

Intelligent Public Lighting System

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ABSTRACT

This paper describes an intelligent public lighting system. At night times, public lighting system is the main source of light for users while walking and driving. The system comprises of a light weight module that allows the lighting to incline at any angle and even illumination can cover the entire width of the road with the provision to provide more illumination in the accident prone zones for driver and passenger safety.

Keywords: Public Lighting System, Internet of Things, Fuel, Illumination, Safety, Security, Threat, Accident, Drivers

1. INTRODUCTION

The present invention relates to the field of Internet of things (IOT) in Public Lighting System.

The goal of this research is to develop an intelligent lighting system which has become a growing concern for the public since many safety and security problems arise due to low or improper lighting system.

The recent advancements in the area of IoT has provided solutions to public lighting system. In street lighting efficient management of power and lighting in appropriate areas is needed.

Our research team has developed a smart system that challenges the current system and provides the following advantages for public lighting system that also provides safety and security to the public

1. A sensor attached at the bottom part of lamppost to detect the speed of vehicle passing the lamppost
2. A solar panel and/or small wind turbine is attached at the topmost end of the lighting lamppost to generate the alternate power sources for said lighting system.
3. A scanner incorporated on the lamppost below the said speed sensor which can scan the vehicle license plate number for verification with predefined numbers list.
4. A module fixed on the top of the lamppost is used to adjust the head of the lamppost at various inclination in such a way to cover the entire breadth of the road.
5. A controller coupled to the said scanner, sensor and the module to responsive to the signals from the said scanner and sensor to generate the alert signal to the respective nearby patrol station or RTO. A central hub collects and stores the information from the said controllers of various lighting and is used to forecast the modification/improvisation need for any particular area/roads

The implementation and description of intelligent public lighting system would be discussed in the preceding sections of this paper.

2. DESCRIPTION

The paper discusses in detail on an Intelligent Public Lighting System which is used to improve the safety of public in low lighting area.

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FIG. 1 illustrates the different parts of an Intelligent Public Lighting System. As shown in the fig. 1, the lamppost 100 is having a module 102, light 101, small solar panel or wind turbine 103, a licence plate scanner 105 and a speed sensor 104.

In this present disclosure, an intelligent public lighting system is introduced which has an option to work on alternate energy. In the present scenario there is scarcity of energy in the society. Use of alternate energy sources for public lighting system can save energy that can be used in the future.

As shown in fig. 1, street lights are also connected with small individual wind turbines and solar panels 103 so the dependency on electricity is highly reduced. The street light is charged by both wind turbine and solar panel 103 which is placed on the top of the lamppost 100. Each street light contains either a small solar cell or wind turbine according to the climate and weather condition where the street lights are placed, the production of energy may vary. Solar panels 103 are present generally on those street lights where there is no possibility of shade of the tree or building and where the intensity of sunlight is more. Similarly, wind turbines are placed on the street light where the wind is blowing genuinely or the place where the sunlight is not falling properly on street lights. This alternate energy sources makes the public lighting system an eco-friendly environmental system.

The provision to the other way of reducing the consumption of electricity is the street lights can adapt to the brightness based on weather condition. The brightness of the light is got adjusted according to either the weather condition or the visibility. An auto ON/OFF according to the weather condition is also contributes to the feature of energy consumption.

There is also a provision to control the light's brightness by the help of software which can be monitored and controlled wirelessly. Apart from the automatic lighting brightness control, the auto switching on/off lights can also be controlled by this software.

The head of the lamppost 100 of the public light has a module 102 that allows the rotation of the lamppost to be aligned at such an angle that it illuminates the entire breadth of the road evenly to avoid the problem of differential night view while driving in different lanes of the road. This make this public lighting system as a suitable one for places where the width of the road is varying.

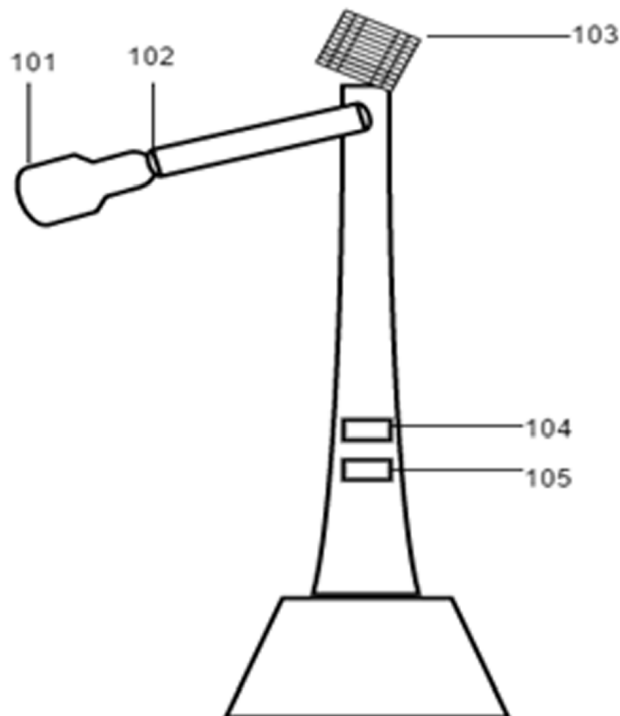


Figure 1: Street Light

The public lighting system is provided with adjustable illumination setup to set manually especially in the areas of emergency, sharp bent roads, prone zone to avoid the accidents. In these areas, the intensity of the light is set to be higher than others.

The controller of these smart lights will be connected to a central hub where the regular status update is monitored. All the public street lights are connected to the central hub through the above mentioned software. The central hub is a system present in multiple localities in the city. The central hub described herein is to control and monitor the status of that particular locality and also to visualize the needs of that particular area with the help of software installed in computer system.

From the security aspect, there is a small scanning sensor 105 present at the bottom part of the lamp post 100 in such a way that help in scanning the vehicle license number while passing through the street light. This information were send to the RTO in case the police is in pursuit of catching any unidentified, stolen or suspected vehicle. The scanning system includes the LPR (License Plate Recognition), an image-processing technology which is used to identify vehicles by their license plates. This scanning system can be activated and deactivated at any point of time by the RTO (Regional transport office), thus this system will be in use only when there is a need to find any unknown vehicle. This system will be installed in few peak poles out alone.

Fig 2. Illustrates a block diagram indicating the procedure while the vehicle passing by this present invention public street light system. As shown in the fig. 2, there is a speed sensor 104 present at the bottom part of lamp post 100 that are present near to curves, school areas, hospital and crowed area where speed has to be within to certain specific value.

Fig. 2 explains the whole scenario of vehicle passing through the lamppost in curve, accident prone zone, school area, medical area etc. The Speed sensor 104 which can work on License Plate Recognition technology can sense the speed of the vehicle. If any vehicle found to be involved in violating against the rules and moves at a higher speed (i.e., $\text{speed} > 40$, as per the specific place) 201 then the scanner 105 scan the vehicle number plate 203 automatically and send that information to any nearby RTO 202. This way of informing to the RTO helps the officials to raise warning/alert signals to the police to take further necessary action against them 204.

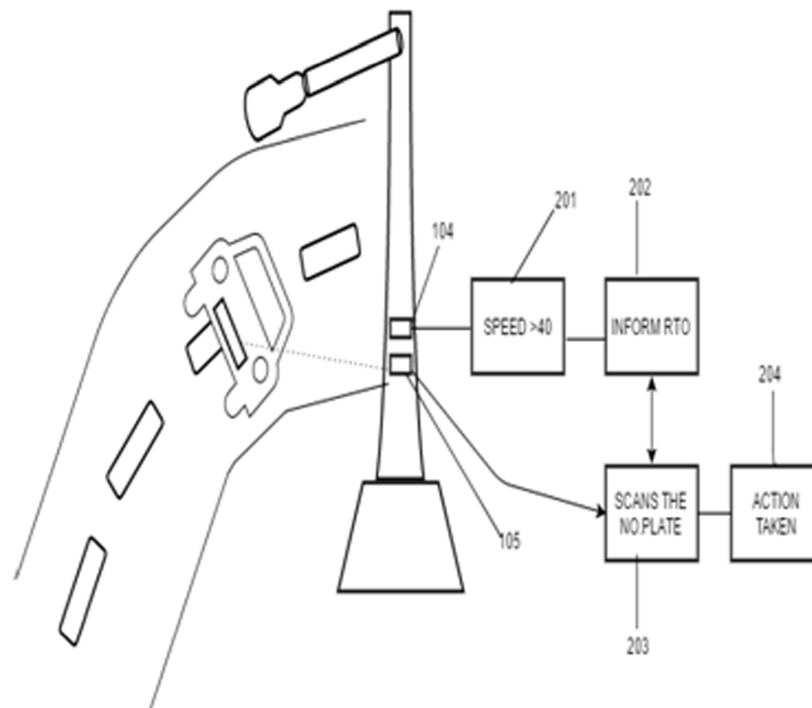


Figure 2: Whole Scenario of Public Street Lighting System

3. IMPLEMENTATION

The present invention and its advantages can be implemented as described below. The invention provides safety to the public by using intelligent public lighting system which can reduce accident by providing brightness evenly over the entire roads especially on a low lighting area.

The system assists the driver with sufficient amount of light in the sharp turning and to improvise the safety for both drivers and general public. This present disclosure also has the provision to function using alternative source of energy to reduce the consumption of electricity from the public electricity department.

The intelligent public lighting system also incorporate with speed sensor to sense the speed of the vehicle when it passing through this lighting system to avoid rash driving. The controller fixed along the public lighting system collects the input from the speed sensor and send to the nearest patrol station if it finds any over speeding vehicle

In yet another aspect, it also projected with scanner in the bottom part of the public lighting lamppost to scan the vehicles whenever it passes through. A signal will be send to the nearest patrol station or RTO once the scanner identify the suspected vehicle. The memory of the controller is already fed with the license plate numbers of all vehicles.

4. APPLICATIONS

The invention as described in the drawing finds applications in public street lighting system and in stadiums

5. CONCLUSION

The present invention provides a smart public lighting system that also has vigilant system that helps the RTO/police in the pursuit of a catching lost/stolen vehicle and vehicle involved in rash driving.

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