Microcontroller Based Street Light Energy Saving System

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Abstract- *Nowadays, human has become too busy and unable to switch ON or OFF the street lights. The proposed system will automatically switch ON the street lights in the evening before the sunset and switch OFF in the morning when there is sufficient lights on the road. Two sensors are used-LDR is used to indicate the day or night on the street and PIR is used to detect presence of vehicle or person. The street light automation can reduce energy consumption there by it reduces cost and it is built using sensors and microcontroller. The programming language used for developing the software is C-language.*

Keywords- Street light, LDR, PIR sensor, PIC microcontroller.

I. INTRODUCTION

Street lighting is one of the important parts of a city's infrastructure where the main function is to illuminate the city's streets during dark hours of the day. Lighting is often the largest electrical load in offices, but the cost of lighting energy consumption is low when compared to the personnel costs. Thus its energy saving potential is often neglected. According to Frost and Sullivan study about 4400MW of power is alone spent in India on public lightning. Previously, the number of streets in the town and city is very small. Therefore, the street lamps are relatively simple but with the development of urbanization, the number of streets increases rapidly with high traffic density .Based on the design of system, saving in efficient streetlight energy is a must. The idea of designing new system for save the huge amount of electricity.PIR sensor is a motion sensor, is used to identify the presence of vehicle or person, giving an input to turn street light or street lights ON/DIM/OFF. LDR sensor is a light sensor, will detect darkness or brightness in nature. Depending on it, street light will be ready to turn ON/DIM/OFF. Controller will control & monitor all the operations of sensors & output device.

II. WORKING OF STREET LIGHT CONSERVATION SYSTEM

2.1. LDR

The theoretical concept of the light sensor lies behind, which is used in this circuit as a darkness detector. The LDR is a resistor as shown in Fig.1,and its resistance varies according to the amount of light falling on its surface. When the LDR detect light its resistance will get decreased, thus if it detects darkness its resistance will increase.

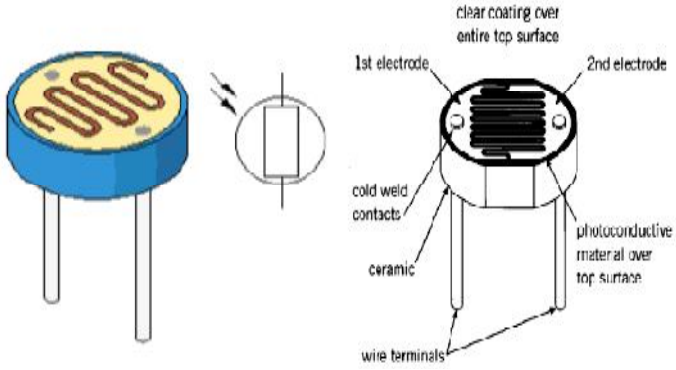

Fig 1.LDR

2.2 16F877AMICROCONTROLLER

A microcontroller is a computer control system on a single chip. It has many electronic circuits built into it, which can decode written instructions and convert them to electrical signals.

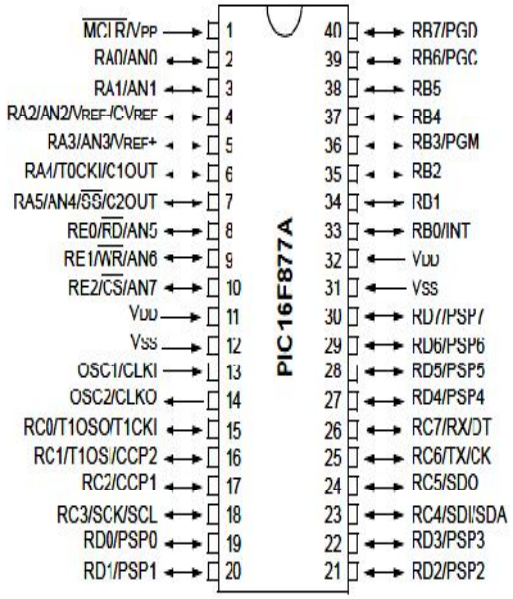

Fig 2.Pin Diagram

The microcontroller will then step through these instructions and execute them one by one. As an example of this a microcontroller we can use it to controller the lighting of a street by using the exact procedures. Microcontrollers are now changing electronic designs. Instead of hard wiring a number of logic gates together to perform some function we now use instructions to wire the gates electronically. The list of these instructions given to the microcontroller is called a program. Microcontroller is the most important part in electronic design. The list of instructions given to microcontroller is called as program

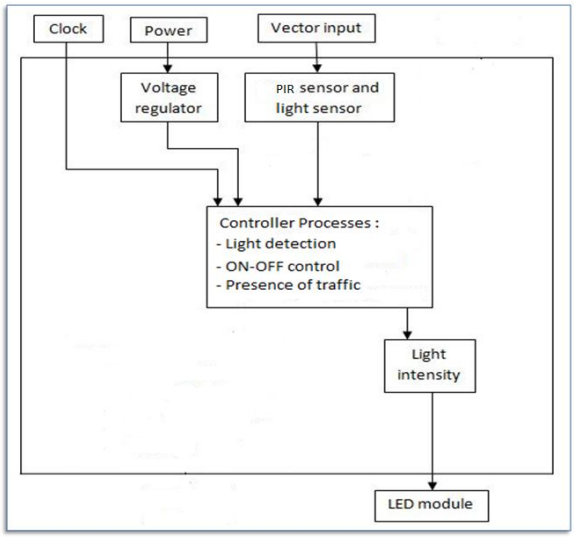

Fig 3.Block Diagram

III. CIRCUIT DESIGN OF SYSTEM

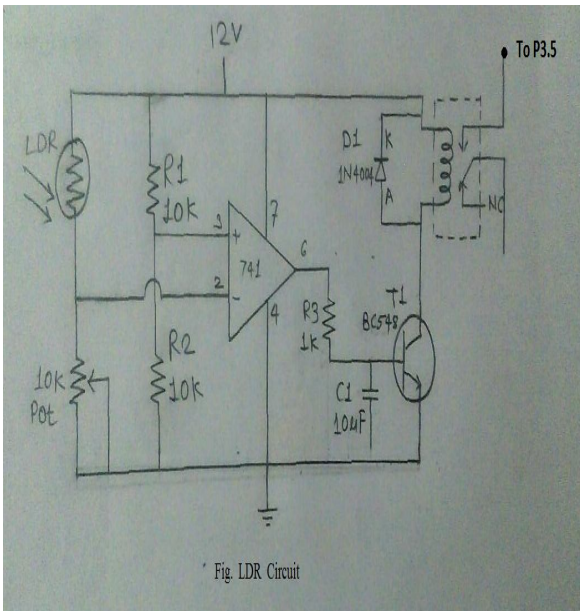

Fig 4.LDR Circuit

In this section LDR circuit, which has been designed. Firstly the LDR circuit as shown in Fig.4, the LDR and RV1 form one arm of the bridge, and R1-R2 form the other arm. These arms can actually be regarded as potential dividers, with the R1-R2 arm applying a fixed half-supply voltage to the non-inverting input of the op-amp, and with the LDR-RV1divider applying a light dependent variable voltage to the inverting terminal of the op-amp. Finally, the last relays are used to turn ON and OFF the lights. Fig5 shows the circuit diagram for the system. That circuit diagram is designed by using PIC microcontroller. The detail explanation of circuit diagram is given bellow-

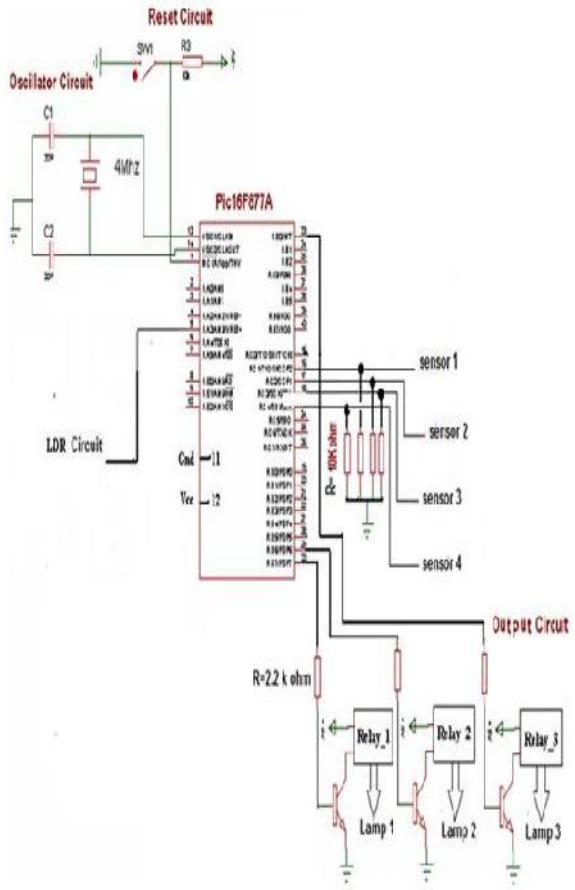

Fig 5.System Circuit Diagram

1. Pins 13 & 14 of the PIC are connected tothe Oscillator circuit and crystal which consisting of 4MHz crystal is connected to33pf capacitor
2. Pin 1 is connected to VCC +5V through 10KΩ resistor, connected to reset bottom for resetting the circuit.
3. Pin 5 is connected to the LDR Circuit.
4. Pins 16, 17, 18, and 19 connected to the Photoelectric sensors through 10K resistor.
5. Pins 29, 30 and33 connected to the lamp1, lamp2 and lamp3, through 2.2KΩ resistance and transistor and Relay.

IV. RESULT

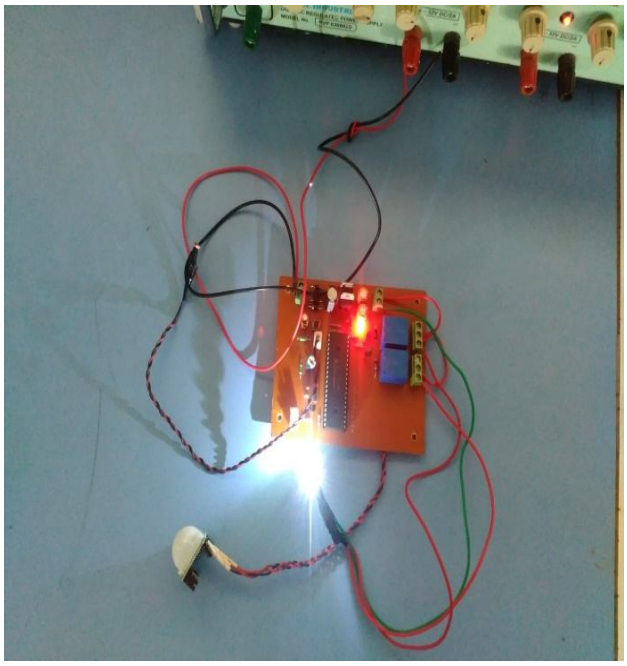

Fig 6. Street Light system

The aim of this project is to reduce the wastage of electricity during day time. In this system, first thing is to make inputs and outputs comfortable to the street light system. This project will be more useful for energy saving. When object passes in front of LDR sensor the led will be dim and when outputs of two sensors are high then output light will be full.

V. CONCLUSION

This system elaborates the design and construction of street light energy saving system circuit. After designing, the circuit works properly to turn street light ON/DIM/OFF.LDR sensor and PIR sensor are two main conditions in working of system. Each sensor controls the turning ON and OFF street lights. The street lights will automatically control the operation by microcontroller. The lights will be ON when person detect on street and OFF during day time. Finally this control circuit can be used in cities.

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