

Solar Lighted Footpath - an Ecofriendly Approach Towards Smart Cities

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Abstract:— This paper introduces a intelligent street lighting system based on human sensors. This paper also includes design of intelligent street light system using innovation. Main goal of this research paper is to design a power saving street light system and take a step towards making our street smart and intelligent. Improved street lighting is intended to serve many purposes, one of them being the prevention of crime. An idea based proposal of using solar lighting for footpaths with a user friendly railing design. Lighted pathways which will promote the use of walkways, which is an eco-friendly approach towards smart cities.

Keywords:-----street lighting, Lighted pathways

I. INTRODUCTION

Now-a-days, street lighting is one of the important parts of a city's infrastructure where the main function is to illuminate the city's streets during dark hours of the day. Street Lighting is often the largest electrical load as they are lit all night even if not needed, and the overall cost of lighting energy consumption is even higher when compared to the personnel costs. Thus its energy saving potential is often neglected.

According to Frost and Sullivan study about 4400MW of power is alone spent in India on public lightning [1]. Previously, the number of streets in the town and city were very less. Therefore, the design and the function of street lighting were relatively simple but with the rapid development of cities, the number of streets increased rapidly with high traffic density.

Currently in India enormous electric energy is consumed by the street lights which are controlled manually by the local bodies. Very few cities in India are equipped with the street lighting system which is automatically turned on when it becomes dark and automatically turns off when it becomes bright. This is also a huge waste of energy as the lights are still on in the day as well as in the night time even if not needed Thus a serious attempt needs to be made in which the energy waste of the street lights could be minimize.

II. CURRENT CONDITION OF STREET LIGHTING IN INDIA.

In most cities, the street lights are installed and maintained by municipalities. Most urban and semi-urban cities and towns are still using a combination of fluorescent, CFL, high pressure sodium lamps or metal halide bulbs, which are not designed to meet area-wise lighting needs.

Very little study or planning has gone into the luminance required in different areas of streets, to address the needs of pedestrians and vehicular traffic alike. For instance, the lighting needs of vehicular traffic in high speed zones are different from low-speed high traffic zones. Likewise, lighting needs in road crossings are different from secondary roads. Then again, the lighting requirements of an area with vehicular traffic will vary from that of an area with high pedestrian traffic.

A one-size-fits-all approach to street lighting results in inefficient deployment of power resources and ends up in wasteful use of electricity that could have been better utilized elsewhere. Street light planning is not just about luminosity but also the 'height' of the lighting mast, which in turn varies based on the requirements of that particular area.

Due to a lack of 'area-wise' study, standard tenders are issued on a 'city-wise' basis, leading to high operational cost incurred on street lighting. Very often, one notices that the street lights stay on well past sunrise. This is because the lights are switched off based on a predecided time rather than lighting needs, which vary based on season and location of the city. There is a need for devising a well thought out way to prevent wastage of electricity.

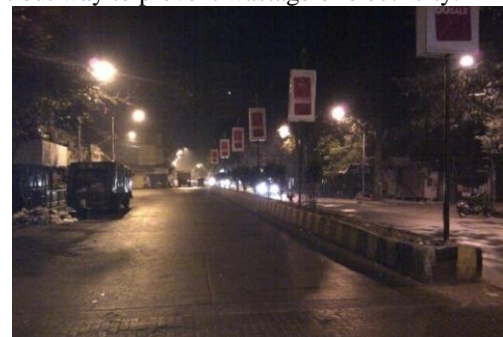


Fig1: Present condition of footpath

III. PROPOSAL

A sensor light which is controlled by the brightness sensor and the motion sensor is sometimes used.

Sensor switches for light & motion are commonly used for economic consideration. It only turns on for a while when the motion is detected in front of the light and again switches off.

However it usually is too late to turn the lights on when a person or a vehicle comes in front of it. The light should turn on before a person or a vehicle comes.

We propose an automatic lighting system in which the lights turn on before biggest incomes and turn off or reduce power when the pedestrian moves away.

Perhaps, the government can think of implementing Automatic Street Light Control System using LDR (Light Dependent Resistor), which automatically switches off lights when sunlight fall on it.

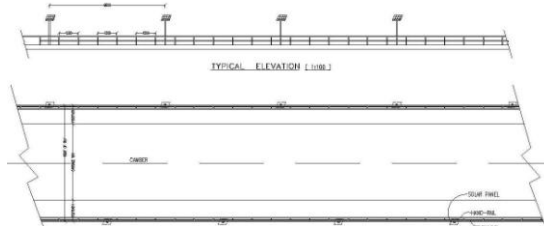
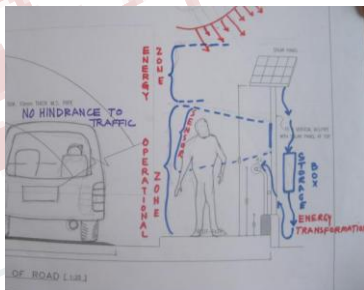


Fig2: Plan of road for proposed railing system.



Railing:

Railing is the only furniture which can promote the use of footpath during the night. Grip of the hand rail is easy, safe and is also provided with nitch for LED. 10 mm thick M.S. pipe of 50mm diameter is used.

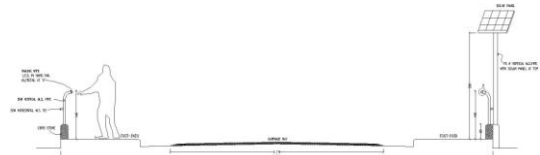


Fig3: Typical cross section of road

Battery can be charged by using Solar terminal. This Solar Terminal can be installed at a regular interval of 9000mm. Solar energy will be stored in the battery during day time which will be used for lighting footpath during night by using human sensors.

When sensor detects the human presence, the light illumination will be 100% and as the person moves away from sensor the frequency gradually decreases upto 20% and again it increases to 100% as the person comes near to next sensor.

- Ambient light sensor
- Based on human motion sensor
- LED light automatically turns on motion detection
- Turns off automatically; if no motion is detected for 60 seconds

REFERENCES:

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- 2) [Illuminating cities with sustainable smart lighting systems - The Guardian](#)

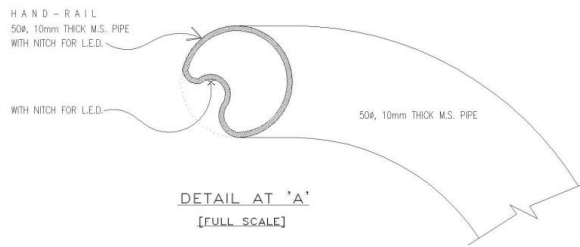


Fig3: Typical cross section of railing

