

Energy Saving Using LED Automatic Street Light Control System

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Abstract

This project is all about to control the power consumptions at the streets and eliminating manpower. This includes controlling a circuit of street lights with specific Sensors, LDR and Microcontrollers during day and night.

Keywords: Introduction-Block diagram, Technical Details-Required hardware/ software, circuit diagram and proposed model, advantages, applications, Conclusion.

1. Introduction

Street lights are the major requirement in today's life of transportation for safety Purpose and avoiding accidents during night. Despite that in today's busy life no one bothers to switch it off/on when not required. This 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. As soon as the light level goes high or if light falling on the device is of high enough frequency, photons absorbed by the

semiconductor give bound electrons enough energy to jump into the conduction band. The resulting free electron conducts electricity, thereby lowering resistance. Now the circuitry goes in on condition and the block diagram represented here starts working. There are many safety purposes like Fire detector alarm (when surrounding temperature reaches up to some fix limit), Bugler alarm (when there is detection of any circumstances after fixed time) and Main gate of street open/closes automatically with the detection vehicles.

1.1 Block diagram

When LDR allows the current to flow this block diagram of circuitry goes into working condition. IR sensors start emitting IR rays via IR transmitters. As soon as any vehicle crosses or obstructs the path of IR rays and prohibits it to reach at IR receivers the microcontroller starts getting the blockage signals. The programming installed in microcontroller starts running which basically presented here allow the street lights to on automatically at evening time when sun light intensity decreases to 10% of its maximum. Between 1:00 am to 5:00 am all street lights goes to deem. Between that duration if any vehicle come then again light goes on full mode as per the vehicle movements. There is also other feature which display the temperature and other important notice regarding township advertise. As fire is happen there the burglar alarm detect it so everyone can be aware of it.

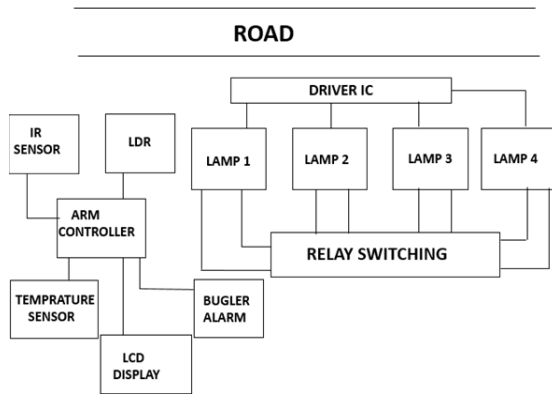


Figure 1.1: Generalized block diagram

At the main gate when any vehicle comes, the gate automatically open with the help of IR sensor. There is also one feature which gather the information about total traffic during day time in township using bi-direction counter.

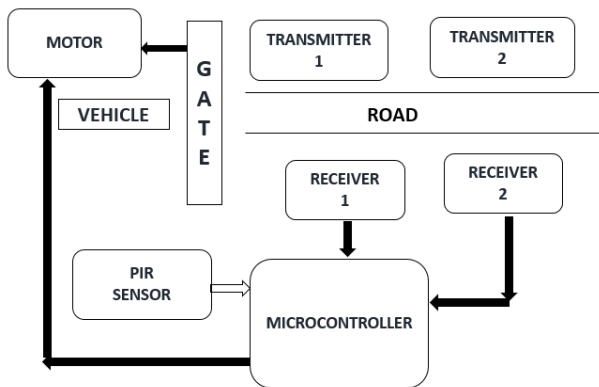


Figure 1.2 Block diagram at the main gate to detect vehicle

2. Technical Details

2.1 Required Hardware/Software

- We used ARM micro-controller LPC2148 and for programming we used Keil for arm.
- We used ultra-light SMD flexible light white LED as a street light.
- We used 4.7k, 10k, 330ohm, 3.3k ohm resistors in our project.
- We used IR sensor for detecting movements.
- We used 12v and 5v dc supply for running whole our project.
- We used dc motor for on/off of the gate.

2.2 Circuit Diagram and Proposed Model

- *IR sensor Schematic:*

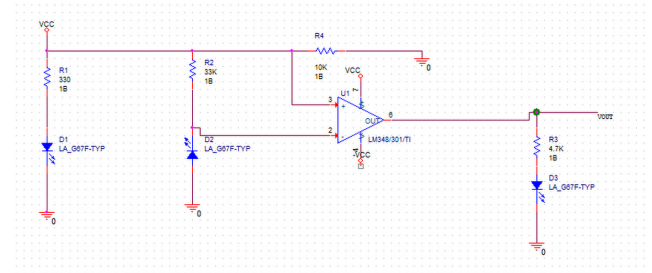


Figure 2.1: IR sensor schematic

- *Relay switching:*

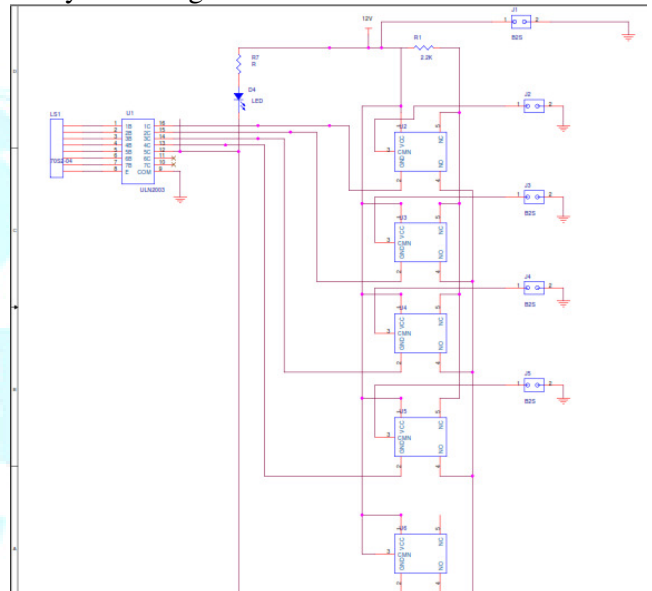


Figure 2.2: Relay switching schematic

2.3 Advantages

- Complete elimination of manpower
- Reduced energy costs
- Reduced maintenance costs
- Higher community satisfaction
- Higher security aspects
- Fast payback

2.4 Applications

- Parking Lightings
- Street Lights
- Garden Lights
- Township Management

3. Conclusions

This project Automatic Street Management System is a cost effective, practical eco-friendly and the safest way to save energy. It clearly tackles the two problems that world is

facing today, saving of energy and also disposal of incandescent lamps, very efficiently. According to statistical data we can save more than 40 % of electrical energy that is now consumed by the highways. Initial cost and maintenance can be the drawbacks of this project. With the advances in technology and good resource planning the cost of the project can be cut down and also with the use of good equipment the maintenance can also be reduced in terms of periodic checks. The LEDs have long life, emit cool light, do not have any toxic material and can be used for fast switching. For these reasons our project presents far more advantages which can overshadow 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. This can also be used for surveillance in corporate campuses and industries.

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References

- [1] ARM Assembly Language: Fundamentals and Techniques by William Hohl.
- [2] Electronic Devices and Circuit Theory, Boylestad.
- [3] Sensors: Advancements in Modeling, Design Issues, Fabrication and Practical by Subhas Chandra
- [4] Handbook of Modern Sensors: Physics, Designs, and Applications by Jacob Fraden.
- [5] Hand Book of Electronics by A.K. Maini.
- [6] Digital Systems Principles and Application by Ronald Ltocci (Sixth Addition). [7] Digital Design by Moris Mano (Second Addition),
- [8] Relays and Its Application Sharma, M.C. (BPB-Publishers)
- [9] www.atmel.com