Proc. Annual Symposium on Research & Industrial Training, 01(2014) 109 -113
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AUTOMATIC STREET LIGHT INTENSITY CONTROLLING SYSTEM

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ABSTRACT

Currently established street light systems, especially in Sri Lanka, causes a considerable amount of energy wastage because they are not automated to act efficiently and effectively. Automated intensity controlling street lamp system will reduce the energy consumption and some other collateral disadvantageous facts as well. Suggesting method has architecture consisting PIR sensor, PIC microcontroller and light-emitting diode (LED) street lamp. Street lamp on time can be configured at the PIC microcontroller. Lamp will lit in general mode with full intensity within the configured to the busy time. And apart from that light will be kept switched to dim mode with less intensity of light. In this system PIC microcontroller uses the Pulse-width modulation (PWM) function decision making. In dim mode PIR Sensor is used to identify the pedestrians and vehicles which are passing away from the sensor. If PIC gets a heat or motion signal from PIR covering the configured criteria, this is the case of detecting a human activity around the lamp; it will be automatically switched to the general mode. Even though the implementation cost is considerable, this system as it will save the power consumption up to 40% than presently available method.

Keywords: *PIR sensor, energy consumption, Light Emitting Diode, Pulse Width Modulation*

1.0 INTRODUCTION

A Street light, lamppost, street lamp, light standard, or lamp standard is a raised source of light on the edge of a road or walkway, which is turned on or lit at a certain time every night. Modern lamps may also have light-sensitive photocells to turn them on at dusk, off at dawn, or activate automatically in dark weather. In older lighting this function would have been performed with the aid of a solar dial. It is not uncommon for street lights to be on poles which have wires strung between them, or mounted on utility poles. Beyond the traditional light controlling method, there are some innovative methods used in today world to control the electricity usage light sources. In this research it's going to be

introducing a new way to save the electricity as well the life time of the light sources by controlling their usage throughout the day by using PIC Microcontroller IC with the help of PIR Sensor.

2.0 EXPERIMENTAL

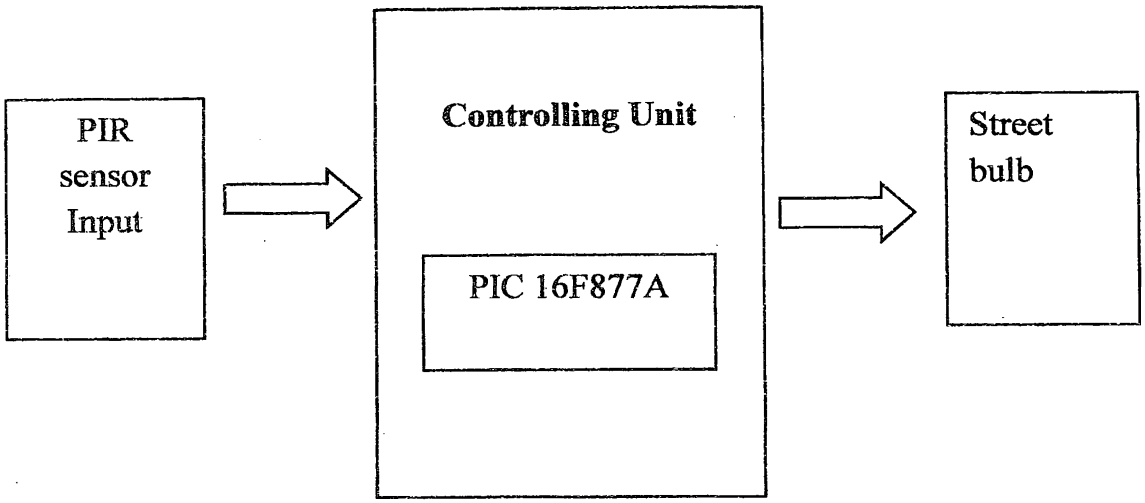

Figure 1: The block diagram of the model traffic light controlling

Initially, the light will be in general mode, after the busy hours (Switching time can be configurable) system will be switched to Dim mode. Whenever the vehicle or pedestrian crosses the sensor, light starts to increase. By this proposed system it can be controlled the power consumption of the street light.

There are two modes in this project for saving power

1. General mode (light be in maximum bright)
2. Dim mode (light be in minimum bright)

In general mode the street lamp will light in its full intensity, assuming that there are human activities on the street. General mode time lapse can be configured to the busy hours. In dim mode, any case of pedestrian or vehicle activity street lamp will be automatically switched to the General mode to give the full intensity of light.

3.0 RESULTS AND DISCUSSION

In the current system CFL lamps or HID lamps working on whole nights there full intensity. If the street light bulb that uses 60 w we have on 12 hours every day of the month (6.00 pm – 6.00 am). So it can calculate how many kWh this incandescent light bulb is using every month.

Kilowatt Hours used that month = 60w * 12 hours / day * 30 days / mo / 1000

= 21.6 kWh per month

So using the 60w incandescent street light bulb, this was using 21.6 kWh /mo. The unit price is Rs 12.50.

Cost per month = 29.28 kWh * Rs 12.50 / kWh

= Rs 270 / mo.

So a single 60w incandescent street light bulb will cost Rs 270/mo.

In my system researcher used LED lamps. Because of that power consuming is less than other lams. If uses 15W LED bulb in same conditions of the previously mentioned 60W bulb,

In General mode,

Kilowatt Hours used on General mode that month = 15w * 4 hours / day * 30 days / mo / 1000

= 1.8 kWh per month

In Dim mode,

Kilowatt Hours used on Dim mode that month = 7.5w * 8 hours/day * 30 days / mo / 1000

= 1.8 kWh per month

* Assume anyone did not use the road at the Dim mode.

Total Kilowatt Hours used that month = 1.8 kWh per month + 1.8 kWh per month.

= 3.6 kWh per month

Because of that,

Cost per month while using new system = 3.6 kWh * Rs 12.50 / kWh

= Rs 45/mo.

So, after using the street light intensity controlling system a single 15w incandescent street light bulb will cost only Rs 45 / mo.

Using the proposed Street Light Intensity Controlling System it can save 8.0 kWh per month (21.6 kWh per month - 3.6 kWh per month) from only one bulb. Because of that it can be save 37.04% power from one bulb in single month.

Saving money per month, for one bulb while using new system = Rs 270/mo - Rs 45/mo
= Rs 225/mo.

Usually initial cost for the one unit of this system is Rs 800.00. It can be covered the initial cost within 4 months as the system saves 225.00 Rs in one month.

For this project it is tried to find a best solution for the object of the project using sensor and street light system. As the existing normal sensors are unable to identify separately the humans and the other objects such as animals, there exist a limitation of this system as it will activate whenever any moving living being moved in front of the sensor. This limitation can be exceeding if the advanced sensor method used.

In the final products there are some advantages such as Low power consumption, Low cost, User friendly and not depend on the environment factors. In the final products there are some disadvantages; PIR can't handle several inputs at the same time etc.

4.0 CONCLUSION

This project of Street Light Intensity Controlling System is a cost effective, practical, ecofriendly and the safest way to save energy. It clearly tackles the two problems that world is facing today, saving of energy and also disposal of incandescent lamps, very efficiently. According to statistical data we can save more than 40% of electrical energy that is now consumed by the streets. Initial cost and maintenance can be the draw backs of this project. With the advances in technology and good resource planning the cost of the project can be cut down and also with the use of good equipment the maintenance can also be reduced in terms of periodic checks. The LEDs have long life, emit cool light, donor have any toxic material and can be used for fast switching. For these reasons my project presents far more advantages which can over shadow the present limitations. Keeping in

view the long term benefits and the initial cost would never be a problem as the investment return time is very less.

ACKNOWLEDGEMENTS
Authors take this opportunity to express my profound gratitude and deep regards who have helped me to make this research success.

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