



MICROCONTROLLER AND IT'S APPLICATION FOR ENERGY CONSERVATION AND VISITOR COUNTER.

Varad Pai*¹, Aniket Kokare²

¹C.E.S institute of technology, Banglore(south campus),

²SVPMCOE, Baramati

Abstract

This application of Micro-controller for the Energy Conservation with Bidirectional Visitor Counter is a reliable circuit that takes over the task of controlling the room lights as well as counting number of persons in the room very accurately. Whenever somebody enters into the room the counter is incremented by one and the 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 only be switched off when all the persons in the room go out. The total number of persons inside the room is also displayed on the seven segment displays. The microcontroller does the above job. It acts like the CPU of the whole system. It receives the signals from the sensors, and this signal is operated under the control of software which is stored in ROM. Microcontroller AT89S52 continuously monitors the Infrared Receivers. When any object passes through the IR sensor the Receiver will sense the obstruction and send the signal to the counter and further the Microcontroller does its operations.

Introduction

The objective of this project is to make a micro-controller based model to count the number of persons visiting a particular room and accordingly light up the room. Here we use a sensor to detect the number of persons coming inside the room or leaving the

room. In today's world, there is a continuous need for automatic appliances. The world is running fast and so the device or appliances should be. 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 a room so as not to know the percentage of congestion, or this application proves to be helpful.

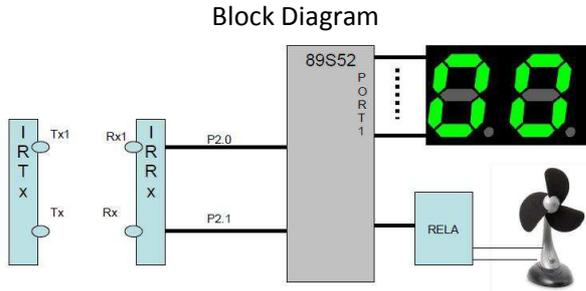
For Correspondence:

varadpai@gmail.com

Received on: February 2014

Accepted after revision: February 2014

Downloaded from: www.johronline.com

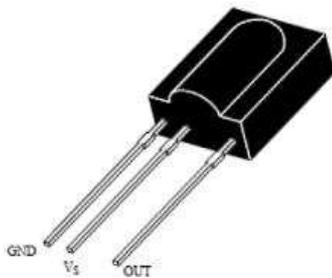


The above figure shows the block diagram for this micro-controller application. They mainly comprise of the Micro-controller, IR sensors, Relays, Seven segment display etc. They can be further elaborated as :-

1. Power Supply:-

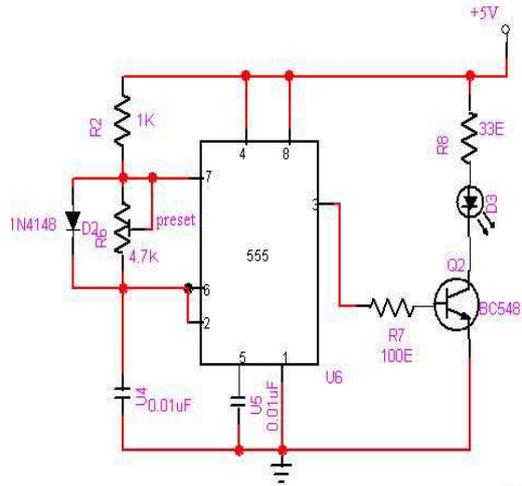
Here we use +12V and +5V dc power supply. The main function of this block is to provide the required amount of voltage to essential circuits. +12V voltages is given to relay driver. To get the +5V dc power supply we have used here IC 7805, which provides the +5V dc regulated power supply. Also a transformer is used to step down a high voltage AC to a low voltage AC. The a rectifier is used to convert a AC into a DC.

2. Sensors:-

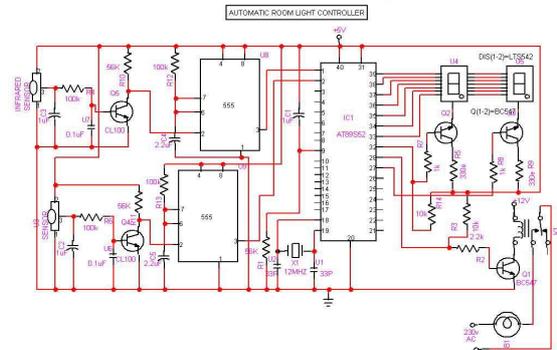


In this system we use IR sensors to detect the number of people going inside or coming outside. It is placed on the doors of a room or a hall. There are two parts of the sensor-Transmitter and the Receiver. When the person goes through the sensor there is objection and the receiver sends the signal to the Timer. We have implemented the person counter module using 2 transmitters and 2 receivers.

Transmitter Circuit diagram-



Receiver Circuit Diagram-



We use th Infra-Red transmitters as IR LED is infrared whose beams are not visible to human eyes and they are not easily triggered by other sources in the environment. Transmitters used are IR LEDs. We have used an IR sensor which is an active low device. It means it gives low output when it receives the Infrared rays. So when the IR rays are interrupted by any person then microcontroller will receive a high pulse from the IR receiver.

Features:

- Photo detector and preamplifier in one package
- Internal filter for PCM frequency
- Improved shielding against electrical field disturbance
- TTL and CMOS compatibility
- Output active low
- Low power consumption
- High immunity against ambient light

Continuous data transmission possible (up to 2400 bps)

Suitable burst length .10 cycles/burst

IC555(Timer) :-



This IC is used to generate the pulses. The LM555 is a highly stable device for generating accurate time delays or oscillation. Additional terminals are provided for triggering or resetting if we want. In the time delay mode of operation, the time is precisely controlled by an external resistor and capacitor. The circuit may be triggered and can be reset on falling waveforms, and the output circuit can source or sink up to 200mA of current or drive TTL circuits.

4. AT89S52 Microcontroller:-

It is a low-power, high performance CMOS 8-bit micro-controller with 8KB of Flash Programmable and Erasable Read Only Memory i.e. (PEROM). The device is manufactured using Atmel's High-Density nonvolatile memory technology and this micro-controller is compatible with the MCS-51 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 Flash on a monolithic chip, the Atmel AT89S52 is a powerful Microcontroller, which provides a highly flexible and cost effective solution so many embedded control applications. The AT89S52 provides some of the following special standard features like- 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 it freezes the oscillator which disables all other chip functions until the next interrupt or hardware is reset.

FEATURES:

8 KB Reprogrammable flash.

32 Programmable I/O lines.

16 bit Timer/Counter—3.

8 Interrupt sources.

Power range: 4V – 5.5V

Endurance : 1000 Writes / Erase cycles

Fully static operation: 0 Hz to 33 MHz

Three level program memory lock Power off flag

Full duplex UART serial channel

Low power idle and power down modes

Interrupt recovery from power down modes

256 KB internal RAM

Dual data pointer

Relay Driver Circuit:-

This block has the potential to drive the various controlled devices. In this block mainly we are using the transistor and the relays. One relay driver circuit we are using to control the light.



We have used 12 volt relay. As the microcontroller can not turn on relay directly, we need to use a Relay Driver circuit. This circuit consists of a transistor. This transistor is used to turn on relay through microcontroller. We have used a SPDT relay which stands for Single Pole Double Throw relay. In this project we have provided 2 pin connector as an output of Relay. One of these 2

pins is connected to the normally open terminal of the relay which is also known as NO contact. Output signal from AT89S52 is given to the base of the transistor, which further energizes the particular relay. It then controls the flow of charge to the the load that is tube-lights and fans etc. Because of this, appropriate device is selected and it does all its allotted function.

6. Voltage Regulator:-

The three-terminal positive regulator are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a wide range of applications.



Each type employs internal current limiting, thermal shut down and safe operating area protection, making it essentially indestructible. If adequate heat sinking is provided, they can deliver over 1A output current. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

Features:

Output Current up to 1A

Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V

Thermal Overload Protection

Short Circuit Protection

Output Transistor Safe Operating Area Protection

7.LTS 542 (7-Segment Display)

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. The microcontroller sends the number of person count to the seven segment display, so that the person operating should read and come to the number of persons inside the room.



Features:

Common Anode

0.52 Inch Digit Height

Continuous Uniform Segments

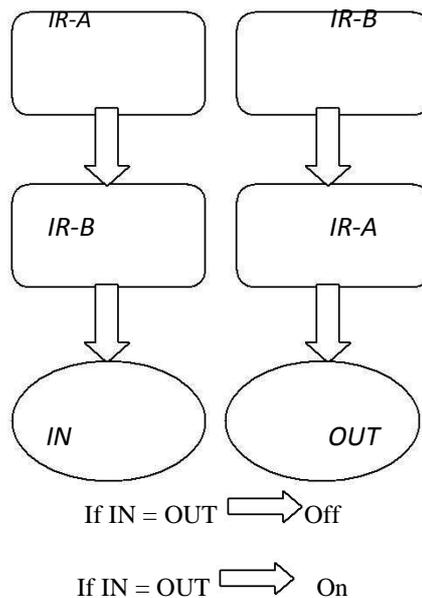
Low power Requirement

Excellent Characters Appearance

High Brightness & High Contrast

Wide Viewing Angle

Flow Chart-



A proceeding of

The above flow chart describes the working of this Application of Micro-Controlller. The 2 sensors are to be put at the entrance. When the Ath IR sensor is interrupted the Micro-controller will look for the BthIR sensor. That is if Ath sensor is interrupted 1st and then the Bth sensor then it is said that the person is going inside. And vice-a-versa. Now the counter will send the pulse to the micro-controller. Further the micro-controller will send the signal to the relay.

The 2 sensors A and B are used for the purpose of getting the direction. If the sequence IR-A – IR-B will give the number of persons going inside. And the sequence IR-B – IR-A will give the the number of persons coming outside. The number of interrupts in the IR sensor will give the number of persons passing through.The receiver of the IR sensor will give the pulse to the counter. And then the micro-controller will give the signals to the relay.

Survey in our College Building

Floor	Fan(60 W)		Tubelight(40W)		Energy Lost (kW-Hr)
	ON	OFF	ON	OFF	
Ground	7	9	7	15	0.700
First	5	12	8	13	0.620
Second	8	35	8	32	0.800

We did one survey in one of our buildings of our college. We checked the total number of tubelights and fans that were still on during the two breaks:- 1-Short break(15 minutes) & 2-Long break(45 minutes) i.e. total of 1 hour. And we got the above result. Now taking approximately Rs 10 /unit, everyday there was loss of Rs 21.2 which is just for one building. When we consider other all the buildings in our campus, the financial loss will be

considerably high. And even more will be the monthly and annual loss.

Hence by implementing this project we can save about Rs 636 every month for a single building. And when we will implement this in the whole campus, the saving will be considerably large, both in financial and also there will be appreciable Conservation of Energy.

Applications:-

This project can be used in various rooms like seminar hall, conference hall where the capacity of room is limited and should not be exceeded. Project will display actual number of persons inside the room.

Automatic Room light Controller with Visitor Counter can be used in class rooms, study rooms and library in colleges.

This project can also be used in our home because as many times it happens that we come out of our bedroom or hall or kitchen and we forgot to turn off the lights.

This project can be used in Cinema halls, multiplex, malls as well as in temples to count the number of person entering inside. So that these places should not get over crowded to avoid congestion. We can fix the limit of people going inside. And once the count is shown we will stop people from entering to avoid any troubles or even mishaps.

Advantages:

Energy Conservation is the most prime advantage of this project. It saves large amount of energy and alos it saves our money. Human efforts to count the number of person is eliminated. It automatically counts the number of people inside a particular room or hall.

It can be used in schools and colleges for the purpose of attendance.

Future Development:

Voice Alarm System can be added withinstalled to indicate that “the room is full and no one can enter further”.

We can also place the LDR to detect the sunlight and if sufficient amount of sunlight is present we can off all the tubelights. It will also lead to Energy Conservation

We can send this data to the any location using mobile or internet, like in college we can send the number of students present to H.O.D or Principal computer.

We can also add a transducer for the measurement of temperature of the particular room or hall.

Conclusion-

This method of Energy Conservation will work more efficiently. It not only saves energy but it also proves to be beneficial financially. Thus with the help of the Micro-controller we can save large amount of energy. It also makes the room or hall more automated. We can also use for many other purposes like for

attendance or detect the percentage of conjection in any particular room or the hall.

References:-

- Book -The 8051microcontroller and embedded systems: By Muhammad Ali Mazidi
- Janice Gillepsie Mazidi -Websites-
- www.discovertechcom.com
- www.electrcialengineeringcommunity.com
- www.academia.com
- www.8051.com
- Prof Mangate S.
- H.O.D, Electrical Department, SVPM College of Engineering, Baramati.
- Prof Gholap S.
- Senior Staff, Electrical Department, SVPM College of Engineering, Baramati.
- Prof Kokare D.
- Senior Staff, Electrical Department, SVPM College of Engineering, Baramati.