SMART STREET LIGHTING SYSTEM FOR EFFECTIVE POWER UTILISATION WITH ACCIDENT AVOIDENCE

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ABSTRACT: The main aim of the project is to provide automatic control and monitoring on the street lights. This paper deals with the designing of automatic LED lighting system which targets on the energy savings. The intensity of lighting is directly proportional to the traffic density. The light intensity would be maximum when there is traffic at the night time. If there is no traffic on the road then light intensity is reduced to /20 of the total intensity. By using HC-05 the street lights are manually controlled. This paper includes the concept of accident avoidance with the help of ultrasonic sensor. If it founds any object within the range of 40-60 meters just in front of it then automatic breaking system will be applied in order to avoid accidents. Our system is capable of a 70 % to 95 % energy savings depends on variations in daylight hours by using PWM Technique. A significant reduction in greenhouse gases, improved overall system reliability, and reduced maintenance due to smart control suggest promising results for future wide-area deployment.
Index terms –Pic16F877A, I.R sensors, HC-05, L.D.R, Ultrasonic sensor, power led's, traffic lights.

I. INTRODUCTION

Now-a-days, there is an increase in the development of Internet of things (IOT) and wireless sensors. Smart lighting is also new technology which is estimated as a part of future smart cities. The objective of this paper is connected public street lighting to observe various environmental parameters. The switching of street lights is made manually in all zones.

This causes an increase in the man power and time. Due to the man power some errors are occurred. Registering the complaints and switching of the light manually is a time consuming process and it requires man power. Automatic ON/OFF is a new method and it doesn't require any man power. Therefore, it is more efficient than the existed method.

There are two types of sensors in this paper. They are light sensor and photo electric sensor. The light sensors will detect the darkness for activating ON/OFF switch. Hence the street lights will be ready to turn on. The photo electric sensor will detect the movement for activating the street lights. LDR is used because it varies as per the amount of light falling on its surface. Hence, photo electric sensors are placed on the side of the road. These sensors are controlled by micro controller PIC16f877A.

The photo electric sensor will be activated on the night time. A certain light will be automatically ON when any objects crosses the photo electric beam. Based on this principle, the intelligent system can be designed for the perfect utilization of street lights in any place.

The street lighting system which is well designed should allow the vehicles to travel at night with safety and comfort. The main objective of this paper is to reduce the power consumption of street lights. It is done by installing advanced technique of power LEDs in to the ordinary phoroscent lamp. This paper mainly consists of PIC micro controller that is internally controlled to the LDR (Light Dependent Resistor), IR (Infra Red) sensors which gives the output to the Power LEDs in Street light.

II. LITERATURE SURVEY

We propose a wireless street lighting system with optimized management and efficiency. Zigbee based wireless devices are allowing more efficient street lamp system management. Many sensors are used to control and provide assurance to the optimal system parameters. Zigbee transmitters and receivers are transferring the information point to point. It is sent to a control terminal which is used to verify the state of street lamps and to take suitable measures in cases of failure.

III. WORKING PRINCIPLE

The main objective of this paper is to reduce the power consumption of the street lights by establishing an advanced technique of power LEDs. PIC micro controller is internally connected to the LDR (Light Dependent Resistor), IR sensors. It provides the output to the power LEDs in the street lights.

A new technique is proposed that is light intensity is directly proportional to the traffic density. In the existence of traffic in the night time the intensity of light should be maximum. When there were no vehicles then automatically the intensity of light can be reduced to 1/20 of its total intensity.

The traffic density on the road is also controlled by this method. By using ultrasonic sensors we can avoid the accidents. If the sensor founds any object in the range of 40-60 meters then automatic breaking system will be applied.

We includes a robot which consists of a gear motor and a drive motor L293D. If ultrasonic sensors recognize any object within the range of 40-60 cms then immediately the movement of vehicle will be stopped by the gear motor.

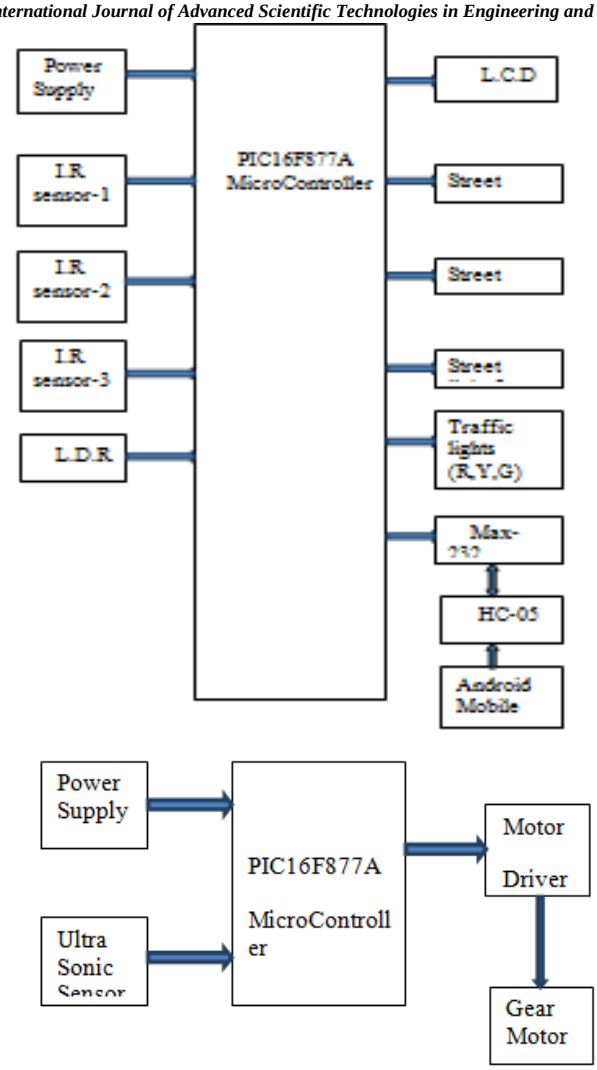


Fig 1. Block Diagram.

IV. AUTOMETIC STREET LIGHT SYSTEM CIRCUIT DESIGN

The system mainly contains of a LDR, IR sensor, Power supply, Bulbs and Micro controller.

LDR: The LDR is a resistor and its resistance is differs corresponds to the amount of light falling on its surface. When LDR recognize light then its resistance can decrease. If it detects darkness then its resistance can increase.

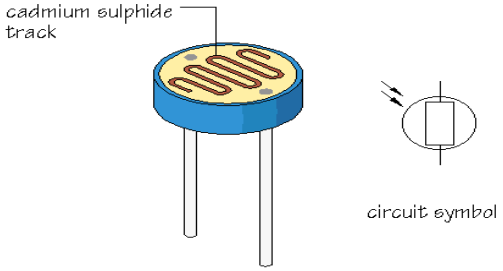


FIG 2. LDR CIRCUIT.

IR Sensor: The movement of any object is detected by the IR sensors. Light from the emitter directly strikes the target and the reflected light is diffused at all angles. If the receiver receives sufficient reflected light then the output will switches the state. If no light is reflected to the receiver the output came into the original state.

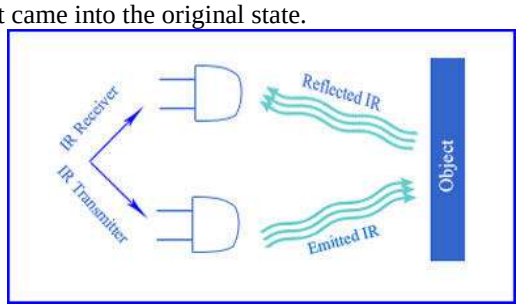


Fig 3. Ir Sensor Circuit.

PIC16F877A Micro controller: Micro controller contains many electronic circuits which are built in to it. They can decode the instructions and converted in to the electrical signals. There are different micro controllers. We can use the PIC16877A micro controller in this paper which is shown in the below figure 4.

Ultra sonic Sensor: These are also known as transceivers because it can be operated as both transmitter and receiver. It can produce high frequency sound waves and estimate the echo received by the sensor. Sensors will calculate the time interval between the sending of a signal and receiving of an echo which determines the distance of an object. Fig 6 shows the schematic diagram.

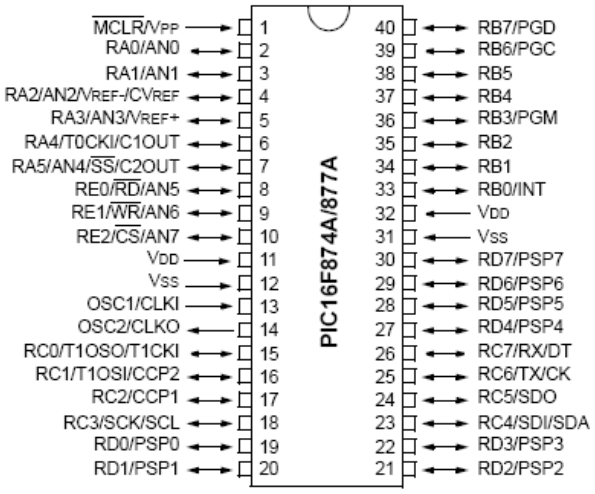


Fig 4. PIC16877A PIN DIAGRAM.

Fig 5. Ultrasonic Sensor.

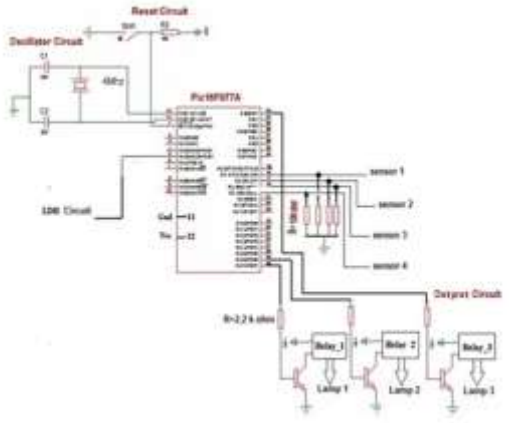
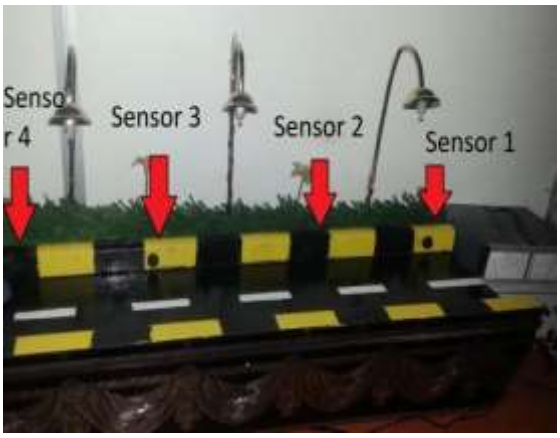


Fig 6. Schematic Diagram.

V.RESULTS

The main aim is to reduce the side effects of the street light system and detect a solution to save the power. The inputs and outputs of the system are used to control the lights of a street which is shown in below figure.



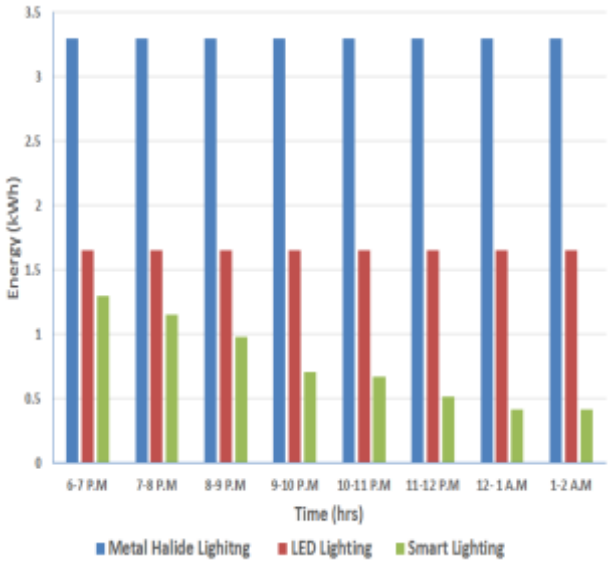


Fig 7.Comparison Of Proposed System With Respect To The Energy.

The smart LED lighting is compared with the conventional method shown in above figure. Smart lighting achieves the energy saving phenomenon by switching LED lights to minimum Power Consumption Mode.

VI. CONCLUSION

The amount of energy and cost is reduced with lighting applications. In this paper, an efficient LED lighting system is proposed and implemented. Compared to previous works, a probabilistic method is followed by a statistical analysis of varying-time-based traffic has been considered for implementing an optimal system. The proposed system provides the additional benefits of LED technology and saves 80 % energy over previously-installed metal halide bulbs. The benefits of this system are increased reliability, enhanced system life and reduced GHG emission.

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