

# INTELLIGENT SWITCHING SYSTEM WITH SAFE TRANSPORTATION

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**Abstract—** Energy conservation is the emerging problem of both developing and developed countries. The daily depletion of energy resources leads to the desperate way to search some alternate energy resources like nuclear energy which is hazardous in some conditions. Due to the enormous development in cities, numerous industries start to evolve which consumes tremendous amount of energy. It is necessary to save energy in all possible ways. A kind of way considered in this paper is to save the unnecessary usage of energy of street lights at the time of unwanted situations. Lot of energy is consumed through street lights in cities especially in National Highways and International highways, large amount of light energy is exposed to the outside world. This enormous amount of energy leads to diminishing of stars which means decreases the visibility of stars from far distance due to the over spread of light in the stratosphere. Generally most of the street lights emit CO<sub>2</sub> as they are not shielded properly. Considering these hazardous effects, the street lights will get automatically ON and OFF using the proposed method. Another major problem in our urban as well as rural areas is ACCIDENTS. In this scenario, a solution has been provided to reduce the number of accidents.

**Index Terms—** Database, Ground penetrating radar, Street lighting.

## I. INTRODUCTION

\*\*The street lighting is one of the largest expenses of money for the metropolitan cities. The street lights consume cities 50% of usage of electricity during nights. In the existing system, we have installed LDR system where the street lights will be switched ON in the evening after the sunset and they are switched OFF in the morning. Under this system, there will be a lot of wastage of electricity at the time of absence of vehicles during midnight. Energy conservation is the main responsibility of every citizen to save the energy for future needs. Due to the enormous development in cities, numerous industries start to evolve which consumes a tremendous amount of energy. So this leads to the shortage of power which mainly affects the normal middle-class people. By saving the electricity through this proposed method, that can be utilized in some other places.

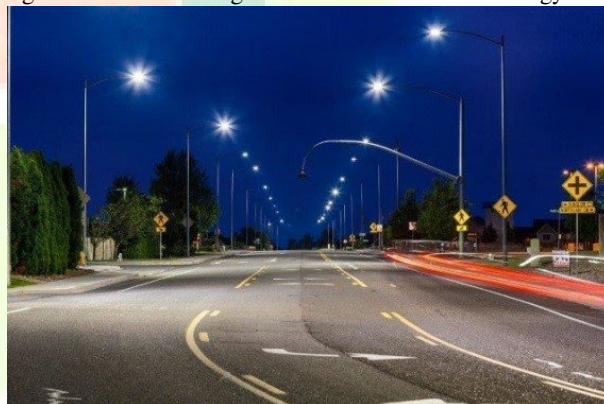
Another problem due to blue-rich light emitting street lights is the diminishing of stars which means visibility of stars is reduced due to the overspread of light in the stratosphere. Nature is also affected due to the

over-illumination of lights.

Wild habitat is changed due to the emission of light during night time. Several harmful diseases like skin cancer, sleeping disorder will affect the humans who is continuously simulated to blue-rich emitting lights. Generally, this kind of streetlights emits CO<sub>2</sub> as they are not shielded properly.

To avoid this kind of problems, our system can be installed which can reduce at least half of the problems.

Almost 200 million street lights are presented in our country. In which, saving a small amount of energy in a single light will lead to saving a tremendous amount of energy.



\*\*The other aim of our paper is to reduce the number of accidents which occurs due to unknown road damages. So our aim is to warn the drivers predominantly about the damages which will be more useful to avoid the accidents.

Almost 1L accidents occur in INDIA per year which leads to a lot of human lives damages. So we have considered three ways of indicating the drivers about the road damages.

Creating a database about the specific area and it should be maintained continuously about the damages and the conditions of the road.

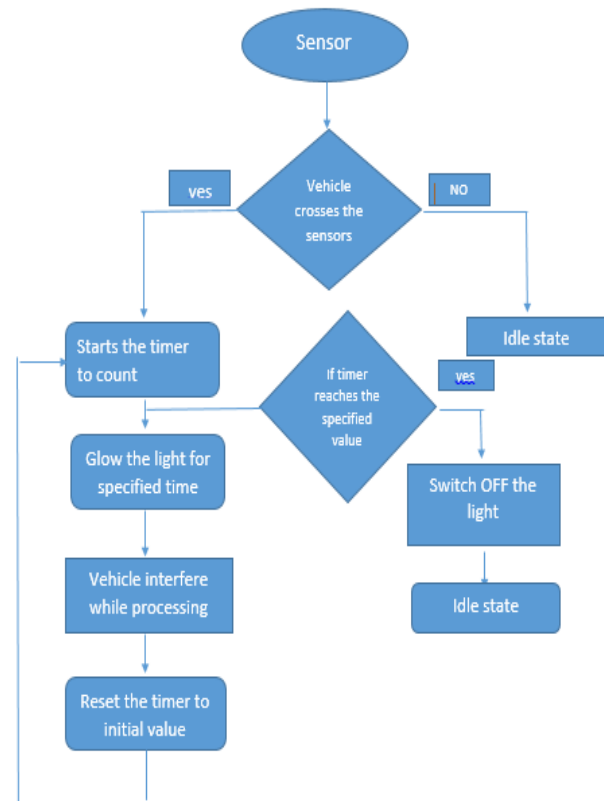
1. Placing an indication red light in the specified area instead of placing any boards or ropes.
2. Placing a ground penetrating radar in the vehicle to detect the damages.
3. Finding the damages and placing the GPS system near to the place which will indicate through any mobile while entering near to it.



## II. PROBLEMS STATEMENT

1. The energy crisis is a fast emerging problem which is the reason for developing dangerous nuclear power plants.
2. The wild habitat of animals and harmful diseases to humans due to over explosion of blue-rich emitting street lights.
3. Carbon dioxide emission is more due to the over exposure of street lights during the night into the atmosphere.
- 4 .Number of accidents happen every day especially in metropolitan cities during nights because of the unknown road damages.

continuously happens whenever the vehicle interferes the sensor. The light remains in OFF state until the sensors give the output by the presence of the vehicle..



### B. Road Damage Indication

The Flowchart clearly explains the process of detecting the road damages and how to indicate the drivers about the damage.

1. The database has to be created for the specific area and it has to be continuously updated about the conditions of the road.
2. The presence of any road damages has to be inserted in the database and some person should be made in-charge for monitoring the database.

After creating the database indications can be made in 3 ways.

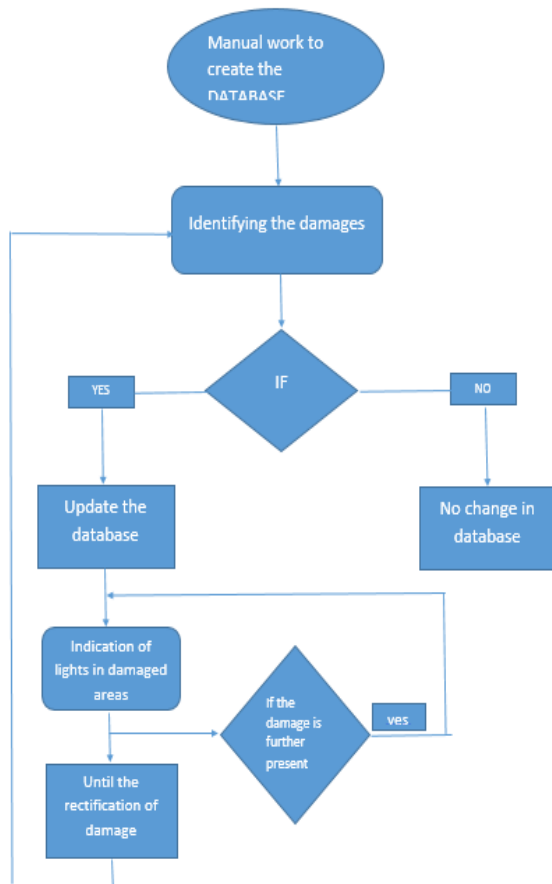
- A specific light, especially in red colour, can be indicated at the specific damaged place which will be more useful for the drivers to know about the conditions predominantly.
- Another method is the usage of ground penetrating radar which is to be fitted in the vehicle. But the main problem is the cost of the antenna and the extra fitting in the vehicle.
- GPS can be placed in the place of road damage. An application has to be created

## III. METHODOLOGY

### A. Intelligent Switching System

The flowchart explains the automatic street light switching by detecting the incoming of vehicles. Initially, the system checks continuously whether the sensors gets the output or not. If the vehicle crosses the sensors, the output of sensor becomes one and then lights are switched ON and timer initiates to run for certain period of time. As timer is running whereas the sensor input is continuously checked by the system for every clock cycle. If any other vehicle crosses the sensor, the output becomes ONE and timer is reset to the initial value. Until timer is finished to the specified time, the street lights are switched ON. The street lights become switched OFF as soon as timer finishes. This process

which will indicate the drivers about the conditions when the vehicle comes in the area of GPS.



Whatever the method is used, after clearing the damage the methods like indicating lights and GPS placing has to be removed.

After the clearance, Database has to be updated.

If the damage is not cleared for a specified time, it should produce a warning to the person in-charge.

#### IV. HARDWARE REQUIREMENTS

1. Sensors.
2. Timers.
3. Arduino board
4. LED light

##### A. SENSORS

Sensors are the sophisticated devices which are used in such a way to detect the presence of objects. Generally, sensors convert the physical parameter into an electrical signal.

In order to find the vehicle presence, preferable choice is “Magnetic Sensors” and “Inductive

Sensors”.

##### • Infrared sensors:

There are two types of IR sensors; Active and Passive sensors. Active infrared sensor. In IR sensors we have transmitter and receiver, the transmitter sends the infinite IR radiation. Both Active and Passive infrared sensors operate by transmitting energy either from a light emitting diode or laser diode. Generally, the infrared radiation is the portion of the electromagnetic spectrum and it has the longer wavelength than visible light and smaller than microwaves. These sensors emit invisible radiation which has both positive and negative effects. These sensors are able to detect the object between 100- 500 cm, it is sufficient to do a prototype.

##### Advantages:

1. A benefit of infrared detectors is their ability to be applied to a large area. IR detectors can be used to transmit and receive the radiations after reflected from the object.
2. Operating in real time, infrared detectors pick up movement making them useful in various situations, including their use by many fire departments, allowing firefighters to see through smoke.

##### Disadvantages:

1. The infrared detectors detect infrared images based on the temperature variance of objects, they cannot detect the differences in objects if they have similar temperature range. This leads to inaccuracy in many circumstances.
2. IR detectors are extremely expensive, which limits their use in many sectors.

##### B. TIMERS

The 555 IC timer is a widely used component in the electronic circuits. It is an integrated chip used in a variety of timer, pulse generation, and oscillator applications. The 555 IC can be used to provide the time delay, as an oscillator and as flip-flop element.



The timer is used in various electronics circuits for its robust and stable properties. It works as square waveform generator



with duty cycle ranges 50% to 100%. The 555 IC got its name from three 5kΩ resistors connected in a voltage divider pattern.

The timer is the 8 pin DIP, in this project we use this timer to make the delay circuits.

#### PIN DESCRIPTION:

Pin 1 - Ground  
Pin 2 - trigger  
Pin 3 - output  
Pin 4 - reset  
Pin 5 - Vcc  
Pin 6 - discharge  
Pin 7 - threshold  
Pin 8 - control.



#### *C. ARDUINO*

Arduino is an open source, computer combination of both hardware and software. Companies generally prefer to do the project and use community that designs and manufactures microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world. The products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), [1] permitting the manufacture of Arduino boards and software distribution by anyone.

Arduino is a user-friendly platform which is used to do many mini projects. Therefore for our convenience, all sensors are interfaced in Arduino board. In this paper, we are going to interface IR sensor.

To interface the IR sensor with the Arduino we need some basic materials they are

1. IR LED receiver
2. IR LED emitter
3. 100k resistors
4. Jumper wires
5. Bread board
6. Electrical tape
7. LED lights

By using above components we can interface the IR with Arduino and control the overall project.

#### *D. LED LIGHTS*

LED is the light emitting diode and it is a two terminal semiconductor device similar to the diode except it emits the light when an electrical pulse is given as an input. We have several kinds of LED, each varies with distinct specifications. Generally, street lights are designed by using the LED lights. It leads to the production of CO<sub>2</sub> than any other kind of street lights. Due to its less power consumption, all countries replace the existing lamps by the LED. By this, U.S saves nearly 100 million dollars per year.

#### *E. CALCULATION:*

The distance between two street lights is considered to be 15 meters if the vehicle travel at a speed of 80 km/hour then in 10 seconds vehicle crosses each street light so 0.5 second is the sufficient to make the street lights to be switched ON. The driver cannot be disturbed by the process as sensors are placed in a prior manner.

Power saved by single street light= 0.5W (minimum)

For 200 million street lights  
**0.5W\*200,000,000=100,000,000W** can be saved for a single day.

#### *V. CHALLENGES FACING*

“STREET LIGHTS ARE THE BENEFIT FOR ALL OF US TODAY. IT OFFERS SAFETY AND COMFORT DURING DARK HOURS”.

However, a lot of developments are made in the street lights but there is no automation technique existed in the street lights based on the incoming of vehicles.

Considering the amount of energy that can be saved by this method, there are a lot of difficulties also faced in installing this project.

- Continuous maintenance is required.
- The sensor is the base of the project which can get dusty and the problem in proper working leads to the replacing of the sensor.
- It will be difficult for placing the indications for the continuous damages.

## VI. CONCLUSION

1. Energy consumption can be reduced by installing our method in our developing country.
2. The emission of CO<sub>2</sub> due to blue-rich street lights can be avoided.
3. The efficiency of indicating the damages of roads by ropes or boards are not efficient during nights which can be replaced by our system.

## REFERENCES

- [1] Archana. G, Aishwarya N, Anitha J "Intelligent Street Light System" International Journal of Recent Advances in Engineering & Technology, Vol-3, Issue-4, 2015.
- [2] AkshayBalachandran, Murali Siva, V. Parthasarathi, Surya and Shriram K. Vasudevan "An Innovation in the Field of Street Lighting System with Cost and Energy Efficiency" Indian Journal of Science and Technology, Vol-8, August 2015
- [3] DeepanshuKhandelwal, Bijoy M Thomas, KritikaMehndiratta, Nitin Kumar "Sensor Based Automatic Street Lighting system" International Journal of Education and Science Research Review Volume-2, Issue-2 April- 2015.
- [4] IsahAbdulazeez Watson, OshomahAbdulaiBrahmah, Alexander Omoregie " Design and Implementation of an Automatic Street Light Control System" International Journal of Emerging Technology and Advanced Engineering, Volume 5, Issue 3, March 2015
- [5] KapseSagar Sudhakar1, AbhaleAmol Anil2, Kudakechetan Ashok3, ShirsathShravan Bhaskar4 "Automatic Street Light Control System" International Journal of Emerging Technology and Advanced Engineering" Volume 3, Issue 5, May 2013
- [6] Mustafsaad, AbdalhalimFarij, Ahamed Salah "Automatic Street Light Control System Using Microcontroller" Mathematical method and Optimization Technique in Engineering ISBN: 978-960-474-339-1.
- [7] SaksheeSrivastava, "Electronics And Communication Engineering, Institute Of Technology And Management AL-1, Sector-7, GIDA, Gorakhpur, U.P., INDIA" Advance in Electronic and Electric Engineering. ISSN 2231-1297, Volume 3, Number 5, 2013..
- [8] Prof. K.Y.Rajput, GargeyeeKhatav, Monica Pujari, PriyankaYadav, "International Journal of Engineering Science Invention" www.ijesi.org Volume 2 Issue 3 □ March. 2013 □ PP.60-69". Volume 2, Issue 3, March. 2013.
- [9] L. Jasio, T. Wilmschurst, D. Ibrahim, J. Morton, M. Bates, J. Smith D. Smith and C. Hellebuyck, PIC Microcontrollers: know it all, Publishing Elsevier Science, 2008.
- [10] K. S. Sudhakar, A. A. Anil, K. C. Ashok and S. S. Bhaskar, Automatic Street Light Control System, International Journal of Emerging Technology and Advanced Engineering, Vol. 3, May 2013.
- [11] Soledad Escolar, JesúsCarretero, Maria-Cristina Marinescu and Stefano Chessa "Estimating Energy Savings in Smart Street Lighting by Using an Adaptive Control System" International Journal of Distributed Sensor Networks Volume 2014, Article ID 971587
- [12] Samir A. Elsayegh Mohamed "Smart Street Lighting Control and Monitoring System for Electrical Power Saving by Using VANET", Int. J. Communications, Network and System Sciences, 2013, 6, 351-360.
- [13] Andrea Zanella, Senior Member, IEEE, Nicola Bui, Angelo Castellani "Internet of Things for Smart Cities" IEEE Internet Of Things Journal, vol. 1, no. 1, Feb. 2014.
- [14] J. Sherry1, D. Somasundareswari "INTERNET OF THINGS BASED SMART TRANSPORTATION SYSTEMS" International Research Journal of Engineering and Technology Volume: 02 Issue: 07 | Oct-2015