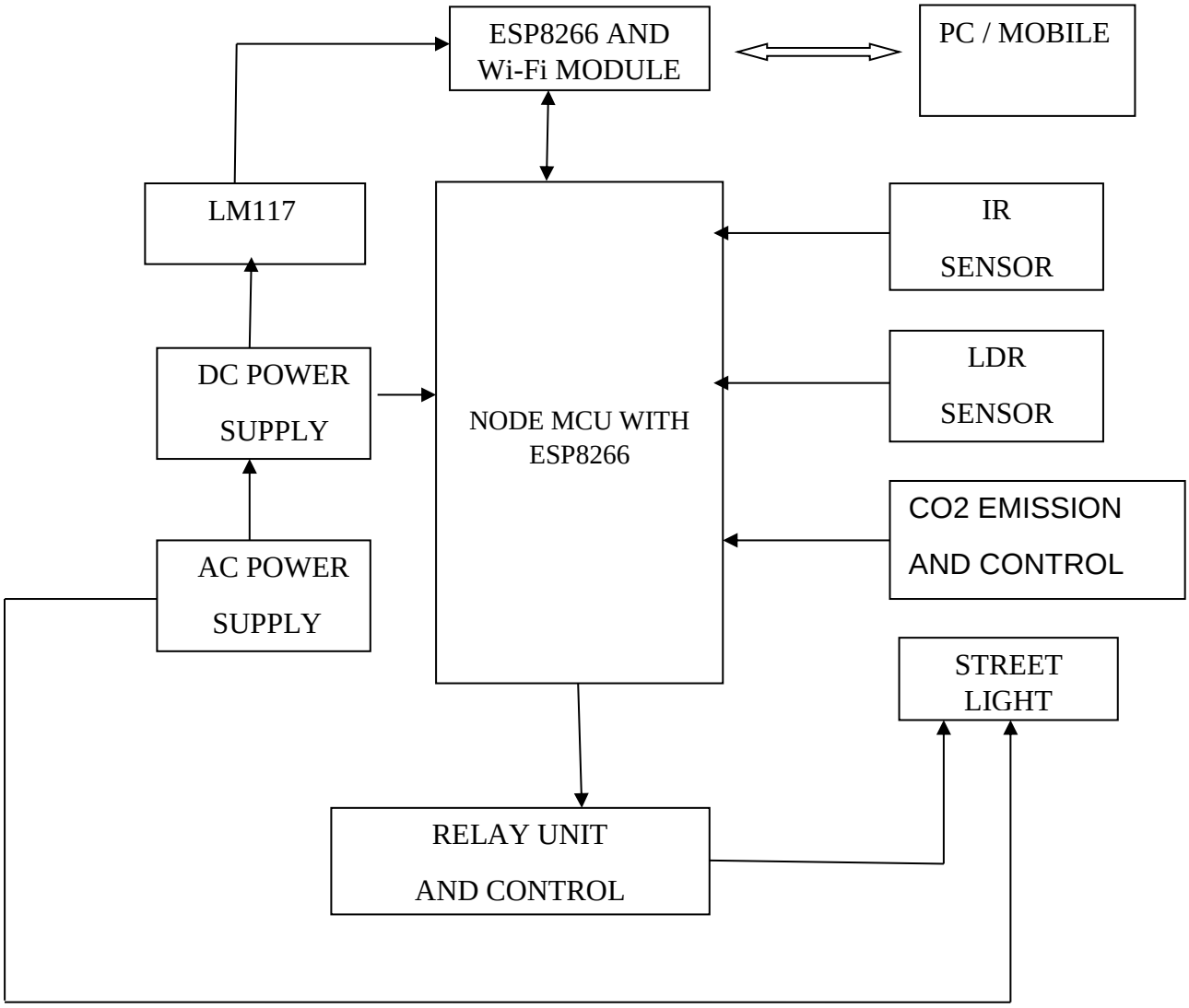

Figure1. Block Diagram of Proposed System

3.1 LDR (Light Detecting Resistor)

LDR is a variable resistance that provides variable light intensity based on light falls on it.

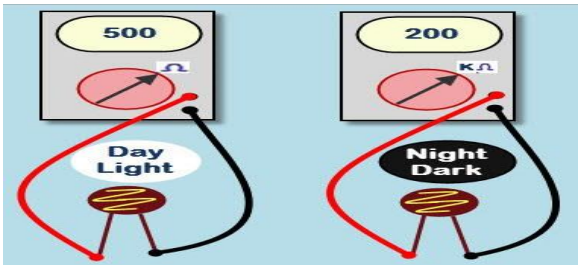

Figure2. LDR - Variation of Light Intensity and Resistance

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LDR circuit is primarily utilized as the light sensor which will detect the surrounding light. The highway light is to naturally switch ON / OFF which is relying upon the power of the daylight on LDR. The obstruction worth will choose the road light are required to turn ON. The basic concept of the LDR sensor can be utilize the insignificance identifier and this will fluctuates as per amount of light falling on the plane. LDR device produces the variation in resistance depends on difference in light intensity.

3.2 IR (Infrared sensor)

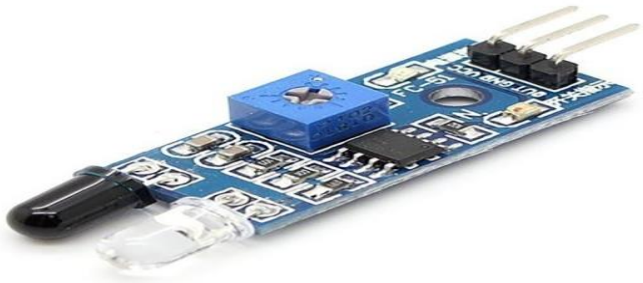

Figure3. Infrared Sensor

An infrared sensor is an electronic device which can be used to sense the certain characteristics of its environment. Infrared sensor can be either emit or detect the infrared radiation and also it can measure the heat emitted by the surrounding object as well. Infrared sensors can be measure only the infrared radiation instead emitting in known as passive infrared sensor. In general the infrared spectrum that shows all the substance radiate in a few form of thermal radiation. Infrared radiations are invisible to human eyes which can be detect by only on infrared sensor. When infrared light falls on the photodiode, the resistances and the output voltages will change with respect to the magnitude of the infrared light received.

3.3 NODE-MCU

The Node MCU is the open wellspring of the advancement pack which will help to model or to assemble the IoT. This hub incorporates the pack model sudden spikes in demand for the ESP8266 Wi-Fi from the Expressive framework and the equipment depends on the ESP 12.It has GPIO,SPI,I2C,ADC,PWM ,UART pins for the correspondence and controlling different peripherals appended to it. On board Node MCU has the CP2102 IC which gives USB to TTL usefulness.

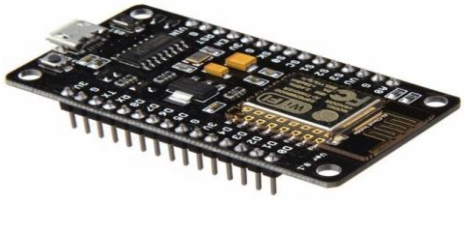

Figure3. Node MCU unit

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The ESP8266 Node MCU consists of 17 GPIO pins and it can be used to connection between all the peripheral operations. It consists of 10-bit ADC channels, UART controlling interface and PWM outputs. The ESP8266 node MCU also enables two kings of buttons like RST and Reset. This board also consists of CP2102 USB-to-UART Bridge Controller unit.

3.4 RELAY

A relay is a electrical switch and it consists of multiple input terminals with the single or multiple control signals.The switch contains number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations. Relay can be used to isolation between main controlling unit and actual device which will works on both AC and also DC supply. In general the relay receives the information signal from the node MCU unit.

Figure5. Relay Unit

Features of Relay unit:

- The minimum voltage and current is required
- The maximum voltage will be received in the output.
- More no. of armature.

4. RESULTS AND DISCUSSION

The project were aims to reduce the light intensity and controls the CO2 emission with eliminating current system that provides energy saving. In day time, the LED fixed in street lights will be in OFF condition and the intensity also low because of the various atmospheric conditions like heavy storm, smog etc. after that street light will get turned ON. The IR sensor will detect the movement of object and it sends the information to the interfacing unit and it will reduce the light intensity after crossing the object and also it controls the CO2 emission.

System working procedure:

(1) Detect object and scanned by IR sensors
(2) If object found then switch the street light to high intensity and
(3) Set threshold value for timer (e.g. > 25 sec for crossing the object)
(4) Start timer and compare with threshold value
(5) Set threshold value for CO2 emisssion (e.g. > 150) and Compare current timer with threshold value

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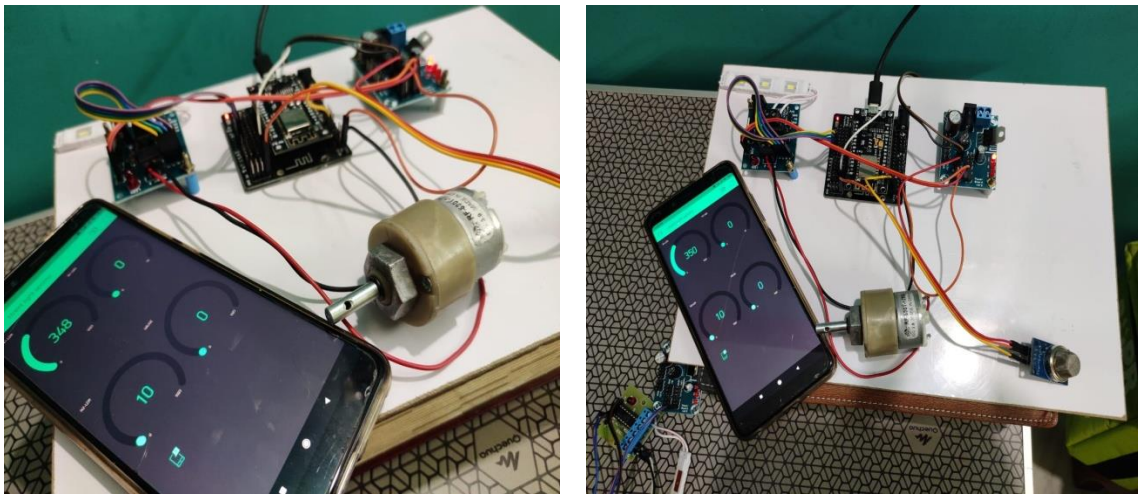

Figure 6. Pollution controlled and monitored using IoT

Fig 6 shows CO2 emission value measured on real time on the mobile webpage. The users can able to access this real time information form anyplace anywhere via internet using mobile or PC.

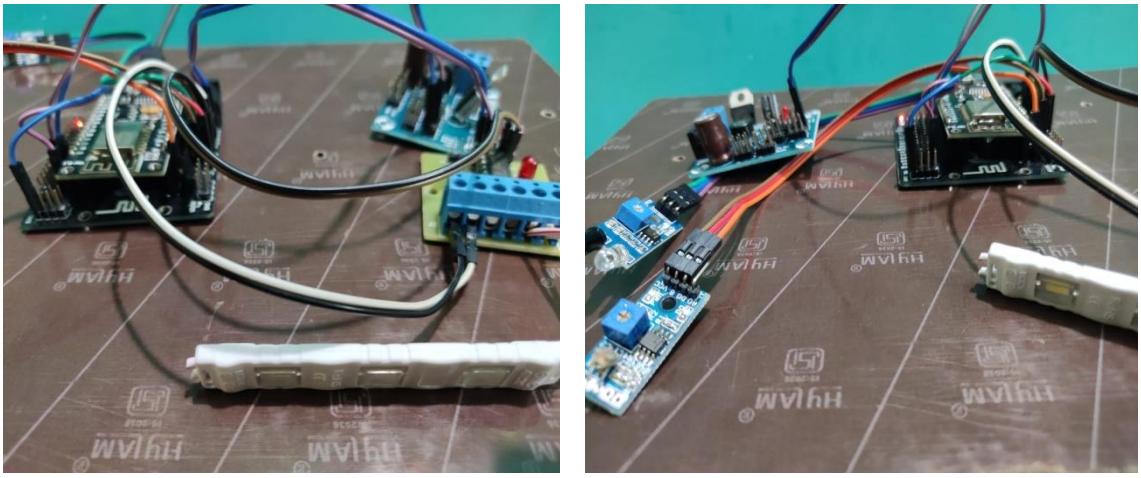

Figure 7. Street light intensity optimizer

The Fig7 shows that the street light optimizer that automatically reduces the light intensity after detecting the object crossing the street and also by continuously monitoring the status of LDR and it sends the real time data to the host through the IoT.

5. CONCLUSION

Smart Street light system is used to save very large percentage of available energy by introducing LEDs in the place of sodium vapour lamps and also incorporating new techniques to security implementations. The proposed method reduces the power wastages mainly caused by unattended street lights during sun light in day time. With the help of IR sensors the power wastages are reduces. It can lessen the vitality utilization also keeps up the expense. This framework is flexible, easy to expand and absolutely customizable to client requirements. This framework is currently utilized uniquely for single route traffic in parkways. Constant utilization of LDR and IR sensors are widely used even in day time. It ensures that the street lights are not turned ON prior to the dusk. Savvy light framework can also be additionally reached

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out to utilize the present framework in two-manner traffic. This framework is progressively made adaptable during the stormy days and the lights can be controlled using GSM. This project can be expanded to provide smart lightings in various industrial and campuses applications.

REFERANCES

1. Abdul Latif Saleem, Raja Sagar R., Sachin N. S., Sachin H.S., Usha M.S., "Street light monitoring and control system", International Journal of Engineering and Techniques (IJET), vol.1, issue 2, April 2015.
2. Archana. G, Aishwarya N, Anitha J "Intelligent Street Light System" International Journal of Recent Advances in Engineering & Technology, Vol-3, Issue-4, 2015.
3. AkshayBalachandran, Murali Siva, V. Parthasarathi, Surya and Shriram K. Vasudevan "An Innovation in the Field of Street Lighting System with Cost and Energy Efficiency"Indian Journal of Science and Technology,Vol-8, August 2015
4. Deepanshu Khandelwal, Bijo M Thomas, Kritika Mehndiratta, Nitin Kumar "Sensor based automatic street lighting system", International Journal of Education and Science Research Review (IJESRR), vol. 2, Issue 2, April 2015.
5. Fabio Leccese, "Remote-control system of high efficiency and intelligent street lighting using ZigBee network of devices and sensor", IEEE Transactions, vol. 28, no. 1, Ianuary 2013.
6. Jasio, T. Wilmshurst, D. Ibrahim, J. Morton,M. Bates, J. Smith D. Smith and C. Hellebuyck,PIC Microcontrollers: know it all, Publishing Elsevier Science, 2008.
7. K. S. Sudhakar, A. A. Anil, K. C. Ashok and S. S. Bhaskar, Automatic Street Light Control System, International Journal of Emerging Technology and Advanced Engineering, Vol. 3,May 2013.
8. Nallaparaju Venkata Kalyan "GSM based smart message display board", International Journal of Advancements in Research & Technology (IJART), vol. 3, issue 12, December 2014.
9. Dhanagopal, R., Muthukumar, B. A Model for Low Power, High Speed and Energy Efficient Early Landslide Detection System Using IoT. Wireless Pers Commun (2019). https://doi.org/10.1007/s11277-019-06933-7

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