Smart Lighting System for Smart Homes

[1]Sanjana Pathak, [2]Suzanne Jacob,[3]Utkarsh Saraswat, [4]Pallavi Yarde

[1,2,3]Department of Electronics and Communication engineering, Manipal University, Jaipur 303007
[4]Assistant Professor, Department of Electronics and Communication engineering, Manipal University, Jaipur 303007
Email: sanjanapathak900@gmail.com

Abstract : Usually, In our day to day life, there is a tendency in people to search for the switch or also in order to locate the switch. Moreover, sometimes people tend to forget to switch the lights off before leaving the room. The problem with this system is that there is a lot of manual work required moreover it doesn't turn out to be environment friendly. This problem can be solved using Smart lights. An automatic room-light controller turns on or off the lights when a person enters into or leaves the room. The basic idea behind the project is to conserve power and minimize the wastage of power and also minimize the manual input.

Index Terms: Efficiency, IR Transmitters, Sensors

I. INTRODUCTION

Over the past few years, intelligence and cost effectivity has emerged as two of the most important components while designing any architectural structure such as a house, an office building. Energy efficiency and sustainable development has become an essential part of our lives impacting everything such that new ideas are forged in accordance with this. Over the past few years the energy consumption has increased exponentially. One of its reasons being the ever increasing population.

[3]According to the reports given by CEA(Central Electricity Authority), an average household in Delhi uses about 250-270 units of electricity per month and it is likely that these statistics will go up. Hence it is becoming necessary to change our approach towards conserving electricity. It is continuously observed that a lot of household energy gets wasted while appliances are on standby mode, that is, when they are switched off and not in use. There is a striking need for developing technologies to help reduce this wastage of energy.

The need for the sensors to selectively turn the LED (or any light emitting object) on or off depends on many factors and these give rise to many discrepancies. One such being the detection of number of persons entering or leaving the room.Say, two people enter the room at the same time and only one exits after sometime, in that case the light would switch off as the sensor has detected a certain motion

[1]A system that was developed by Nur Anisah Bte Syed, Vikneshwaran and Tan. Daniel under the supervision of Chan-Tan and Yuck Wee, used IR sensors in order to sense the movement of people entering or leaving the room. The signals are sent to the microcontroller for processing.The conclusion were given as such: The lights were turned on if people were there in the room or else no lights when nobody was present. This system, when developed further could alert the users about an intruder entering the house. By using different sensors we can create a better model of it.

II. METHODOLOGY

Once we formulated the idea, we calculated the costs of all the components required and also tried to look for more economical options. Then we looked into all the different circuits and tried to analyze the best way to design the circuit. Once this was done, we started procuring all the hardware components required and also ensure that we had the latest software installed with us. Then we worked on the code and also implemented the circuit and also checked that the components were in perfect working condition and giving the desired output. The final step was to assemble the entire project and make it ready for the final demonstration.

III. HARDWARE AND SOFTWARE COMPONENTS USED

Low cost components were used:

a.   Arduino UNO

b.   2 x Infrared Sensors

c.   16 x 2 LCD Display

d.   5V Relay Module

e.   LED

f.   Connecting Wires

g.   Power Supply

h.   Arduino IDE (1.8.5)

IV. PRINCIPLE

Automatic room lighting system can be implemented by using a microcontroller and wireless IR technology. This system is designed by using two sets of IR transmitters and receivers. They are placed in such a way that they detect a person entering and leaving the room. In this optimum energy management system, a microcontroller is the Central processing unit of this project which is an Arduino UNO (development board) in this case. The system can work as a bidirectional counter. Also showing the count of the people inside the room or the building.

When someone enters in the room or the building, an IR

transmitter and receivergets obstructed. The sensors are directly connected to the microprocessor and signals are sent to the microprocessor. Now, the microcontroller is programmed such that when signal is received from the sensor,the lights are switched on. Hence, the microcontroller instructs the relay and the relay in turns starts working such that the lights are on. Now, as soon as someone leaves the room, another IR sensor sends signals to the microcontroller. Now, the system turns off all the working appliances. Not only this but also the project counts the people currently present in the room.The results of the same are displayed on the LED. A lot of electricity consumption can be minimized using the following as the lights will switch on only if there is someone present inside the room or else all lights will be switched off.

V. OUTCOMES

The project should work in such a way that with minor hand gestures (moving the hand left or right) or any other movement, the lamp/bulb/LED lights should glow or switch off. The main objective of this design is to facilitate optimum energy management. This contributes greatly to energy conservation and reducing costs for varied establishments. The circuit should work for other sensors as well like temperature sensors, light sensors (intensity) etc.
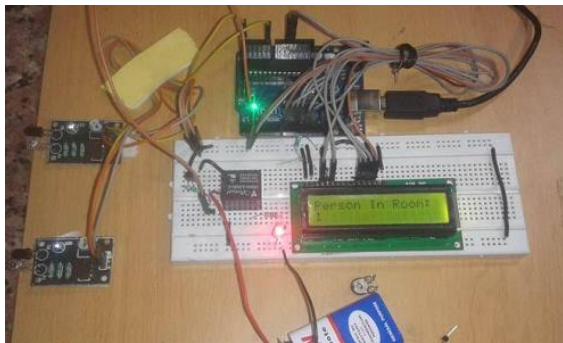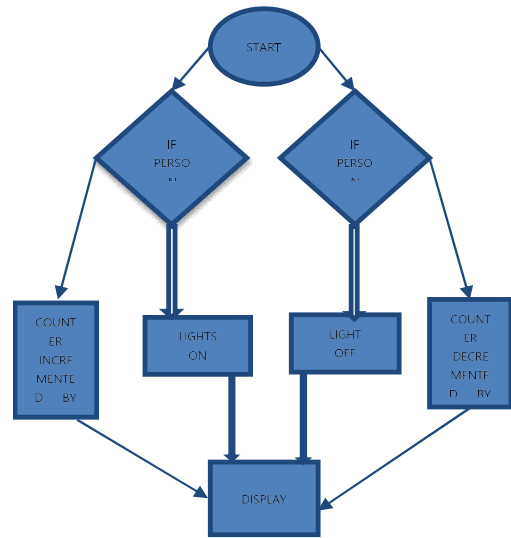

Fig. 1. Diagram showing the circuit for the lighting system

VI. CONCLUSION AND FUTURE SCOPE

In order to tackle this problem we have also added a counter to the program so that the sensor detects the number of persons entering or leaving and only when the counter detects zero as the number of persons in the room, will the light switch off.With every person entering and leaving the room, the microcontroller reads the input from the receivers, and then calculates the number of persons inside the room, and displays it on the LCD.

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