

Lighting Controller Counts Visitors Automatically Using IC-7805 and IR Sensor

D. Nalini^a, K. Jenifer Asuntha^{a*}, P. Harilakshminarayani^a, G. Umamaheshwari^a,
T.Saranya^a

^aDepartment of Physics, Kamban arts & science college for women,
Tiruvannamalai-606603, Tamilnadu. India

ABSTRACT

The lighting controller counts how many people are in a room. This system control used to turn ON or OFF room light based on counting how many people are in a room using IC-7805 microcontroller. When somebody enters into the room then the counter is INCREMENTED by one and at the same time, the light will be ON. When somebody leaves in a room then the counter is DECREMENTED by one. The light will be switched OFF until all the people in the room go out. The total number of persons how many are inside the room is shown in seven segment display.

Keywords: Microcontroller, IR sensor, Arduinonano, LCD.

I. INTRODUCTION

Now a day, all are based on electronic security systems because; the fear of theft and burglary always annoys many people. When lock and keys become less safe.[2] So, this system is set up as a portable security system. This electronic setup auto activated whenever the intruder enters to the unauthorized no entry area. It activates the sensor circuit of either sound activation or infrared light beam in the circuit. Microcontroller AT89S52 continuously monitor the Infrared Receivers are obstructed this obstruction is sensed by the microcontroller.[3] In such way Relay does the operation of automatic control of lighting [1].

II. MATERIAL AND METHODOLOGY

MATERIALS:

The lists of components are,

- ❖ Power supply
- ❖ IR Sensors
- ❖ Relay
- ❖ Microcontroller (IC7805)
- ❖ Arduino Nano
- ❖ LED Light
- ❖ Battery connectors
- ❖ 7 Segment display
- ❖ Jumper wires

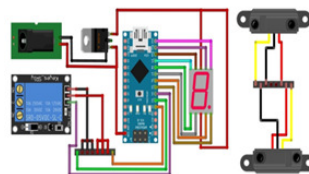


Fig.1:-Circuit Diagram:

PRINCIPLE:

When any one enters in the room, IR Sensor will get interrupted by the object then other sensor will not work because we have added a delay for a while.

III. WORKING OF METHODOLOGY:**POWER SUPPLY:**

The main function of the block is to provide the required amount of voltage to essential circuit. +12v is given to relay driver and +5v is given to regulated power supply.[8]



Fig.2:- IR SENSORS

Most of them use a pair of IR transmitter and IR receivers as sensing device for detecting human entry or exit [2]. IR Sensors are used to produce IR waves. There are two IR sensors. IR sensors consist of IR Transmitter and IR receiver are shown in fig.2.

IR TRANSMITTER:

IR1 detects the number of individuals entering a room. The reason behind choosing IR LED is, infrared beams are not visible to human eyes. In case of using IR sensors the IR transmitter and IR receiver need to be placed in a straight line on both side of the door. Any kind of deviation in placing the IR transmitter and receiver in a straight line may cause counting error [3]

IR RECEIVER:

IR2 detects the number of individuals leaving a room. It is an active low device. so its gives low output. This result in a large change in the intensity, which is detected by receiver of IR sensor. The cost of automatic control system for lighting based on IR sensor from MicroTronics Technologies [4] is about 5200 BDT.

RELAY:

One relay circuit are using to control the light. The relay is used to operate the external solenoid forming part of a locking device or for operating any other electrical devices. Its operation is not affected by sunlight or black material [5]

MICROCONTROLLER (IC-7805)

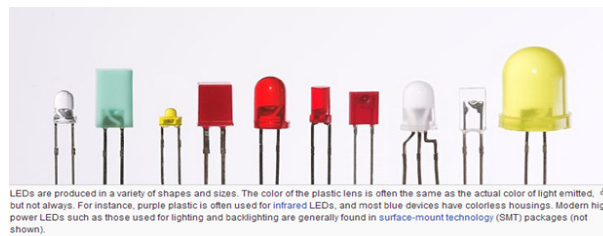
IC7805 is a voltage regulator integrated circuit. It has 3 pins in 7805 IC . Pin 1 takes the input voltage and Pin 3 produce the output voltage. The GND of both input and output voltage are given to Pin 2. The **voltage regulator IC** maintains the output voltage at a constant value. 7805 provides +5V regulated power supply ,the tabulated as shown in table 1. Capacitors of suitable values are connected at input and output pins. The **7805** voltage Regulator is manufactured by Texas Instruments, ON Semiconductor, STMicroelectronics, Diodes incorporated, Infineon Technologies, etc. The IC7805 Pin diagram as shown in fig.3.

Table 1

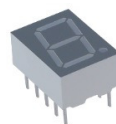
Pin No	Name	Function
1	Input	Input voltage (5V-18V)
2	Ground	Ground (0V)
3	Output	Regulated output; 5V (4.8V-5.2V)

**Fig. 4: ARDUINO NANO:**

It is one of the most popular arduinoboard. It has 36 pins. Each of these Digital and analog pins assigned with multiple functions as shown in Fig.4. The main function is to be configured as input or output. Operating voltage of this microcontroller ranges between 4.5V-5.5V [6].

LED LIGHT:**Fig 5: Light Emitting Diode**

Light emitting diode is a semiconductor diode which glows when a voltage is applied. LED is often small in area (less than 1mm.sq), and integrated optical components may be used to shape its radiation pattern. LED emit low intensity infrared light as shown in fig 5. Modern LED'S are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness[7].

SEVEN SEGMENT DISPLAY (LTS 542):**Fig.6: 7 segment display**

Description:

The LTS 542 is a 0.52 inch digit height single digit seven-segment display. This device utilizes Hi-eff. Red LED chips, which are made from GaAsP on GaP substrate, and has a red face and red segment.

IV. CIRCUIT DISCRIPTION:

There are two main parts of the circuits.

- ◆ Transmission Circuit(Infrared LEDs)
- ◆ Receiver Circuit(Sensor)

TRANSMITTER:

This circuit diagram shows how a 555 timer IC is configured to function as a basic monostable multivibrator. A monostable multivibrator is a timing circuit that changes state once triggered, but returns to its original state after a certain time delay. It got its name from the fact that only one of its output states is stable. It is also known as a 'one-shot'.

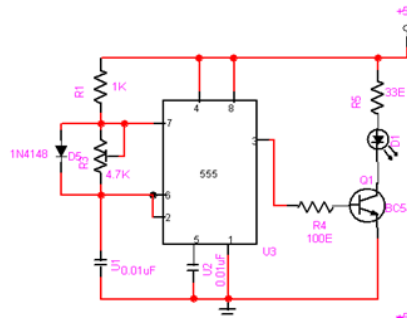


Fig.7:- Transmission circuit

RECEIVER :

The IR transmitter will emit modulated 38 kHz IR signal and at the receiver we use TSOP1738 (Infrared Sensor). The output goes high when there is an interruption and it return back to low after the time period determined by the capacitor and resistor in the circuit. I.e. around 1 second. CL100 is to trigger the IC555 which is configured as monostable multivibrator. Input is given to the Port 1 of the microcontroller. Port 0 is used for the 7-Segment display purpose. Port 2 is used for the Relay Turn On and Turn off Purpose.LTS 542 (Common Anode) is used for 7-Segment display. And that time Relay will get Voltage and triggered so light will get voltage and it will turn on. And when counter will be 00 that time Relay will be turned off. Reset button will reset the microcontroller.

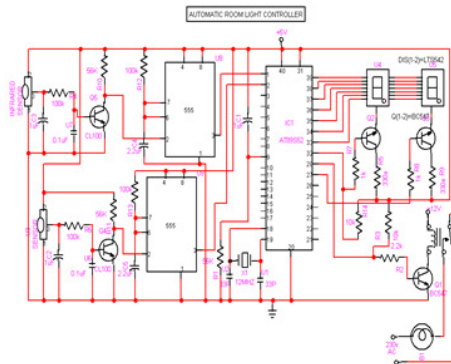


Fig.8:-Receiver circuit:

SOFTWARE TESING CODE OF THE CIRCUIT

```
#include <ButtonDebounce.h>
#include <Arduino.h>
#include <AdvancedSevenSegment.h>
int count = 0;
AdvanceSevenSegmentsevenSegment(11, 12, 6, 7, 8, 10, 9, 5);
```

```

ButtonDebouncebutton1(2, 100);
ButtonDebouncebutton2(3, 100)
Voidsetup() {
button1.setCallback (button1Changed);
button2.setCallback (button2Changed);
pinMode(4,OUTPUT);
}
void button1Changed(int state) {
if (state)count++;
if (count > 9) count = 9;
}
void button2Changed(int state) {
if (state)count--;
if (count < 0) count = 0;
}
}
void loop() {
button1.update();
button2.update();
sevenSegment.setNumber(count);
if (count > 0)
{
digitalWrite(4, LOW);
}
else
digitalWrite(4, HIGH);
}
}

```

TABLE: 2 LED DISPLAY I/P & O/P COUNTS

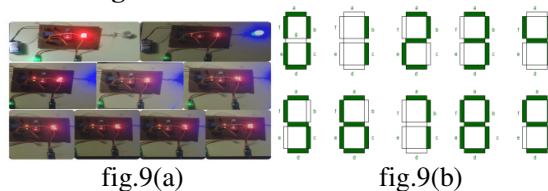
No.of Visitors entering in the room	In Time	Led display Output	No.of visitors leaving in the room	Out time	Led Display Output
5	11:30	5	2	11:45	3
3	2:05	3	1	2:20	2
2	2:40	2	1	2:55	1
1	3:05	1	1	3:30	0

From table 2 we can find out following kinds:

The circuit testing LED Display outputs are shown in fig 9 & fig 10. 5 visitors are entering in the room at 11:30. When the LED display counts the how many visitors entering the room and the output monitored in the 7 segment LED Display.

2visitors are leaving in the room at 11:45. When the LED display counts the how many visitors leaving the room and the output monitored in the 7 segment LED Display.

Fig.9: LED DISPLAY OUTPUT:



Then for a 7-segment display, we can produce a truth table giving the individual segments that need to be illuminated in order to produce the required decimal digit from 0 through 9 as shown above fig.9 (a) and fig.9



Fig.10: CIRCUIT TESTING

V. RESULT AND DISCUSSION

We started our project by making power supply. That is easy for me but when we turn toward the main circuit, there are many problems and issues related to it, which we faced, like component selection, breadboard, and other materials related to its as shown in above **fig.:10**.I also had some soldering issues which were resolved using continuity checks performed on the hardware. We Test the circuit with power supply after getting 9V from the transformer it was converted to 5V and the circuit received 9V.As the solder was shorted IC 7805 got burnt. So we replaced IC 7805.

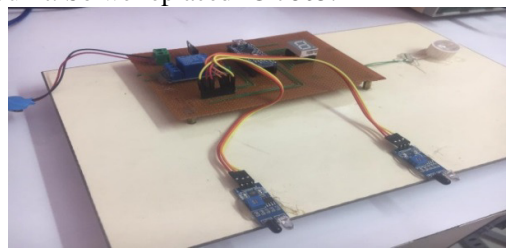


Fig .10:- HARDWARE DESIGN CIRCUIT

And also the circuit parts around the IC 7805 were completely damaged. With the help of the solder we made the necessary parts. I had issues with better or correct result, which I desired. And also have the software problem. I faced components selection, component is better than other and its features and cost wise also, then I refer the data books and other materials related to it.

V.CONCLUSIONS:

This project is useful in developing countries and this project has a bright future. This project is help us to Control the light of a room automatically and counts the number of persons or visitor entering and leaving a room. It helpful in various applications such as fans, tube, and lights etc.

FUTURE SCOPE:

Voice alarm system can be added to indicate that the room is full and persons can't enter inside.I send this data to a remote location using a mobile or internet.We can increase the maximum number of persons that can be counted by implementing the external EEPROM IC.By modifying this circuit and using to relays we can achieve a task of opening and closing the doors.

REFERENCES

- [1] Y.C. Chang, T.Y. Chen, D.J. Wang, People Counting System for Getting In/Out of a Bus Based on VideoProcessing, Eighth International Conference on Intelligent Systems Design and Applications (ISDA),2008, Vol. 3, pp. 565-569.
- [2] F. Schwartz, performance of Narrow Field, Passive, Infra-Red Intrusion Detector, Proceedings of The Society of Photo-Optical, Sep.1972,pp. 565-569.
- [3] Electronic management system employing radar typeInfrared emitter and sensor combined with counter as Described in U.S. Pat.No. 4993049A
- [4] Automatic Room light Controller with Visitor Counter By Microtronics Technologies, 10 June, 2013.
- [5] Ultrasonic Sensor. "HC-SRO4 datasheet".[Online]. Available; www.satistronics.com
- [6] Microcontroller Atmel ATmega328PU. "Atmel ATmega328PU". [Online]. Available: <http://atmel.com/>.
- [7] Bai Y. and Ku Y. (2008). Automatic Room Light Intensity Detection and Control using a Microprocessor and Light Sensors, IEEE International Symposium on Consumer Electronics **54**: 1173-1176.
- [8] JoonHeo et al, "Design and Implementation of Control Mechanism for Standby Power Reduction," IEEE Trans. On Consumer Electronics, vol.**53**, no.1, pp.179-185, Feb.2008.
- [9] LiD., Bai Y., Wang and Li H.(2011). Design of Intelligent lighting control system, IEEE International Conference on Robotics & Control System, 134-137,Xi'an.
- [10] Microelectronics circuit by SEDRA & SMITH 5th edition. Page numbers: 139-146, 761-852 & 1198-1214.