Intelligent Lighting System


Department of Electronics and Communication Engineering,
Sri Shakthi Institute of Engineering and Technology, Coimbatore, India
E-mail : samssssp@gmail.com, rsubashindece@gmail.com, ece.tamilarasan@gmail.com, ecetamilselvan@gmail.com, venkatesan.k@gmail.com

Abstract – In recent years, various types of equipment have become more intelligent. In this project, we propose an intelligent lighting system for providing the necessary luminance in a desired location. This project helps to reduce the unnecessary power consumption due to over illumination in case of natural light. It is capable of changing its luminance level during day and night time automatically. In present lighting system CFL and Incandescent light bulb which consumes more power and results in high electricity bill. Whereas in our system these bulbs are replaced by LED’s which consumes less power by controlling the luminance level. By using PIR (Passive Infrared sensor) motion of a person can be detected and corresponding lights will be turned ON/OFF in particular locality.

Keywords – Microcontroller, PIR Sensor, Illuminance Sensor, PWM, RF module and LED bulbs.

I. INTRODUCTION

With the development of information technology and hardware, many electronic appliances such as televisions, air conditioners and fans, now incorporate an intelligent system which controls the operation of the appliance to suit environmental conditions, reducing the need of human operation.

Now a day, electricity is the major resource for human life. But, the utilization is not in proper way. In the existing system we are using CFL/Incandescent that has reduced life span, consumes more power which leads to high electricity bill and global warming. And also digital controlling of light bulbs is not possible.

II. LITERATURE REVIEW

A. Review of Incandescent light bulbs

Life Span in hours – 1200
Electricity Used in W – 100
Electricity consumed in kWh/year – 5475
Light Output in Lumen - 1100-1750
Electricity Cost/hour in ₹ - 0.1627
Electricity Cost/day in ₹ - 3.904
Electricity Cost/month in ₹ - 117.1234
Electricity Cost/year in ₹ - 1405.4814

B. Review of CFL bulbs

Life Span in hours – 8000
Electricity Used in W – 25
Electricity consumed in kWh/year – 1278.33
Light Output in Lumen – 1800+
Electricity Cost/hour in ₹ - 0.0749
Electricity Cost/day in ₹ - 1.7998
Electricity Cost/month in ₹ - 53.9939
Electricity Cost/year in ₹ - 647.9269

C. Savings of Electricity and cost over incandescent light bulbs

<table>
<thead>
<tr>
<th>Power saved in W</th>
<th>Cost saved/hour in ₹</th>
<th>Cost saved/day in ₹</th>
<th>Cost saved/month in ₹</th>
<th>Cost saved/year in ₹</th>
</tr>
</thead>
<tbody>
<tr>
<td>75</td>
<td>0.0877</td>
<td>2.1043</td>
<td>63.1295</td>
<td>757.5545</td>
</tr>
</tbody>
</table>

Table.1. Savings and Cost of CFL bulbs

D. Review of LED Bulbs

Life Span in Life Span in hours – 50000
Electricity Used in W – 6-9
Electricity consumed in kWh/year – 329
Light Output in Lumen – 400-500
Electricity Cost/hour in ₹ - 0.0278
Electricity Cost/day in ₹ - 0.6677
Electricity Cost/month in ₹ - 12.895
Electricity Cost/year in ₹ - 146.3858

E. Savings of LED Bulbs over CFL Bulbs

<table>
<thead>
<tr>
<th>Power saved in W</th>
<th>Cost saved/hour in ₹</th>
<th>Cost saved/day in ₹</th>
<th>Cost saved/month in ₹</th>
<th>Cost saved/year in ₹</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-19</td>
<td>0.9145</td>
<td>21.9491</td>
<td>658.4733</td>
<td>4828.8787</td>
</tr>
</tbody>
</table>

Table.2: Savings and Cost of LED bulbs

III. PROPOSED SYSTEM

Against such backdrop, intelligent controls are being introduced also for lighting systems from the aspect of saving energy consumption. The resource is a non-renewable one. So, we have to conserve the available resource. One example of such systems is our “Intelligent Lighting System”.

In this system we are replacing the CFL bulbs with modern LED lamps. According to the literature review, the efficiency is more compared to other lighting systems. Here we provide the fully low power consumption system.

IV. OVERVIEW

The main focus of this system is to provide energy efficient lighting with low power consumption which reduces power scarcity in present scenario.

The Passive Infrared (PIR) sensor is mainly used to detect the motion of a person in a particular locality. It observes the IR radiations from the human body. Once the motion of a person is identified by the sensor then the high output signal is given to Microcontroller.

The Illuminance sensor which is actually a transducer converts the Illuminance value into an electrical signal. The brightness of light variation is directly proportional to the output electrical signal. The output signal is pulse width modulated using PWM generator which produces various pulses in accordance with the varying Illuminance levels.

These sensors responses are taken as an input for this system. The output side of the system contains LED lamps driven by drivers. The Microcontroller controls the entire operation of the system. Once the person is identified by PIR sensor then the brightness level of the light in that particular locality is varied by Illuminance sensor.

We can also switch ON/OFF the required lights by using RF remote which contains a transmitter and receiver. This RF remote can operates at a frequency of 434MHz. The switches for corresponding lights are connected with RF transmitter with an encoder circuit. Once the encoded signal is transmitted the receiver receives the signal, decodes using decoder and gives it output to microcontroller. The controller then turns ON/OFF the corresponding light.

The combination of PIR sensor, Illuminance sensor and Microcontroller provides the efficient lighting system. The manual control of light ON/OFF is also employed by using coded RF module.

Fig.1: Block Diagram of Our System
Fig.2: Block Diagram of Remote Unit

V. FUTURE IMPLEMENTATION

In future we are going to migrate this project to ARM platform in order to increase its performance and also to control the system server via Ethernet

VI. CONCLUSION

Thus this project “Intelligent Lighting System” is a very efficient system for our day to day life. It can
effectively be used at various places like seminar halls, commercial complexes, theatres, labs and even at homes to save unwanted power usage. Also, the implementation cost is affordable. It reduces Global Warming by using Digital Control.

VII. REFERENCE


