Automated Room Light Controller with Visitor Counter

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Abstract – This Project “Automated Room Light Controller with Visitor Counter” is a reliable circuit that takes over the task of controlling the room lights as well as counting number of persons/visitors in the room very accurately. When somebody enters into the room then the counter is incremented by one and the LED light in the room will be switched ON and when any one leaves the room then the counter is decremented by one. The light will be only switched OFF until all the persons in the room go out. The total number of persons inside the room is also displayed on the display monitor. The microcontroller does the above job. It receives the signals from the sensors, and this signal is operated under the control of software which is stored in ROM. Microcontroller continuously monitors the Infrared Receivers. When any object pass through the IR Receiver's then the IR Rays falling on the receivers are obstructed. This obstruction is sensed by the Microcontroller.

Keywords – Automated, LED, counting, IR Sensor, obstruction.

I. INTRODUCTION

The objective of this project is to make a controller based model to count number of persons visiting particular room and accordingly light up the LEDs in the room. Here we can use sensor and can know present number of persons. In today’s world, there is a continuous need for automatic appliances. With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. Also if at all one wants to know the number of people present in room so as not to have congestion, this circuit proves to be helpful. The main purpose of our system is to save energy and the efforts required to switch on the lights. Instead of switching on/off the lights in an auditorium or a seminar hall the lights adjust the intensity. To make a controller based model to count number of persons visiting particular room and accordingly light up the room. To know the number of people present in room so as not to have congestion.

II. EXISTING SYSTEM

This section describes about the most commonly used lighting control system used in buildings. Since this method is going to use wireless sensor network it is mandatory to know the operation of existing lighting control system. It can be decided that energy loss is occurred with a lighting system when the lighting system illuminates a light which is an area which is not being used currently at that particular time or when it illuminates a light even though sufficient lighting is available to work. The most commonly used lighting system is explained below.

Switch operated manually:
In this method a user has to switch ON and OFF the required lights. Since the user can switch on and off the lights as per their preferences there is a chance of keeping the lights in on state even though it was not need during that time. This may occur because of carelessness of user and a large amount of power is wasted.

III. PROPOSED SYSTEM

This system is designed by using two sets of IR transmitters and receivers. These IR sensors are placed in such a way that they detect a person entering and leaving the room to turn the home appliances. In this optimum energy management system, a microcontroller is the central processing unit of this project which is of 89S51 controller from the 8051 family. This system facilitates a bidirectional visitor counter for displaying the number of persons inside the room. When a person enters into the room, an IR beam is obstructed between the IR transmitter and the receiver. This IR obstruction from the sensor-1 gives the corresponding signal to the microcontroller. The microcontroller is programmed in such a way that by the reception of the signal from the sensor-1
it turns on the fans and lights inside the room. Thus, the microcontroller gives command signals to a relay driver which turns the relays such that all these appliances turn on. When the person leaves from this room, another set of IR sensors enable and give control signals to the microcontroller. Furthermore, similar to the above process, this system turns off the appliances like fans and lights. Apart from this, the system also takes account of the number of persons inside the room so that this control operation is varied depending on the persons’ availability in the room. For every person entering and leaving the room, the microcontroller reads the digital input from two receivers, and calculates the number of persons inside the room, and then displays it on the LCD. When the persons’ count is greater than one, the microcontroller turns on the room light and when the persons’ count is zero, it turns off all the lights and fans.

Advantages:
1. Low Cost.
2. Easy to use.
3. Implement on Single door.

IV. BLOCK DIAGRAM

V. DESCRIPTION

This system uses Infrared(IR) sensors to detect obstacles. The basic concept of IR(infrared) obstacle detection is to transmit the IR signal(radiation) in a direction and a signal is received at the IR receiver when the IR radiation bounces back from a surface of the object. The other feature present in the system would be the Visitor counter which is displayed on PC monitor which will help congestion control in the room. There is also a emergency LED which gets switched on when all LEDS fail to switch on. The same is show on the PC monitor. All this features are controlled by the Microcontroller which is programmed using assembly language.

VI. IMPLEMENTATION

A. Infrared Sensors

An Infrared (IR) sensor is used to detect obstacles in front of the robot or to differentiate between colors depending on the configuration of the sensor. An IR sensor consists of an emitter, detector and associated circuitry. The circuit required to make an IR sensor consists of two parts; the emitter circuit and the receiver circuit. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, its resistance and correspondingly, its output voltage, change in proportion to the magnitude of the IR light received. This is the underlying principle of working of the IR sensor.
The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel’s high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.[7]

VII. FUTURE SCOPE

The number of applications for this system is numerous which are as follows:
1. By using this concept we can implement various applications such as fans, tube lights, etc.
2. By modifying this circuit and using two relays we can achieve a task of opening and closing the door.

VIII. CONCLUSION

“Automated Room Light Controller with Visitor Counter” is a system to control Room (Classroom, Auditorium, Hall) Lights (LEDs) as well as to count the number of persons entering the room.

As an individual enters a auditorium:-
1. 1st set of IR sensors will tabulate entry /exit and accordingly manipulate the visitors counter.
2. As the individual enters a row in the auditorium, accordingly the individual IR sensors present in each row will tabulate the count limit of that row (ex. If there are 5 seats in the row, so the IR counters max value =5)
3. So, here according to our motto of the project “ automation, Saving electricity, Increasing appliance life span and yet providing a desired output smartly”

As the room is divided into four quadrants. This is how light will operate in each row of any quadrants of room.

According to the above diagram lights glow up / switch off in each individual rows.

4. When the user walks out the main door the visitor counter decrements. This is a brief explanation of the project.

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