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Auto - Controlled Street Light

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Abstract- Street lights on some roads are kept ON even if there is no one moving on the road, thus electricity is wasted. So as to stop wastage of electricity, this paper presents an idea by which lights can be kept ON only for the time there is any object moving on the road. This can be done using a device which will sense moving object on road. When a moving object enters the vicinity of the street lamp, it will switch ON the street lamp, and the other sensing device on other side will sense that the object is no more under that street lamp so the first sensor is reset and the lamp is switched OFF.

Keywords- Street Light, Sensing Device, Power, Electricity, Switched On, Switched Off.

I. INTRODUCTION

The lampposts consume power up to minimum 250W and maximum up to 1000W. To reduce this loss, sensing device, which senses the objects in motions can be used to control automatically, electric supply to lamppost. This reduces the time for which they are kept ON. The problem of reducing natural resources, due to overconsumption, makes this issue important and this technique can solve this issue to large extent. Approach used here, is easy to implement and cost effective too. But this cannot be installed in highways or other roads where there is always hubbub on road. Most important limitation of this is that the constant voltage fluctuations may cause the lamps to stop working.

II. MATERIALS USED IN RESEARCH

1. Astable multivibrators (Infrared motion detectors) as sensors.
2. Flash bulbs as lamppost.

III. WORKING AND COMPARISON

A. Auto controlled street lamps not installed:

Electricity consumed per second = 250J (minimum)
Seconds in one night (7:00pm to 5:00am) = 10 * 60* 60 sec
Therefore, seconds in one night (7:00pm to 5:00am) = 36,000 sec.
Thus total electricity consumed in one night = 250*36,000 J i.e. a total of **90, 00,000** J

This 90 lakhs joules of electricity is consumed per night which is very high. This consumption is from only one lamppost. Any road has series of lamps after every 5 meters, so loss of electricity is much higher.

B. Auto controlled street lamps are installed:

Number of vehicles on street at late night (10:00pm - 5:00am) = 10 (assumed)
Number of vehicles on street (7:00pm - 10:00pm) = 50(assumed)
Time taken by vehicle to pass the lamp = 1 min = 60 sec
Total time for which lamp remains in ON state = (10+50)*60 sec
= 3600 sec .

Thus total electricity consumed in one night =3600*250J
=**9,00,000**J .

From above results one can conclude after installing devices, 10 times electricity can be saved . It can be stated that power saving can be done up to 90 % (theoretically), and about 75 % (practically).

C. Graphically it can be denoted as,

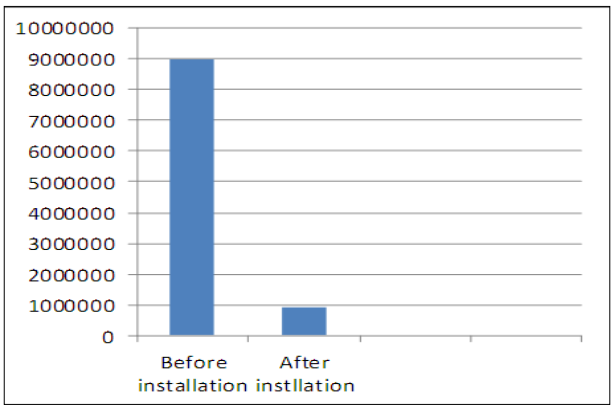

Fig.1: Before installation and after installation electricity consumption.

***Scale*:** Electricity consumption in joules on Y axis

Fig.1 clearly depicts the electricity consumption before installation and after installation of the sensors. It shows the large difference in the electricity consumption.

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D. Diagrammatic representation:

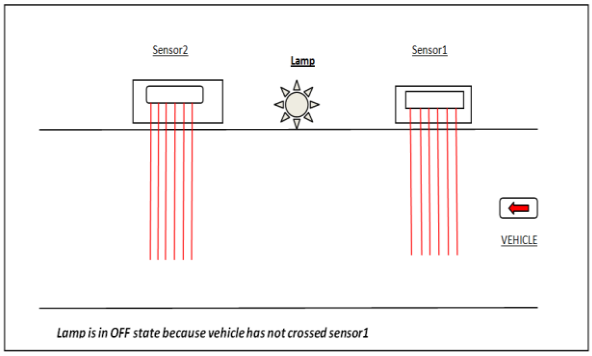

Fig.2: Lamp is in OFF state because vehicle has not crossed sensor 1.

Case 1:
Fig.2 depicts when vehicle has not passed first sensor, the lamp remains in OFF state, because vehicle is not in proximity of lamppost, so it neither ways get any light from this lamppost.

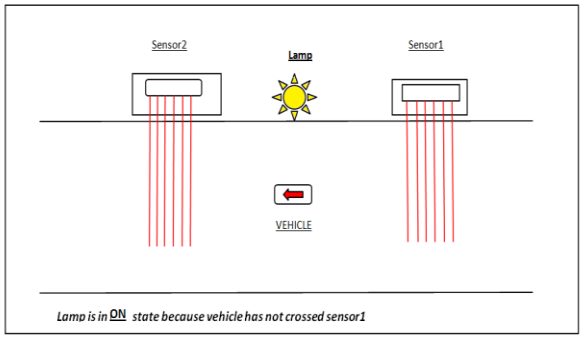

Fig.3: Lamp is in ON state because vehicle has crossed sensor1 and not crossed sensor 2.

Case 2:
Fig.3 indicates that vehicle has passed the first sensor and vehicle is under lamppost, so vehicle needs light from this lamp. Thus lamp is kept ON.

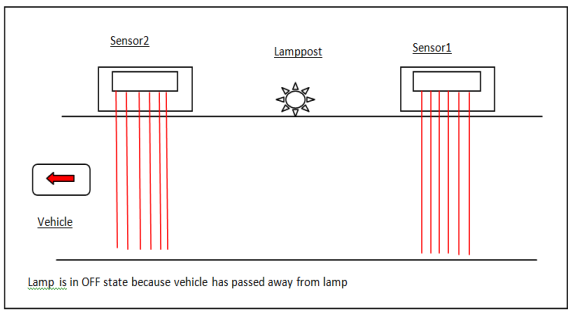

Fig.4: Lamp is in OFF state because vehicle has passed away from lamp crossing sensor 2.

Case 3:
Fig.4 depicts that the vehicle has passed sensor 2, which indicates vehicle no more needs any light from that lamp, so sensor 2 switches OFF the lamppost by resetting the sensor 1.

IV. COMPONENTS OF SENSORS

A. Infrared Motion Detector :

It is used in sensor 1 and sensor 2. It can be used to sense intrusions in lamppost influenced area. It works on principle that the Infrared rays reflected from static object are in one phase and that reflected from moving object is in another phase. This change of phase can be detected and lamppost can be controlled accordingly.

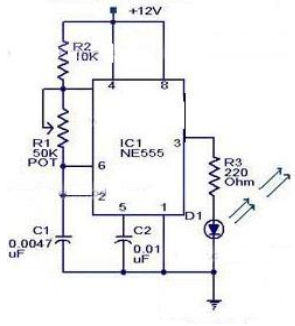

Fig.5: Infrared Motion Detector pin diagram.

Infrared motion detector is basically an astable multivibrator with an IR diode at output pin.

B. Lamppost:

Its automation is connected to infrared rays received from the motion detector. When the motion is detected, the lamppost is switched ON until any motion is detected by other IR motion detector i.e. sensor 2.

V. LIMITATIONS

1. Frequent fluctuations in voltage may spoil lamps and other gadgets.
2. Rain in monsoon can be detected as unwanted motions.

VI. CONCLUSION

In this report, the automation of lamppost is regulated using Infrared technology. This helps in saving the power up to 90 %. This system can be easily installed and can be implemented successfully after some reforms.

REFERENCES

[1] USAID and B. of E. E. GOI, "Energy Efficient Street Lighting Guidelines."

[2] CCI (Clinton Climate Initiative), "Street Lighting Retrofit Projects: Improving Performance while Reducing Costs and Greenhouse Gas Emissions.," Clinton Foundation, 2010.

[3] J. D. Bullough, M. S. Rea, and Y. Zhou, "Analysis of visual performance benefits from roadway lighting," Light. Res. Cent. Rensselaer Polytech. Inst. Proj., no. 5–19, 2009.

[4] Corporation of Chennai. Spot light on public lighting.Chennai, India.

[5] Multivibrator in IEEE Std. 100 Dictionary of Standards Terms 7th ed.,IEEE Press, 2000 ISBN 0-7381-2601-2 page 718

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