AUTOMATIC STREET LIGHT ON/OFF SYSTEM USING MOVING OBJECT DETECTION

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Abstract: During night all the lights on the highway remain ON for the vehicles, but lot of energy is wasted when there is no vehicle movement. Controlling of street light is of utmost importance in developing country like India to reduce the power consumption. Saving of this energy is a very important factor these days as energy resources are getting reduced day by day. This paper describes about the circuit that switches the street lights ON detecting vehicle movement and remains OFF for fixed time duration and become ON when vehicle is detected. This street light system consists of five features. It automatically controls the street light i.e., off during day time. It controls the intensity of street light by dimming and brightening the intensity on detection of any object using LDR sensor.
Key-words: Street Light System, LDR, Sensor

I. INTRODUCTION

Street lights are the major requirement in today's life of transportation for safety purposes and avoiding accidents during night. Despite that in today's busy life no one bothers to switch it OFF/ON when not required. The project introduced here gives solution to this by eliminating manpower and reducing power consumption. This requires three basic components i.e. LDR, Sensors and microcontroller. During daytime there is no requirement of street lights so the LDR keeps the street light off until the light level is low or the frequency of light is low the resistance of the LDR is high. This prevents current from flowing to the base of the transistors. Thus the street lights do not glow[6]. In intelligent street light system the street light is designed in such a way where the street light automatically switches OFF and ON based on the sunlight. The LDR (light dependent resistors) are used for this feature, next feature of the intelligent street light system is the intensity control where it dims and brightens automatically based on the detection of any moving object. This feature is implemented with the use of motion sensors which are LDR sensors. These systems are developed to control and reduce energy consumption of a town's public lighting system using different technologies. The Proposed work is to control switching of street light automatically according to light intensity to develop flow based dynamic control statistics using infrared detection technology. The proposed system utilizes the latest technology for the sources of light as LED Lamps instead of generally used street lamps such as High Pressure Sodium Lamps, etc. The LED technology is preferred as it offers several advantages over other traditional technologies like energy saving due to high current luminous efficiency, low maintenance cost, high the intensity is not

controllable by any voltage reduction. White Light Emitting Diode (LED) based lamps are soon replacing the HID lamps in street light[7].

II. NEED OF SYSTEM

The traditional implementation and organization of street lighting have no possibilities for improving and development any more. The dynamic changes in economy, energy supplies and ecology on a national, Indian and world like scale require an adequate modernization of street lighting. However, this would be possible only with a quite new functional conception which in fact means adaptability of street lighting. Simultaneous ensuring of the conditions of safe traffic and decreasing the energy consumption and operational costs could be realized in conformity with the constantly changing parameters of the environment.

III. EXISTING SYSTEM

Industry of street lighting systems are growing rapidly and going to complex with rapid growth of industry and cities. Automation, Power consumption and Cost Effectiveness are the important considerations in the present field of electronics and electrical related technologies. To control and maintain complex street lighting system more economically, various street light control systems are developed. These systems are developed to control and reduce energy consumption of a town's public lighting system using different technologies. The existing work is use the High intensity discharge lamp (HID)[6]. HID presently used for urban street light are based on principle of gas discharge, thus the intensity is not been controllable by any voltage reduction method as the discharge path is broken.
Disadvantages of Existing System:

- HID lamps consume more power.
- The life time of the HID lamps is very less.
- It cannot be used in all outdoor applications.
- Wastage of energy, as the street lights are ON during whole night.
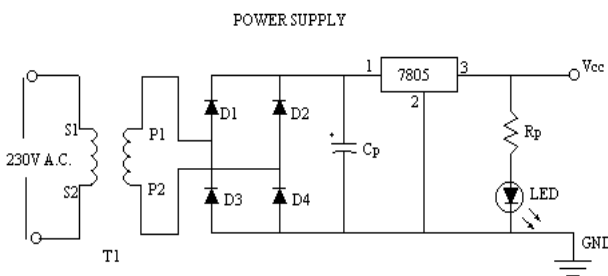
IV. PROPOSED SYSTEM

Automation, Power consumption and Cost Effectiveness are the important considerations in the present field of electronics and electrical related technologies. Industry of street lighting systems are growing rapidly and going to complex with rapid growth of industry and cities. To control and maintain complex street lighting system more economically, various street light control systems are developed. These systems are developed to control and reduce energy consumption of a town's public lighting

system using different technologies. The Proposed work is to control switching of street light automatically according to light intensity to develop flow based dynamic control statistics using LDR sensor. This proposed system utilizes the latest technology for the sources of light as LED Lamps instead of generally used street lamps such as High Pressure Sodium Lamps, etc. The LED technology is preferred as it offers several advantages over other traditional technologies like energy saving due to high current luminous efficiency, low maintenance cost, high colour rendering index, rapid start up speed, long working life etc.

V. WORKING

The inputs in the streets lighting system are LDR sensor, after dusk the light sensor activates the system, to be ready to detect any object by LDR sensors, on the road to turn ON the streetlights. LEDs are used as streetlights in this system[5].

As the surrounding gets darker, the resistance of the LDR(Light Dependent Resistor) increases and vice versa. Further, the Reset circuit is used to put the microcontroller into known state. Normally when a PIC microcontroller is reset, execution starts from address 0 of the program memory. Also, the oscillator circuit has been used to provide a microcontroller with a clock, so that the microcontroller can execute a program[1]. Four LDR sensors are used in this system. Their function to sense the objective that passes through the street, at the same time give a signal to the microcontroller to turn on the LED. The idea to save the energy, where the system have been designed to light ON the lamp in the night only and only if there is any object passes through the street. Except to that the light will be OFF. First LDR sensor is used to turn ON the first two LED panel via microcontroller automatically when any object passes in front of it. Meanwhile the second LDR sensor will turn ON the third LED panel and turn OFF the first two after few delay when the object passes in front of it. The third sensor will activate the fourth LED panel when the object passes in front of it, and will turn OFF the third lighting column after few delays. Finally the last sensor which will be used to turn OFF the fourth LED panel after the object passes in front of it.

Power Supply

POWER SUPPLY

Step-down transformer is used to convert the 230v AC into 12v AC as required to the project. The power supplies used in our project are +5V and+12V. Rectifier is used to flow the current only in one direction. It is used in power supply operation. It can carry higher current than other diodes[5]. Voltage regulator is used to control the unregulated power supply. ADC and DAC is used for conversion of voltage.

Resistor

Resistor is a passive component used to control current in a circuit. Its resistance is given by the ratio of voltage applied across its terminals to the current passing through it. Thus a particular value of resistor, for fixed voltage, limits the current through it[3].

LED

Light emitting diodes (LEDs) are semiconductor light sources. They operate on low voltage and power.

LDR

An LDR (Light dependent resistor), as its name suggests, offers resistance in response to the ambient light. The resistance decreases as the intensity of incident light increases, and vice versa.

Transistor

A transistor, stands for transfer of resistance, is commonly used to amplify current. A small current at its base controls a larger current at collector & emitter terminals.

Transformer

Step down transformer is the first part of regulated power supply. To step down the mains 230V AC. We require step down transformer.

PCB

Printed Circuit Board (PCB) provides mechanical support to the components mounted on it, necessary electrical interconnection, a conduction path leading to removal of most of the heat generated in the circuit.

VI. FUTURE SCOPE

The proposed system can develop Solar Street light system with Automatic street light controller. The system can be powered from a battery, which can be charged during day time by harvesting the solar energy through a solar cell. The solar energy harvested from sunlight can be stored, inverted from DC voltage to AC voltage using sun tie converter. The AC voltage can be stepped up and given to the electric grid. The AC voltage from the electric grid can be stepped down, rectified and used for powering the circuit. Meanwhile, the street light can also be powered by the A.C. voltage, which is controlled by a relay switch connected to the switching part of the circuit. The above mentioned strategy will enable us to harvest solar energy in an effective way for the operation of the circuit and for powering the street light also. Also this system can be implemented using raspberry pi kit rather than using PCB as all the components are already mounted on the kit. In future, detection of living and non-living objects feature can also be added to the system that will make the system more reliable.

VII. CONCLUSION

This paper introduced Automatic Street Lights System which is cost effective and better way to save energy. So we can use it in rural areas as well as cities. It tackles the two important problems that is energy consumption and disposal of incandescent lamps efficiently. Intensity of LED changes as per LDR sensor causes energy saving. The LEDs have long life, emit cool light, donor have any toxic material and can be used for fast switching. For these reasons our paper presents far more advantages which can over shadow the

present limitations. Keeping in view the long term benefits and the initial cost would never be a problem as the investment return time is very less. The project has scope in various other applications like for providing lighting in industries, campuses and parking lots of huge shopping malls.

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