

MINI PROJECT REPORT-I

On

“Visitor Counter”



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Certificate

This is to certify that

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Of TY [Department of Electronics & Telecommunication Engineering] have Satisfactorily and Successfully completed their project work Sem-I “Visitor Counter” and submitted this report of the project work in partial fulfillment of the TY (Electronics and Telecommunication Engineering) Degree Course during academic year 2023-24 (Sem-I).

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Abstract

The VC is a reliable circuit that takes over the task of counting number of persons / visitors in the room very accurately and beeps a warning alarm when the number of visitors exceeds the capacity limit of the auditorium/hall. When somebody enters the room then the counter is incremented by one (+1) and when any one leaves the room then the counter is decremented by one (-1). The total number of persons inside the room is also displayed on the LCD (Liquid Crystal Display). The microcontroller is used for detecting an entry or exit action and computing the figures (addition and subtraction) to acquire accurate results. It receives the signals from the sensors, and this signal is operated under the control of embedded programming code which is stored in ROM of the microcontroller. The 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.

The obstruction occurs under two circumstances, either you obstruct sensor 1 (i.e. outside the building) before sensor 2 (i.e. which is inside the building) this shows that you are entering the building or you do it the other way round, which is obstructing sensor 2 before sensor 1 to indicates an exit movement. This obstruction is sensed by the Microcontroller, computed and displayed by a 16x2 LCD screen.

Introduction

Visitor counting is simply a measurement of the visitor traffic entering and exiting conference rooms, malls, sports venues, etc. With the increase in standard of living, there is a sense of urgency for developing circuits that would ease the complexity of life. Over the years, the usage of Visitor counters has become very positive in terms of monitoring crowd behavior at a particular place. It began with a mechanical tally counter which was introduced to replace the use of tally stick. A tally (or tally stick) was an ancient memory aid device used to record and document numbers, quantities, or even messages. Historical reference is made by Pliny the Elder (AD 23–79) about the best wood to use for tallies, and by Marco Polo (1254–1324) who mentions the use of the tally in China. Tallies have been used for numerous purposes such as messaging and scheduling, and especially in people counting, financial and legal transactions, to the point of being accuracy. The substitute of the tally stick was the mechanical tally counter, it is a device used to incrementally count something, typically passing. One of the most common things tally counters are used for is counting people, animals, or things that are quickly entering and existing a location. As times went on, an electronic tally counter was introduced which used an LCD screen to display the count, and a push button to advance the count. Some also have a button to decrement the count in case of a miscount. Now, due to technology advancement, various type of people counter has been introduced to automatically count the number of people entering and exiting a building at a particular time. Some of these are laser beam, thermal imaging, video camera and the infra-red sensor. All these sensors play their role respectively as visitor detector. These devices are very reliable and accurate in terms of performance as compared to the mechanical tally counter.

Need

- counting the number of people in an auditorium or halls for seminar to avoid congestion.
- Moreover it can also be used to check the number of people who have come to an event or a museum to watch a certain exhibit.
- The Visitor Counter detector counts the number of people who come and go, at a whole site or within a specific zone of observation.

Objective

- This system is helpful for counting the number of people in an auditorium or halls for seminar to avoid congestion.
- Moreover it can also be used to check the number of people who have come to an event or a museum to watch a certain exhibit.
- Microcontroller is a reliable circuit that takes over the task of counting the number of persons/ visitors in the room very accurately.

LIST OF COMPONENTS

S.r No.	Component	Specification	Cost
01	Resistor	10k ohm	3 Rs.
02	Capacitors	0.22mF	9 Rs.
03	Crystal Oscillator	19.20	30 Rs.
04	2 IR Sensor	IR Sensor	205 Rs.
05	16*2 LCD Display	16*2	215 Rs.
06	Micro Controller	8051	235 Rs.
07	Copper Clad	4*4	44 Rs.
		Total	741 Rs.

Block Diagram

This section introduces the methodology involved in the design and construction of the Digital Bidirectional Visitor Counter (DBVC). Using the Takoradi Polytechnic Library crowd management situation as a case study, it was realized that the library's capacity often gets exceeded during its peak usage period (examination period) and therefore makes the environment uncomfortable for learning. This problem was studied by visually observing students reaction anytime the library's capacity was exceeded. Another study was made on the Melcom tragedy incident, whereby the exact number of people trapped in the collapse building was unknown. False information about the number of people trapped was given to the rescue team at their arrival, but they ended up rescuing more survivors than the expected number revealed to them. This means a lot of people could have died if the rescue team relied on the information given to them.

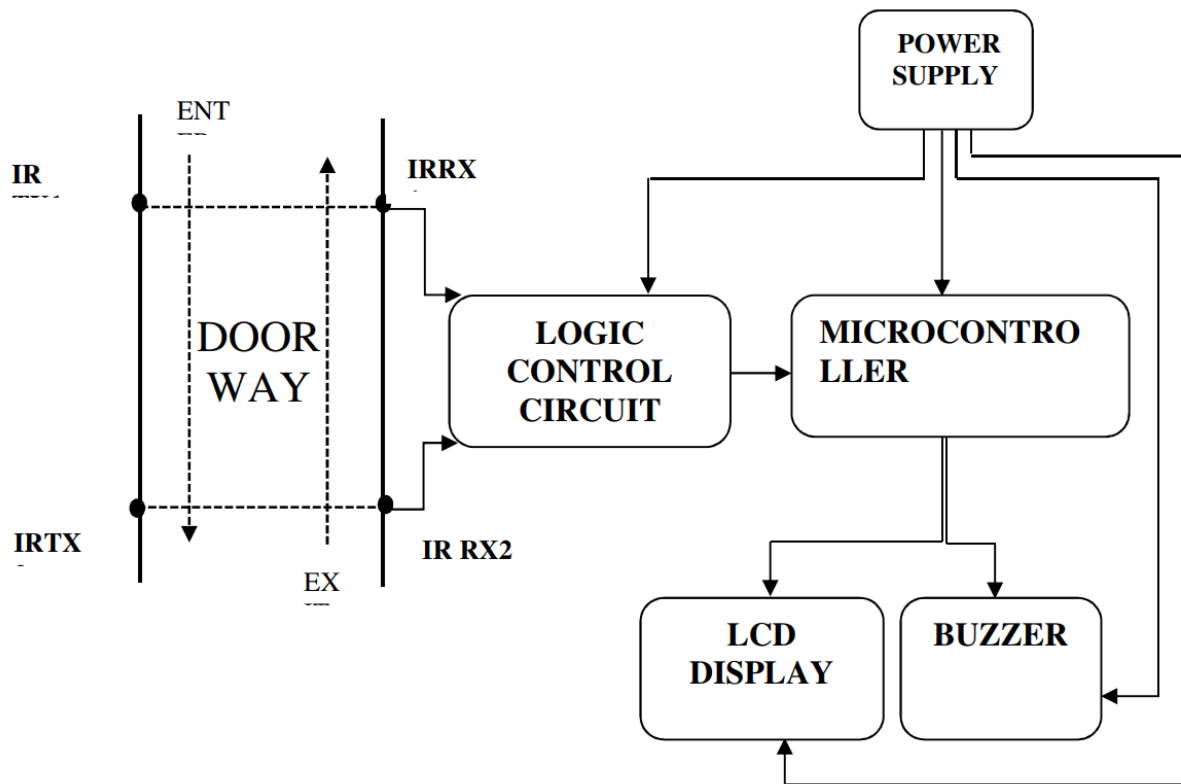


Fig1.1 Block Diagram Of Visitor Counter

Circuit Diagram

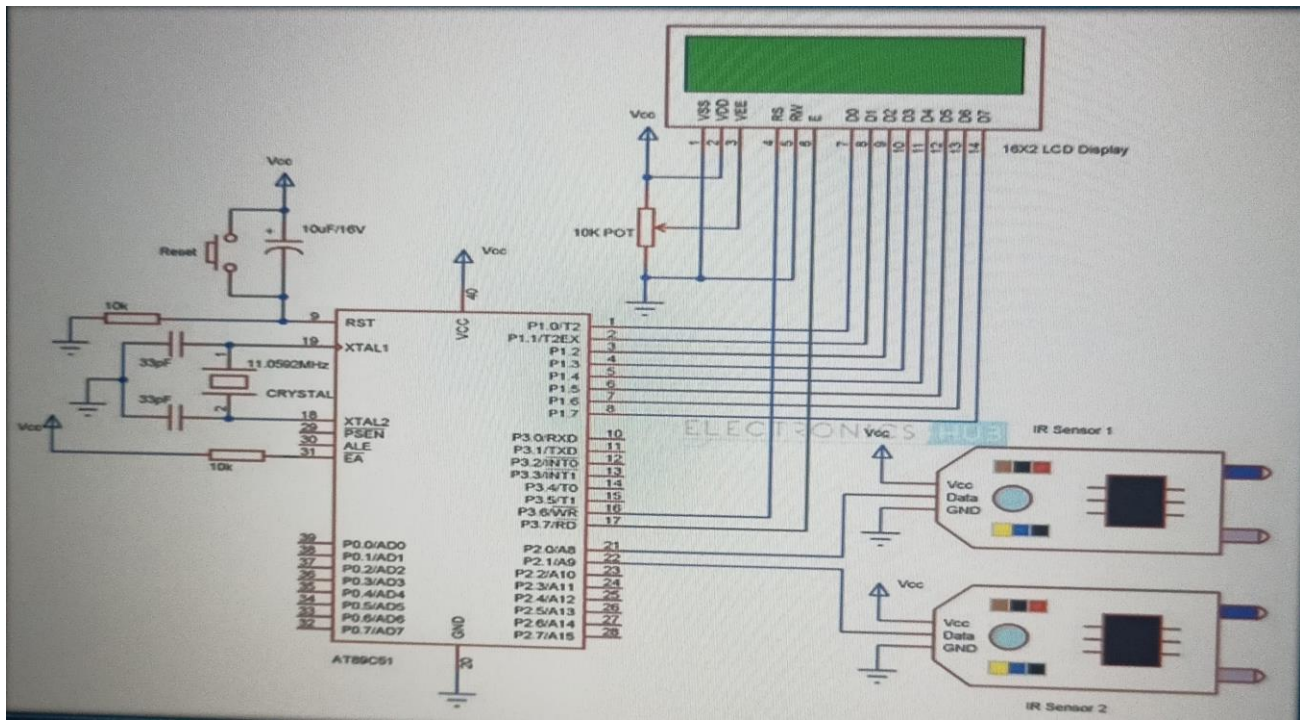


Fig.1.2 circuit Diagram of Visitor Counter

Methodology

Sensor Section:-

This comprises the IR sensor which consists of a transmitter (white LED) and a receiver (black LED). The emitter passes an infrared beam which is detected by an IR receiver (phototransistor). When a person walks by, he "breaks" the beam. Upon this event, the phototransistor no longer can detect infrared light and another event is triggered (door opens). The infrared emitter generates a source of light energy (invisible) in the infrared spectrum. There are several sensors that may be used for the detection of visitor's presence, but the preferred one used in this project is the infrared sensor. The infrared sensor also called IR sensors consists of two parts, namely, IR transmitter circuit and IR receiver unit. The transmitter unit consists of an infrared LED and its associated circuitry as well as the receiver.



Fig.1.3 IR Sensor.

Since the human eye cannot see the infrared radiations, it is not possible for a person to identify whether the IR LED is working or not, unlike a common LED. To overcome this problem, the camera on a cellphone can be used. The camera can show us the IR rays being emanated from the IR LED in a circuit. To test if the sensors were functioning, the sensor circuit was connected to a power source. The circuit was built with 2 resistors with different Ohm value ratings. A 1k Ω resistor connected to a Light Emitting Diode (LED) served as the transmitter whereas a 3k Ω resistor connected to a transistor was used as the Receiver. The circuit is then powered by a 5V DC supply and grounded.

Microcontroller:-

8051 is one of the first and most popular microcontrollers also known as MCS-51. Intel introduced it in the year 1981. Initially, it came out as an N-type metal-oxide-semiconductor (NMOS) based microcontroller, but later versions were based on complementary metal-oxide-semiconductor (CMOS) technology. These microcontrollers were named 80C51, where C in the name tells that it is based on CMOS technology. It is an 8-bit microcontroller which means the data bus is 8-bit. Therefore, it can process 8 bits at a time. It is used in a wide variety of embedded systems like robotics, remote controls, the automotive industry, telecom applications, power tools, etc.

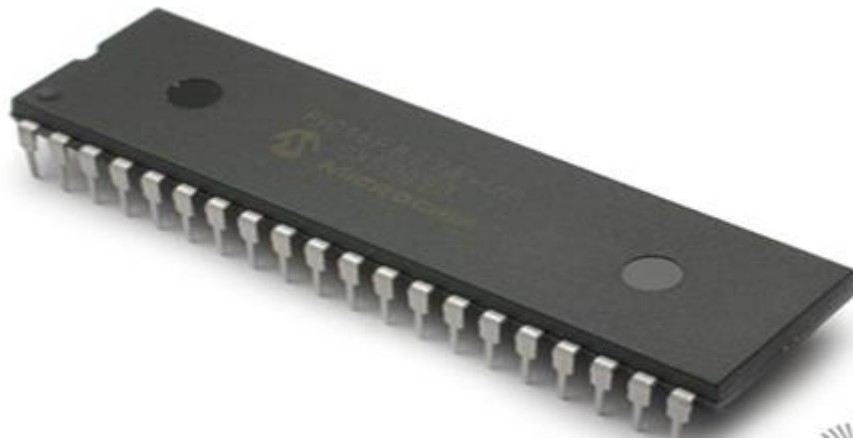


Fig 1.4 Microcontroller 8051

RESONATOR (Crystal Oscillator):-

A crystal oscillator is an electronic oscillator circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency determines how fast a microcontroller executes its instruction. It serves as the heartbeat of the microcontroller. Crystal oscillator is kept in metal housing with two pins where the frequency at which crystal oscillates. One ceramic capacitor whose other end is connected to the ground needs to be connected with each pin. Oscillator and capacitors are packed in joint case with three pins. Such element is called ceramic resonator. The center pins of the element are the ground, while end pins are connected with OSC1 and OSC2 pins on the microcontroller. When designing a device, the rule was to place an oscillator nearer a controller, so as to avoid any interference on lines on which microcontroller is receiving a clock.

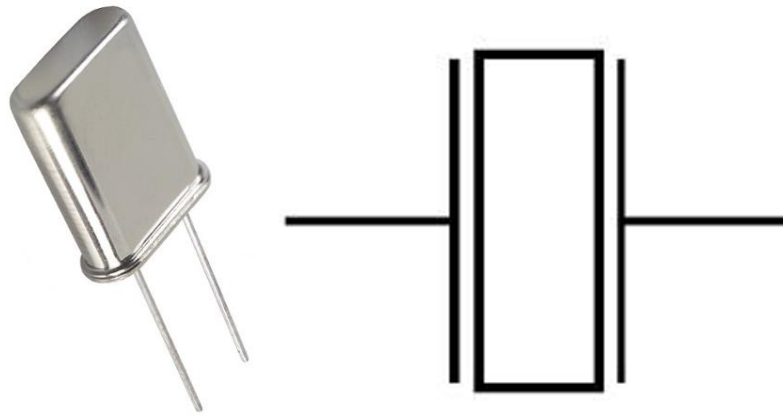


Fig 1.4 Resonator

Alert Section:-

The alert section consists of the Liquid Crystal Display (LCD) and Buzzer as shown in Figures 8 and 10. The LCD screen is an electronic display module with a wide range of applications. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD.



Fig 1.5 LCD Display 16*2

Power Supply:-

Power supply block consists of following units: Step down transformer; Bridge Rectifier Circuit, Input Filter and Voltage Regulator. The step-down transformer is used to step down the supply voltage of 240v ac from mains to lower values such as 6v and 9v, as the various IC's used in this project require reduced voltages.



Figure 1.6: Pictorial view of step down transformer

In the Input Filter, capacitors are used as filters. The ripples from the dc voltages are removed and pure dc voltage is obtained. The primary action performed by capacitor is charging and discharging. It charges in positive half cycle of the ac voltage and it will discharge in negative half cycle. This filter is fixed before the regulator. Capacitors used here are of the value 2200uF The Voltage regulator unit regulates the output voltage to a specific value. The output voltage is maintained irrespective of the fluctuations in the input dc voltage. Whenever there are any ac voltage fluctuations, the dc voltage also changes, and to avoid this regulators.

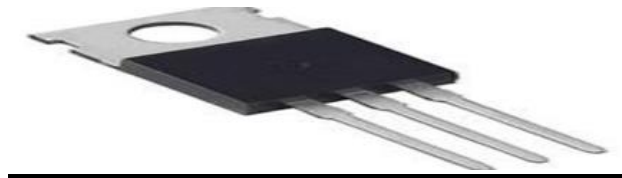


Figure 13: Pictorial view of a voltage regulator

Working

The 2-pair of infrared (IR) which consist of a transmitter (TX) and a receiver (RX) is mounted face to face across the doorway. Both sensors are positioned at the entrance with distance apart. This means upon the approach of a visitor the installed 2-pair sensors are triggered by the obstruction. The direction of the visitor is determined by which sensor is obstructed first before the other sensor follows. If sensor 1 is interrupted first before sensor 2 is interrupted, it indicates that the visitor is entering. The visitor exits the premises by interrupting the sensor in opposite direction. The output of the receiver circuit sends high or low signals in a form of voltage to the microcontroller. The programmed microcontroller follows the set of instructions (C language) written on it. The tally computation (addition and subtraction) is done when it receives low signals from the two IR receivers. It is after this command, which the microcontroller is made to send control signals to the other I/O devices. The microcontroller also sends a data signal to the LCD to visually display the exact number of visitors remaining in the building. The buzzer is activated when the microcontroller detects that the room capacity is exceeded.

The transmitter circuit consists of a Resistor, and an IR LED. The transmitting unit is required to switch 'ON' the IR LED when powered by the 5v supply. A typical circuit of the IR transmitter is shown in the diagram above. The current flowing through the IR LED is reduced to at least 20mA by the resistor in order not to cause damage to the LED's. The receiver sensor works like a typical NPN transistor, but the current that is supplied to the base component (terminal) of the phototransistor is now powered by the infrared light it receives from the IR transmitter. When it happens that way, the base of the phototransistor generates a low level current that is amplified, with the resulting current flowing out through the collector-emitter. It also has a (16x2) LCD screen for interactivity as well as a buzzer, switches and infrared based sensors.

Circuit Simulation

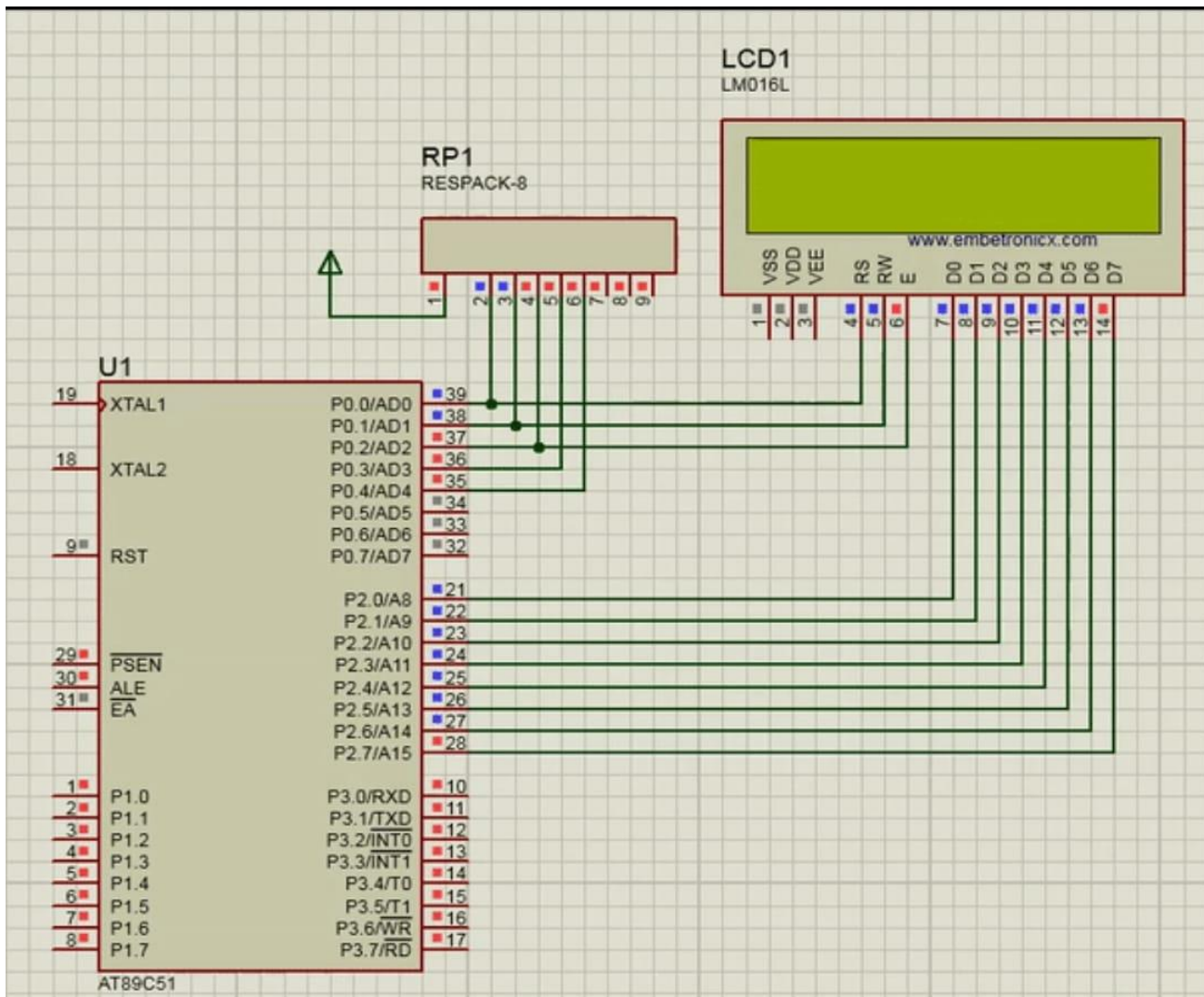


Fig 1.3 Circuit Simulation

Discription of Simulation:-

For Simulation Proteus software is used. First of all we have to make Schematic diagram, for this components are selected from the proteus libraries. The input is given to the circuit is wav file. After selecting components we arrange as per the circuit diagram, and connected all the components.

PCB LAYOUT

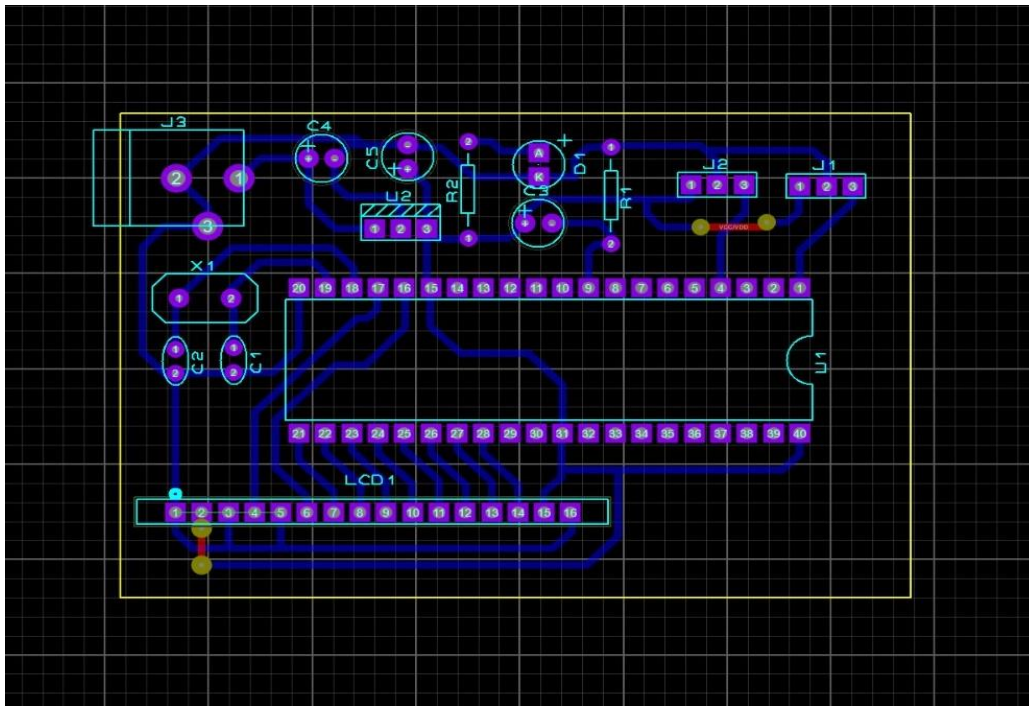


Fig 1.4 PCB LAYOUT

PCB Layout is made by using the schematic diagram on Proteus Software.

APPLICATIONS

- LCD displays this value which is placed outside the room.
- This system is helpful for counting the number of people in an auditorium or halls for seminar to avoid congestion.
- Moreover it can also be used to check the number of people who have come to an event or a museum to watch a certain exhibit.
- It can also be used at gates of parking areas and other public places.
- The device counts the total number of people entering through the gate and also the total number of people leaving through the same gate.
- And finally, it counts the total number of people currently present inside the room.

CONCLUSION

In demonstration of the project, the infrared sensing part used to detect the passage of visitors worked

- Microcontroller was very efficient in its task performance, thus computation of counts and controlling I/O devices
- Also, the LCD, led and the buzzer were effective in alerting and notifications.
- Hence the whole purpose of the bidirectional visitor counter was successfully achieved and is applicable in the wider scope.

Finally, we conclude that the proposed system will count visitors effectively and efficiently by reducing the rate at which error occurs when counting visitors. As the project was to design and construct a device that would count and display the exact number of people in a building, the following recommendation however should be considered to ensure effective operation of the digital bidirectional visitor counter.

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THANK YOU...