STREET LIGHT CONTROL USING ATMEGA328

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Abstract

Smart Street light is an automated system which automates the street. The main aim of Smart Street light is to reduce the power consumption when there are no vehicle movements on the road. The Smart street light will glow with high intensity when there are vehicles on the road otherwise the lights will remain off.

The Smart street light provides a solution for energy saving which is achieved by sensing an approaching vehicle using the Ultrasonic sensors and then switching ON a block of street lights ahead of the vehicle with high intensity. As the vehicle passes by, the trailing lights turn dim automatically. Thus, we save a lot of energy. So, when there are no vehicles on the highway, then all the lights will remain off. It is implemented using Arduino.

Index Terms: Arduino Uno, ATmega328, Smart street light, Ultrasonic sensors, Arduino Software (IDE)

I. INTRODUCTION

; Automation plays an increasingly very important role in the world economy and in daily life. Automatic systems are being preferred over any kind of manual system. We can also call it an "SMART STREET LIGHT SENSING". Intelligent light sensing refers to public street lighting that adapts to movement by pedestrians, cyclists and cars. Intelligent street lighting, also referred to as adaptive street lighting, offs when no activity is detected, but brightens when movement is detected. This type of lighting is different from traditional, stationary and illumination, or dimmable street lighting that offs at pre-determined times. The research work shows automatic control of streetlights as a result of which power is saved to some extent. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist the users with muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Basically, street lighting is one of the important parts. Therefore, the street lamps are relatively simple but with the development of urbanization, the number of streets increases rapidly with high traffic density. There are several factors need to be considered in order to design a good street lighting system such as night-time safety for community members and road users, provide public lighting at cost effective, the reduction of crime and minimizing it is effect on the environment[1]. At the beginning, street lamps were controlled by manual control where a control switch is set in each of the street lamps which is called the first generation of the original street light. After that, another method that has been used was optical control method done using high pressure sodium lamp in their system. Nowadays, it is seen that the method is widely used in the country.

Automation systems are being preferred over the manual mode because it reduces the use of energy to saves energy. These automation systems play an essential role in making our daily life more comfortable and facilitate users from ceiling fans to washing machines and in other applications. Among all exciting applications, street lights play a vital role in our environment and also plays a critical role in providing light for safety during night-time travel. In this scenario, when the street lights are in working functionality over the whole night that consumes a lot of energy and reduces the lifetime of the electrical equipment such as

electric bulb etc. Especially in cities' streetlights, it is a severe power consuming factor and also the most significant energy expenses for a city[2]. In this regard, an intelligent lighting control system can decrease street lighting costs up to 70% and increase the durability of the equipment. The traditional lighting system has been limited to two options ON and OFF only, and it is not efficient because this kind of operations meant power loss due to continuing working on maximum voltage. Hence, wastage of power from street lights is one of the noticeable power loss, but with the use of automation, it leads to many new methods of energy and money saving. In this regard, controlling lighting system using Light Dependent Resistor (LDR), and Arduino together is proposed. In the meanwhile, the importance of smart light system has motivated a lot of studies and the series of research work has been done [4].

Street lighting provides a number of important benefits. It can be used to promote security in urban areas and to increase the quality of life by artificially extending the hours in which it is light so that activity can take place. Street lighting also improves safety for drivers, riders, and pedestrians. Driving outside of daylight hours is more dangerous – only a quarter of all travel by car drivers is between the hours of 7pm and 8am, yet this period accounts for 40% of fatal and serious injuries to the same group1 . Pedestrians and vulnerable road users suffer from decreased visibility in the dark too[5]. For these reasons, ways of reducing the risk to all road users during the hours of darkness must be found. A study for the Department for Transport2 in 2003 found that road safety was perceived as a key benefit for street lighting improvement [6].

II. 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. This proposed system utilizes the renewable technology (Solar) for the sources of light as LED Lamps instead of generally used street lamps such as High Pressure Sodium Lamps, etc[7]. 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. This proposed system makes use of Ultrasonic Sensor for movement detection [8]n. Here Arduino is used to dump the code. LDR senses the light intensity and ultra sonic sensor detect the object and when LDR senses that there is no light present and when there is an object present then street light will be turned ON and vice versa

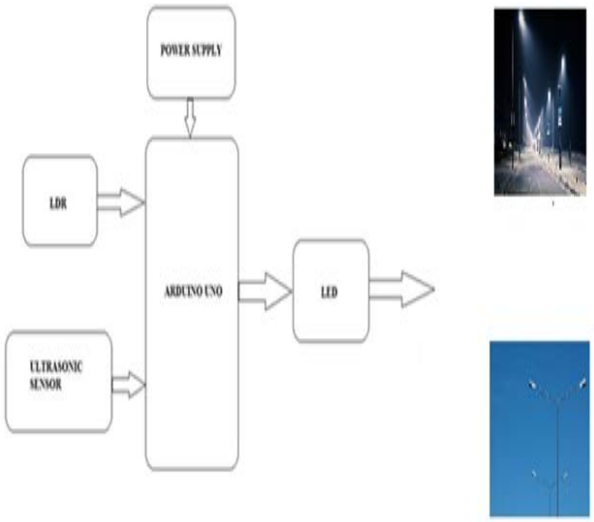

Fig.1, Block Diagram

CIRCUIT DIAGRAM

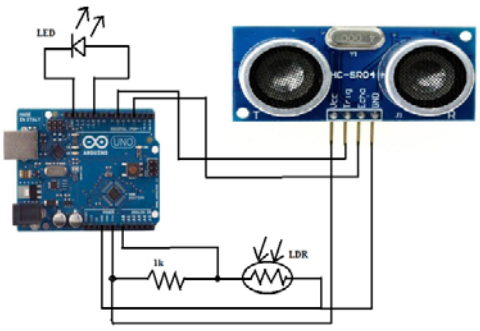

Fig.2, Circuit Diagram

USS are given to the 6th and 3rd pins of Arduino respectively. One end of LDR is given to GND and the other is given to resistor. The other end of resistor is given to the Vcc pin of Arduino. Anode and cathode terminals of LED are given to the 10th and GND pins of Arduino as shown in fig.3

USS and LDR are given as inputs to Arduino. Vcc and GND pins of USS are given to 5V and GND pins of Arduino respectively. Trigger and echo pins of USS are given to the 6th and 3rd pins of Arduino respectively[9]. One end of LDR is given to GND and the other is given to resistor. The other end of resistor is given to the Vcc pin of Arduino. Anode and cathode terminals of LED are given to the 10th and GND pins of Arduino as shown in fig.2

III. WORKING PRINCIPLE

Case 1:

• When the intensity of the light present is low, the resistance of LDR increases.
• When there is an object present on the road, USS detects it.

Fig.3: when light present is low

• If the resistance is high and the distance between USS and the object is less than given amount, the lights turn on.
• If the resistance is high and the distance between USS and the object is not less than 10cm, the lights remain off Fig. 3

Case 2:

Fig.4: when light present is high

• When the intensity of the light present is high, the resistance of LDR decreases.
• If the resistance of LDR decreases, the remain off despite the presence of any object Fig. 4

IV. RESULTS AND DISCUSSION

Fig.5: when there is a vehicle movement

LDR senses the intensity of the light present to be low and USS detects the object. This is when the street lights turn ON Fig. 5

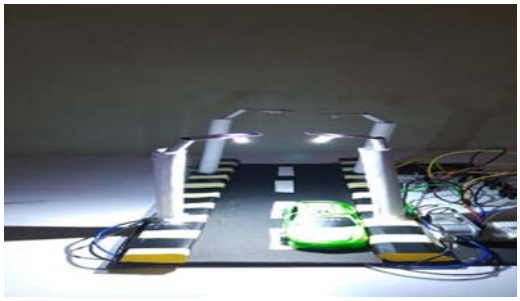

Fig.6: when there is a vehicle movement

LDR senses the intensity of the light present to be low and USS detects the object. This is when the street lights turn ON Fig. 6

. Fig.7 when there is no vehicle at night time
As there is no object present on the road, USS will not detect so lights Will be turn OFF Fig.7.

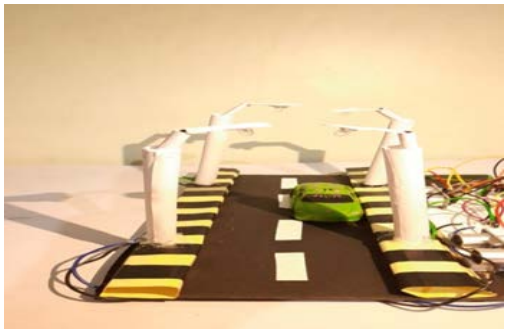

Fig.8: When it is Day Time

As the intensity of the light present is high, lights remain OFF, though there is any object present Fig. 8

V. CONCLUSION

The aim of this paper was to design and implement an automatic street light using Arduino UNO, which can be used to avoid manual operation for switching street light on and off. In order to save and conserve energy in an efficient manner, street lights are on only when a movement is detected by a Ultrasonic sensors. This proposed system is in par with government's policy of energy conservation by reducing consumption of electricity and efficient use of energy, so it can be termed as an innovative project in street lightning that can be implemented in the roads like state and national highways.

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