Arduino Based Street Light Auto Intensity Control at Night: A New Approach

Mohini N. Sapkale[1] , H.T. Ingale[2], H. V. Dhande[3], Vijay D. Chaudhari[4], Dr. A. J. Patil[5]

[1] *M.Tech. (VLSI & Embedded System Design) Scholar ,*   [2,3,4] *Asstt. Prof.*
[1,2,3,4] *E&TC Engg. dept, GF's Godavari College of Engg., Jalgaon-425003, Maharashtra, India.*
[5] *Principal, Shri G. D. College of Engg., Jalgaon-425003, Maharashtra, India.*
mohini16sapkale@gmail.com [1]*,   vinuda.chaudhari@gmail.com* [4]

Abstract *–Now-a-days the amount of power consumed by lighting and streets shares a major energy demand. The Street light Automation system helps in reducing the energy consumption. Generally, street lights are switched on for whole night and during the day, and they are switched off. But during the night time, street lights are not necessary if there is no traffic. Saving of this energy is very important factor these days as energy resources are getting reduced day by day. To overcome from this problem, a proper energy saving methods and lighting control to be implemented. The proposed work is to have two controls like, one is to switch of lights during no vehicle moments in streets and automatically switch it on when vehicles arrive and the other modes are to give less intensity light for pedestrian and to switch on bright mode during vehicle moments at sides on the roads.*

Keywords-High and Low Intensity Light,Light Emitting Diode,Arduino, Street light automation.

1. INTRODUCTION

The 21st century is striving hard to save electrical energy. Street lights are essential, but expensive, therefore there is need to optimize the system. Manually controlling the street lights is time taking and difficult process. Saving power is very important, instead of using the power in unnecessary times it should be switched off. In any city "Street Light" is one of the major power consuming factors. Most of the time street lights are ON even after sunrise thus wasting lot of energy. Over here we are avoiding the problem by having an automatic system which turns ON & OFF the street lights at given time or when the ambient light falls below a specific intensity. And the vehicle enter on the road at night then intensity increases. If there is no vehicle then street light OFF or intensity decreases. Each controller has an LDR which is used to detect the ambient light. If the ambient light is below a specific value the lights are turned ON. A light dependent sensor is interfaced to the Arduino Uno microcontroller it is used to track the sun light and when the sensors goes dark the led will be made on and when the sensor founds light the led will be made OFF.

2. LITERATURE SURVEY

The energy efficient smart street light [1] analyzed the street light with auto tracking system by which one can increase the conversion efficiency of the solar power generation. Here, the sun tracking sensor is the sensing device which senses the position of the sun time to time and gives the output to the amplifier based on light density of the sun [2]. That have proposed about Street Light Glow on detecting vehicle movement using sensor is a system that utilizes the latest technology for sources of light as LED lamps. It is also used to control the switching of street light automatically according to the light intensity [3][4].The implemented design of traffic flow based street light control system with effective utilization of solar energy in the year 2015. They used the renewable source of energy i.e. the solar power for street lighting [5]. He is surveyed on Street Lighting System Based on Vehicle Movements. The system operates in the automatic mode which regulates the street light according to brightness and dimness [6]. To

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proposed a ZigBee based Remote Control Automatic Street Light System. The system is designed with the help of ZigBee modules that helps in detecting the faulty lights and control the light [7].The reports on the two installation case studied in Scotland and Wales and explain the details and benefits of the technology. The system was called as MINOS that had a track record of over 100,000 units installed and working successfully [8]. She is explains a system to reduce the power consumption of street lights by avoiding inefficient lighting which wastes significant financial resources each year. This is done by dimming the lights during less traffic hours [9].He has used an automatic microprocessor with solar cell [10]. The street light optimizer[11]. An Intelligent Street Lighting system for smart city based on IoT [12]. The Automatic Street Light Control system using Wireless Sensor Networks [13]. From this literature survey, the methods each one has implemented and used is simple and easy to understand. These papers are focused to further implement a much efficient system and make things automated.

2.1 Problem Statement

Wastage of power from street lights is one of the power loss system. The vehicles are passing over always and part of places will be consisting of less density areas and even no vehicle movement itself in few areas.But during night all street lights will be on in conventional street lighting system.

2.2 Proposed Method/System

We proposed a way based on that Automatic Street Lighting System on/off does depend upon the vehicle or objects. It depends upon the Intensity of light. Through this process, 15- 20 % of the city's power can be saved. Similarly, manual power reduces. It uses a Sensor named LDR sensor, which is a lightdependent variant. Which means depends on light intensity.

3. METHODOLOGY

This system as shown in figure 1 representing the block diagram, LDR which is interfaced to an Arduino board. As the surrounding light decreases slowly from evening to night, the light intensity gradually increases and then gets gradually decreased from night to early dawn hence saves energy.

The IR sensor is a proximity sensor which consists of an emitter LED and a receiver LED embedded in it. it depends on the detection of vehicle movement using IR sensors. IR radiation is constantly emitted by the emitter LED. When this radiation is blocked by some metal or reflecting object at a distance, the IR radiation gets reflected by the object can be detected by observing the receiver LED. This principle can be used to detect vehicles on pedestrians or the on street roads and accordingly switch on the successive streetlights, as long as the vehicle blocks the IR sensor radiation, fixed to the street light near to the ground.The Arduino is programmed in such a way it automatically adjusts the lights to give most accurate result possible.

3.1 System Hardware

The Automatic Street Light Control Based on Vehicle Detection Using Arduino uno. The Circuit diagram of the IR sensors are connected to the Arduino port pin number 2 to 5 respectively which is the input signal to the Arduino board and connect the ground of all the IR sensors to GND port. All the positive terminals of the LEDs, depicting the streetlights in the model, are given as the outputs of the Arduino signals, are connected to port pin number 6 to 13. Again connect the ground of all the LED's to GND port as per the circuit diagram. It works in accordance with the crossing the vehicle.
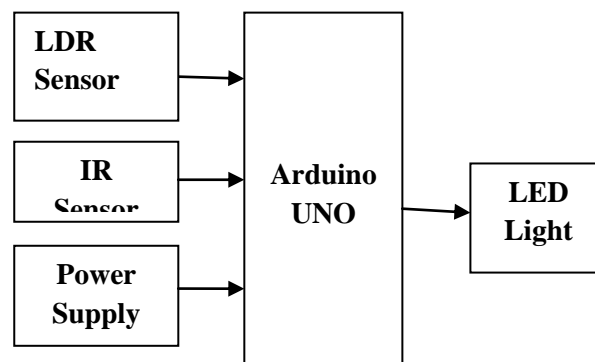

FIGURE 1:Block diagram of automatic street light control system

Initially the IR sensor is in LOW. When the vehicle moves past an IR sensor becomes HIGH,the positive terminals of the two or three LEDs, as per requirement,are made high through the Arduino output ports and hence they glow.As soon as the vehicle crosses one streetlight,the LEDs again switch off.And when the vehicle goes by the next IRsensor,the corresponding LEDsglow.This process continue.And ,lot of electricity will be saved.

3.2 System Software

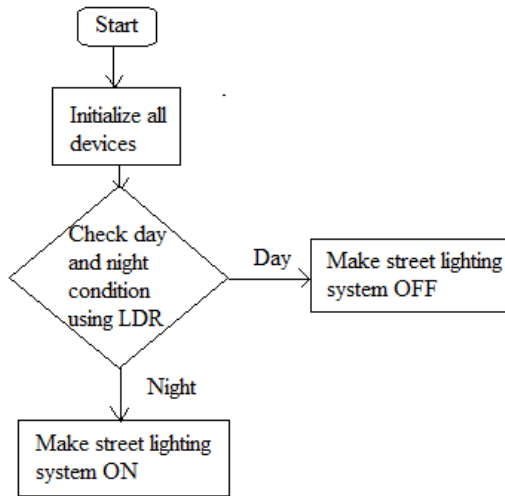the lights ON in highway, but lots of energy is wasted when there is no vehicle movement.

5.　CONCLUSION

By using Smart Street light, one can save surplus amount of energy which is done by replacing sodium vapor lamps by LED and adding an additional feature for security purposes. It provides an efficient and smart automatic street light control system with the help of IR sensors. The system is versatile, extendable and totally adjustable to user needs. The system is now used only for One way traffic in highways. Continuous uses of LDR and IR sensors even in day time. The implemented model is a less cost, pragmatic, ecofriendly and the most secure approach to save energy. As per the statistical information 35%-40% of electrical energy is currently utilized by the national highways, state highways and local street lights. There is no need of any manual operator as the system is fully automatic.

Fig 2: Flowchart for checking day and night condition using LDR
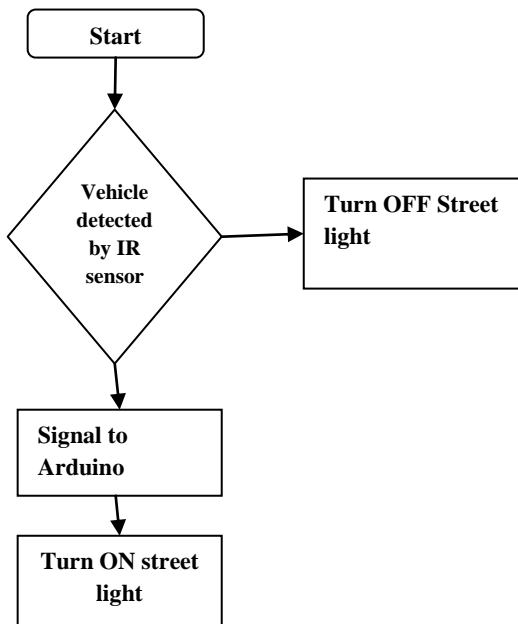
Fig 3: Flowchart for vehicle detection

4.　RESULT AND DISCUSSION

The project is designed to detect vehicle movement on highways to switch ON only a block of street lights pre eeding to te fore of vehicles and to switch OFF the behind lights to save energy. Now days during night all

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