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Smart Street Lightning System for Effective Power Utilisation with Accident Avoidance

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***Abstract*— The objective of the project is to provide automatic control and monitoring on street light. The project deals with designing a lighting system which targets the energy saving and autonomous operation on economical affordable for the streets and immediate remedy on complaint. The Energy Consumption of street light of a specified area can be recorded and accounted on Energy Saving Lighting System with integrated sensors and controllers. Moreover, errors which occur due to manual operation can also be eliminated. Also the street lights can be switched ON/OFF through computer from central control station or can be automated using light sensors embedded in the street light pole circuit of the application. With these facilities the performance and life of the lamps will be increased. The application is based on client server model.**

In this we are also including the Accident avoidance by keep on concentration the distance of the vehicle should be exactly 50-70 mts if it reduces then automatically breaking system will apply in order to avoid the accidents

***Index Terms*—About four key words or phrases in alphabetical order, separated by commas.**

I. INTRODUCTION

Street light is poorly designed and inadequately maintained, there are large number of burned out lamps which leads to insecurity. There is a complaint register in every zonal office street light section. It is being maintained by the line inspector. The complaint received from public, councilors and corporation officials either over phone is in person being recorded in the complaint register(Fig 1). The complaint thus entered is being handed over to the fieldwork man so as to rectify the complaints. the field staff will have the rounds in the respective areas twice in a week and the complaints about non burning are also being attended then and there. But this is not the immediate remedy on complaints and has many disadvantages like the repair work takes days/even months instead of taking few hours which results in delay, telephone line may be busy, sometimes no response.

The switches of street lights are switched ON/OFF manually by the workman in all the zones. This leads to the rise of man power and time. As it is human operation it is prone to errors.

Existing methods like registering the complaint, switching on/off the light manually is time consuming & requires man power. The new method automatic ON/OFF and fault detection without human intervention is easier when compared to the existing system.

In this paper two kinds of sensors will be used which are light sensor and photoelectric sensor. The light sensor will detect darkness to activate the ON/OFF switch, so the streetlights will be ready to turn on and the photoelectric sensor will detect movement to activate the streetlights. LDR, which varies according to the amount of light falling on its surface, this gives an inductions for whether it is a day-night time, the photoelectric sensors are placedon the side of the road, which can be controlled by microcontroller PIC16f877A. The photoelectric willbe activated only on the night time. If any object crosses the photoelectric beam, a particular light will be automatically ON. By using this as a basic principle, the intelligent system can be designed for the perfect usage of streetlights in any place.

A well-designed, street lighting system should permit vehicles /pedestrians to travel at night with good visibility, in safety and comfort, while reducing many malfunctions that occur during night and enhance the appearance of the neighborhood. Conversely, poorly designed lighting systems can lead to poor visibility which maynot be helpful for any pedestrian or vehicle passing by that street.

The main aim of this project is to reduce the power consumption of street light by installing advancedtechnique of power leds into the ordinary phoroscent lamp which is present in the street lights. This project mainly contained with PIC microcontroller which isinternally connected to the LDR(Light Dependent Resistor),IR(InfraRed) sensors which is going to gives the output to the Power Leds in Street light.

II. WORKING PRINCIPLE:

Initially the LDR sensor is checking for the day light or night if it detects any light from the Sun then it automatically switch off the street lights i.e,, In day Time our proposed street lights are in switch off condition. During Night time the Power LEDS(Street Lights) are working very efficiently by

detecting the no of vehicles are persons present in the road by using IR sensors. If more no of vehicles/persons are present in the road then street lights will glow with high power efficiency when it is very less or no persons/vehicles then it automatically reduced to 1/20th part of power.
In this we are also including the Accident avoidance by keep on concentration the distance b//n the vehicle should be exactly 50-70 mts if it reduces then automatically breaking system will apply inorder to avoid the accidents.

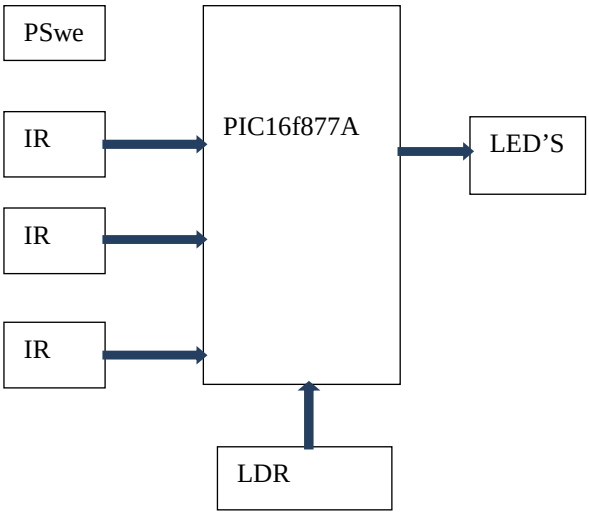


Fig.1: Block Diagram for Street Light

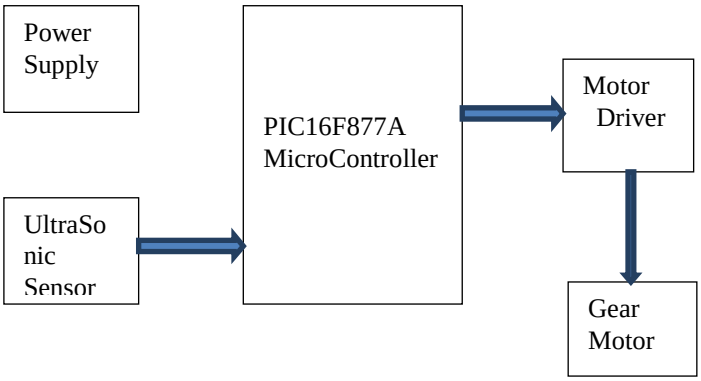


Fig.2: Block Diagram For Accident Avoidance

A. Automatic street light system circuit design

The system basically consists of a LDR, IR sensor, Power supply, Bulbs and Micro controller.

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. 2,
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.

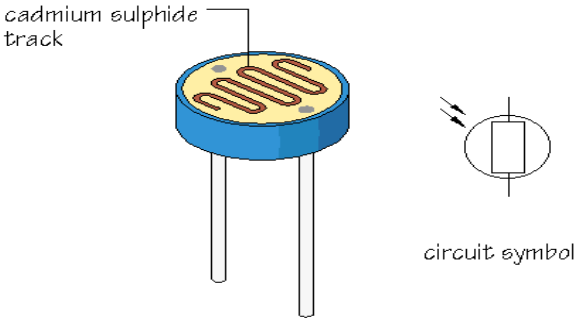


Fig.3: Block Diagram For LDR Circuit

IR Sensor : To detect the movement in the street, the IR sensors have been used in this paper,
where emitter and receiver are in one unit as shown below. Light from the emitter strikes the target and the reflected light is diffused from the surface at all angles. If the receiver receives enough reflected light the output will switch states. When no light is reflected back to the receiver the output returns to its original state. In diffuse scanning the emitter is placed perpendicular to the target. The receiver will be at some angle in order to receive some of the scattered (diffuse) reflection. The photoelectricsensor specifications are illustrated in Table 1.

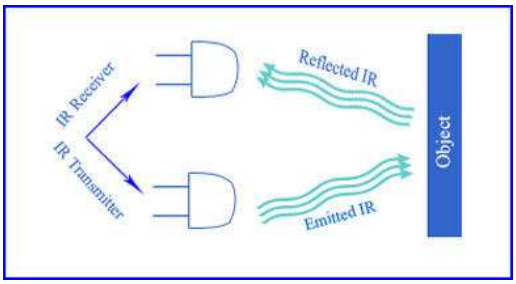
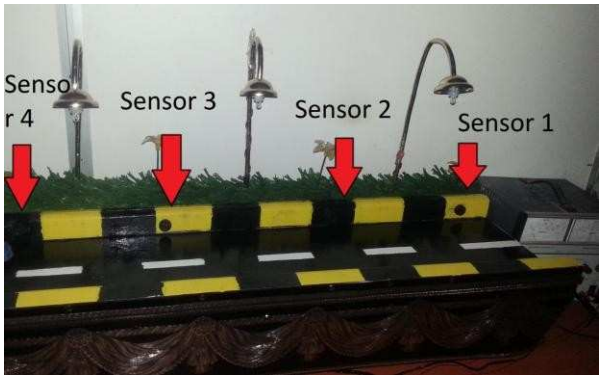


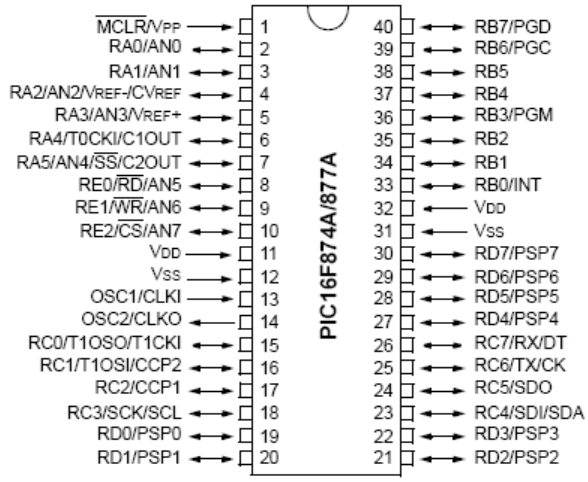
Fig.4: Block Diagram of IR Sensor Circuit

Regulated Power Supply: Usually, we start with an unregulated power supply ranging from 9volt to 12volt DC. To make a 5volt power supply, KA8705 voltage regulator IC has been used.
The KA8705 is simple to use. Simply connectthe positive lead form unregulated DC power supply (anything from 9VDC to 24VDC) to the input pin,connect the negative lead to the common pin andMathematical Methods and Optimization Techniques in Engineering ISBN: 978-960-474-339-1 93then turn on the power, a 5 volt supply from theoutput pin will be gotten**.**

PIC16F877A Microcontroller: 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. 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 electronicdesigns. 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 iscalled a program. There are different types of microcontroller, this project focus only on the PIC16F877A Microcontroller where it's pins



Automatic street light control With Accident Avoidance Circuit Design

Initially the LDR sensor is checking for the day light or night if it detects any light from the Sun then it automatically switch off the street lights i.e,, In day Time our proposed street lights are in switch off condition. During Night time the Power LEDS(Street Lights) are working very efficiently by detecting the no of vehicles are persons present in the road by using IR sensors. If more no of vehicles/persons are present in the road then street lights will glow with high power efficiency when it is very less or no persons/vehicles then it automatically reduced to $1/20^{th}$ part of power.

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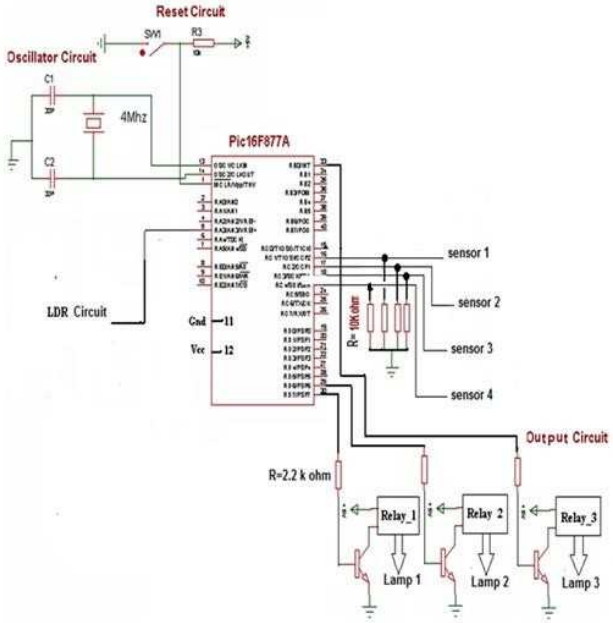

Schematic circuit of the street light system

III. RESULTS AND DISCUSSIONS

The project aims were to reduce the side effects of the current street lighting system, and find a solution to save power. In this project the first thing to do, is to prepare the inputs and outputs of the system to control the lights of the street. The prototype as shown in Fig. 9 has been implemented and works as expected and will prove to be very useful and will fulfill all the present constraints if implemented on a large scale.

IV. CONCLUSION:

The objective of the project is to provide automatic control and monitoring on street light. The project deals with designing a lighting system which targets the energy saving and autonomous operation on economical affordable for the streets and immediate remedy on complaint. The Energy Consumption of street light of a specified area can be recorded and accounted on Energy Saving Lighting System with integrated sensors and controllers. Moreover, errors which occur due to manual operation can also be eliminated. Also the street lights can be switched ON/OFF through computer from central control station or can be automated using light sensors embedded in the street light pole circuit of the application. With these facilities the performance and life of the lamps will be increased. The application is based on client server model.

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