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Smart Street Light Using Arduino Uno Microcontroller

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ABSTRACT: The project deals with making a smart street light that would enable itself when it comes in contact with an obstacle i.e. a vehicle for an instance, and turn off when there is nobody around. The system requires an arduino uno microcontroller, some ultrasonic sensors and a battery for making the entire idea functional. The ultrasonic sensors that are responsible for detection of an obstacle would be manually placed on the street light poles, on detection of an obstacle; they would send electrical signals to the central sensor box consisting of our arduino uno microcontroller. The microcontroller that would be powered by a battery source will then eventually turn on the street lights of the location where the obstacle is detected.

KEYWORDS: Sensor, Arduino Microcontroller, Led, Battery.

I. INTRODUCTION

Nowadays, we human beings are manufacturing abundant amount of vehicles for the purpose of transportation. It is hence an obvious fact, that we would need double the number of roads for those vehicles to be moving from one location to another. Similarly, tons of Led's and light bulbs are being used on the same roads to enlighten the streets in order to make the vehicle reach their destination even in the dark. But have you ever wondered, about the amount of electricity wasted every year for keeping those street lights constantly working? We have all witnessed a sight, where in the lights were still kept on, even when they weren't needed.

There is a need to establish a mechanism that would automatically turn on the lights on the street, on encounter of a vehicle passing by and turn them off when there is no one to use it.

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. This proposed system makes use of infrared photoelectric sensor for vehicle detection. This project is basically an intelligent system which is designed such that the street lights automatically switches OFF and ON based on the sunlight. For this feature they have used a very common and easily available light sensor called as LDR (Light Dependent Resistor). Therefore, we have decided to come up with a system that was economically more cheaper and technically less complex on implementation grounds.

II. RELATED WORK

Roads are enlightened using High Intensity Discharge (HID) lamp. To control and maintain complex street lighting system more economically .We have observed that unnecessary lighting of street lights even though no vehicle passes through it at that particular period of time . So there is wastage of electric power. Unnecessary enlighting hence huge power is consumed HID Light's durability is very less. Hence there is need to change it at regular basis. Therefore the maintenance cost increases. 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.

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III. PROPOSED SYSTEM

To modify the existing system, we have to think such a system that can automatically cut the electric power supply when there is no vehicles passes through that particular street at a particular period of time. In this project, we modified the pre-existing street light mechanism into a better, accurate and economical one and proposed a mechanism that would detect the presence of obstacles on the street and thereby use the street lights efficiently only when it is required. This was done by taking into consideration the reading of ultrasonic sensors on detection of the obstacle and initiating the process of illumination of the streets gradually as the obstacle moves. This enables us to save a lot of electricity or power that was wasted in the previous mechanism while keeping the lights on the street constantly on.

IV. WORKING OF SMART STREET LIGHT

The figure demonstrates the entire work flow of the project. Shown below is the prototype model of a street consisting of street light poles. Assuming if the street used our project for the controlling of the street lights, the scenario then would be as follows:

As shown above, the ultrasonic sensors attached manually on the poles of the street lights would sense the obstacle (vehicle mostly) passing by. These ultrasonic sensors which are constantly emitting high frequency sound would then pass an electrical signal to the central sensor box of the street, consisting of a microcontroller. Note, that this microcontroller responsible for the entire process is powered by an external battery source. The microcontroller would then initiate the LED lights of the street where the vehicle (obstacle) was detected, thereby enabling the driver of the vehicle to drive through a dark street. The microcontroller would illuminate the part of the street where there is some obstacle and turn it of immediately when the lights are not in use.

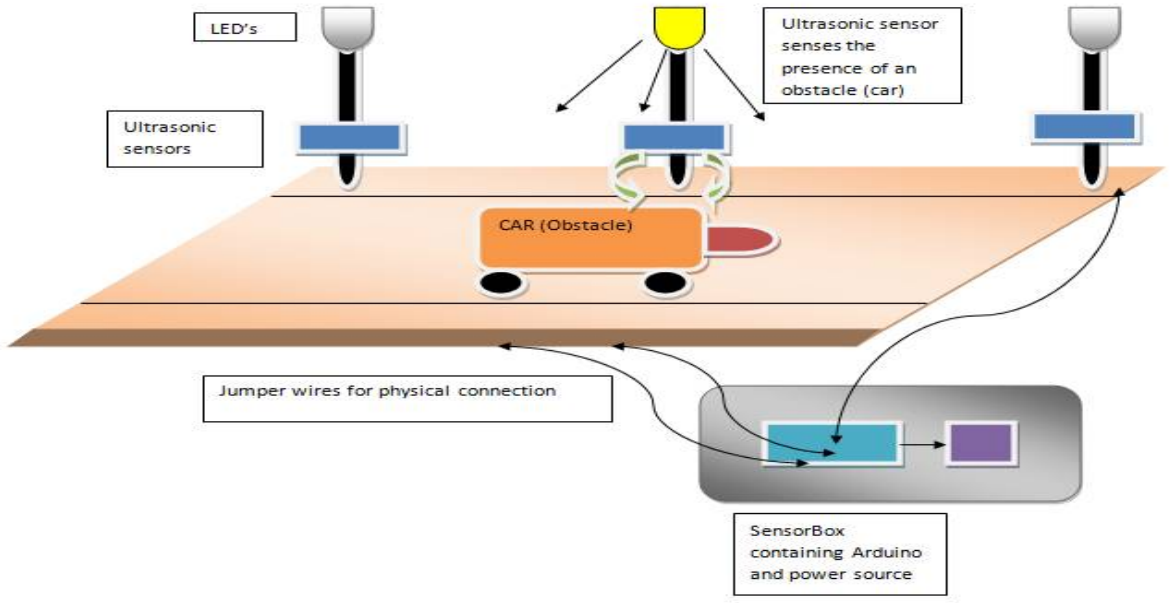

FIG:- **WORKING OF SMART STREET LIGHT SYSTEM**

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V. SYSTEM ARCHITECTURE

As demonstrated in the above given flowchart, the program flow of the microcontroller is as follows, on initiation of the process, the ultrasonic sensors would continuously check for obstacles around the pole. If an obstacle is detected, the ultrasonic sensors would then notify the microcontroller about its presence. The microcontroller would then turn on the light of the path where the obstacle was detected. Furthermore, if the obstacle is still present, the lights would be kept on and if not, the microcontroller would return the LED's to their rest state.

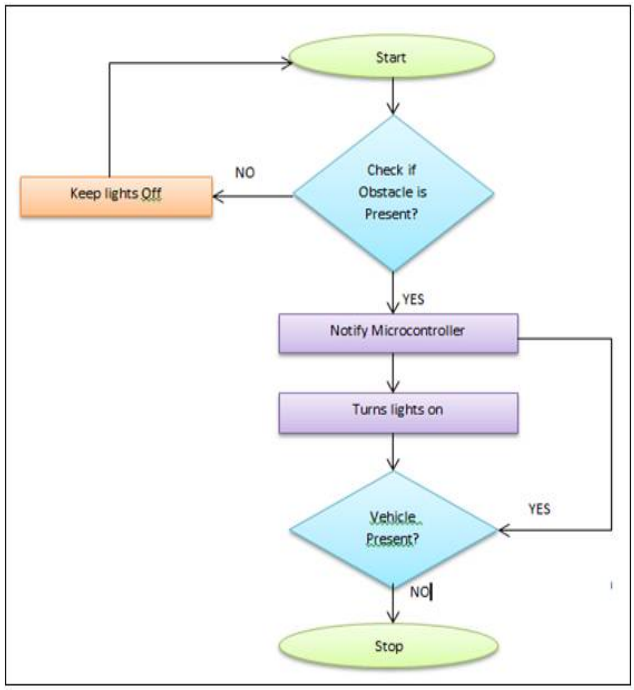

FIG:- WORKING OF SMART STREET LIGHT FLOWCHART

VI. CONCLUSION AND FUTURE WORK

Street-lights are a large consumer of energy for cities using up to 50 percent of a city's energy budget. If every city installs the proposed system then a lot of power can be saved .Proposed system is power saving mechanism for street lights by using a simple sensor box mechanism.

It proposes the idea of illuminating the street only when required and turning of the lights immediately when not in need. It hence saves a load of power consumption that was once utilized unnecessarily by the previous mechanism.

It adopts a dynamic control methodology for traffic flow. The proposed system is especially appropriate for street lighting in remote urban and rural areas where the traffic is low at times. The system is versatile, extendable and totally adjustable to user need. The system works solely in the darkness, avoiding waste of energy Sensors enable the system to operate solely when necessary. System employs highly economical LEDs to ensure correct illumination and assure energy savings. Another advantage obtained by the control system is the intelligent management of the lights by sending signals to a central station.

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BIOGRAPHY

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