

Smart Street Lighting

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Abstract—This paper aims at energy saving and to reduce environmental pollution caused by generation of electricity using coals. A huge amount of energy is being consumed in lighting the street light. There are times when rate of vehicles passing on street is less so we propose a system that will automatically control the brightness of the street light according to the presence of vehicle. And it will automatically switch on and off the lights during day time and night time.

Logically, this system will save a large amount of power. In addition to it, life time of bulbs will increase and automation in the field of street lighting will also be achieved. Through this system approximately 45% of energy will be saved and lifetime of bulbs will be increased to 65%. Further more medication can be done to achieve new goal through this project which will be beneficial to the society.

1. INTRODUCTION

One of the most important civilization index is the development of a good transportation network. This includes streets, roads and highways that have to be adequately illuminated so that a sufficient visibility is guaranteed in order to decrease the accident rate and increase the flow of the vehicles and safety. However, these streets and roads are illuminated constantly for more than 13 hours daily. This in turn requires a huge amount of electrical power to light all the streets and roads. About 30% of the total electrical power of any country is consumed in lighting the roads and the streets. The spending cost for the energy is high.

We also know that for some roads, vehicles pass with very small rate in specific periods of time. In other words, if we divide the roads into small parts, with each part has a length of 500 meters (the minimum visibility range), we can find that in many roads only a very small number of these parts have vehicles that pass through them and the rest of the parts have no vehicles, but still consuming electrical power. This is a dynamic problem that means that any part of the road can be free and then shortly be occupied then free again, etc.

After all the discussion a natural question always rises in our mind which is: Is it possible to automatically cut the electricity for the parts of the roads that do not have vehicles and resume the current for these parts once there are some vehicles that are going to come? If this system could be implemented, it can save very large amount of the electrical power that can be used

to develop other areas in the country. It can also increase the lifetime of the Lamps and hence decrease the maintenance cost.

Actually one reason that made it impossible to develop such a system in the past is that the presence of vehicles on any part of the road has to be known. In addition, it has to be known when some vehicles are going to enter to these parts shortly in order to decide on switching the light on or off dynamically. The classical technologies like using cameras or cables to count the vehicles in any part are not feasible because they need very expensive hardware and computers to analyze the images to count the vehicles. Thus, there is a great need for developing a system that automatically controls and monitors the light of the streets or roads in order to light only the parts that have vehicles. This system has to use the recent innovative technologies to reduce the implementation cost and to be accurate.

The proposed system also aims to achieve individual faults of street light which can be repaired within few working hours instead of taking days/ months of time. In current system fault detection is done when a staff actually goes on “light patrols” in five to eight times a year to check for such faulty street light. Generally, management relies on residents, public or other municipal employees to report active faulty street lights.

This system can be implemented in street light, in corporate fields, institution and organization, and it can also be modified and implemented in home power control system to save energy.

This system will result in energy saving, reduce human resources, increase lifetime of the street light, less maintenance will be required, automatically get switched off and automation in street lighting field.

2. SMART LIGHTING

The basic idea of smart street lighting came from wireless optical mouse. In wireless optical mouse when the mouse is in stand still position then the light intensity of mouse get reduce to a very low rate to save energy of the battery but as soon as we move the mouse the light intensity of the mouse get increased. So we are implementing the same logic in our smart



Fig. 3(b). Prototype of smart street lighting

Above we can see the prototype of smart street lighting which is based on the similar concept. In this prototype the Ir sensor has been placed at the side bottom of the divider.

4. SCOPE OF THE PROJECT

- Automatic dimming of light during night when no vehicle is present for power consumption.
- Switch on and off automatically.
- Street light false detection.
- Reduces power consumption.
- Reduces human resource.
- Increases the life time of the street light.

5. CONCLUSION

The use of power electronics is increasing exponentially across various sectors of human life. The components used in the project, like relays and sensors, are slowly becoming an indispensable part of our daily routines. So, it is only fitting that we use them to improve efficiency in every walk of life.

Keeping in mind the urgent need for energy conservation, SSLS (Smart Street Light System) is an excellent and effective solution. It combines safe lighting protocols with consumption of minimal amount of power. The energy savings, as discussed before, are phenomenal. The future scope of this project expands into speed detection and customizable area of illumination.

An additional component which would lead to better functioning of the concept would be the

use of LED bulbs. Despite their high initial costs, they are a viable option as they drastically reduce the power consumption. They will aid in further saving of energy and reduction in operational costs.

Presently this project is depended on external power supply for its operation. So, if we add solar cell and battery to it then it can become independent of power supply. So Firstly we can make smart street light independent by adding a solar cell and battery.

Second we can add security to this project which can help in tracing and tracking vehicles.

So overall future scope of this projects are speed detection, customizable area of illumination , solar cell, tracing and tracking of vehicle.

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