A

Major Project Report

On

"INTELLIGENT ENERGY SAVING SCHEME USING IR SENSORS"

Submitted in partial fulfillment of the requirements for the

Degree of

Bachelor of Engineering in Electrical and Electronics

Submitted to:

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA,

BHOPAL (M.P.)

Supervised by:

Dr. K.T. Chaturvedi

(Lecturer)

UIT-RGPV, Bhopal

Submitted by:

Satyam Mishra (0101EX141045)

Department of Electrical and Electronics Engineering

UNIVERSITY INSTITUTE OF TECHNOLOGY

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University Institute of Technology
Rajiv Gandhi Proudyogiki Vishwavidyalaya
Narsingharh Bypass Road,Gandhi Nagar, Bhopal – 462032

CERTIFICATE

We hereby declare that the work which is being presented in the Major Project Report entitled "**INTELLIGENT ENERGY SAVING SCHEME USING IR SENSORS** " submitted by **Satyam Mishra** in partial fulfillment of the requirement for the award of the Degree of "Bachelor of Engineering" in Electrical & Electronics Engineering Branch of Rajiv Gandhi Proudyogiki Vishwavidyalaya , Bhopal is an authentic record of our own work carried out under the guidance of **Dr. K. T. Chaturvedi** and submitted for the year 2017-18.

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DECLARATION

We **Satyam Mishra** students of **Bachelor of Engineering in Electrical and Electronics Engineering, 2014-2018, University Institute of Technology Bhopal (M.P.)** hereby declare that the work presented in this project entitled **" INTELLIGENT ENERGY SAVING SCHEME USING IR SENSORS "** is the outcome of our own work, and is bonafide and correct to the best of our knowledge. This work has been carried out taking care of Engineering Ethics and does not infringe any patented work and has not been submitted to any other university or anywhere else for the award of any degree or any professional diploma.

Satyam Mishra (0101EX141045)

ACKNOWLEDGEMENT

We deem it our privilege to extend our profound gratitude and appreciation towards all those who have directly or indirectly involved themselves in making this project great success. It would not have been possible to complete this work without the help and support of the numerous people around us. It is a pleasant task to express our thanks to all those who contributed in many ways to the success of this study.

We would like to express our deep and sincere gratitude to **Dr. K.T. Chaturvedi** for his excellent guidance, invaluable suggestions and continuous encouragement at all the stages of my research work. We also gratefully acknowledge Director of the institute **Dr. R.S. Rajput**, Head of Department **Dr. Seema Saxena** and faculty members of our department **Dr. Bhupendra Singh, Dr. Vinay Thapar** for their advice, supervision and crucial contribution. Their involvement have triggered and nourished our intellectual maturity that we will benefit from, for a long time to come. We are grateful in every possible way and hope to keep up our relation intact in the future.

We give special thanks to all our college staff members who were ready to find solutions for any problems and gave immeasurable support and caring. We would also like to give special acknowledgement to all our friends for their valuable companion without which completion of this project would have been tough task. We are extremely grateful to our parents for their love, prayers and sacrifices. We extend deepest gratitude to the faculties of EX department.

Satyam Mishra (0101EX141045)

CONTENT

Chapter-1

INTRODUCTION

1. Project Definition
2. Project Overview

1.1 Project Defination:

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 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 soaps not to have congestion, this circuit proves to be helpful.

This project "automatic room light controller with visitor counter using microcontroller" is a reliable circuit that takes over the task of persons/visitor in the room very accurately. When somebody enters into the room will be switched ON and when any one. The light in room will be only switched OFF until all the persons in the room go out. The total number of person inside the room also displayed on the seven segment displays. The microcontroller does the above job. it receives the signals from the sensers and this signal is operated under the control of software which is stored in rom.

Micron roller AT89S52 continuously monitor the infrared receivers, when any object pass through the IR rays falling on the receivers are obstructed this obstruction is sensed by the microcontroller.

1.2 Project Overview:

This Project –Intelligent Energy Saving Scheme Using IR Sensors and Arduino is a reliable circuit that takes over the task of controlling the room lights as well us 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 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 seven segment displays

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. MicrocontrollerAT89S52 continuously monitor the Infrared Receivers, When any object pass through the IR Receiver's then the IR Rays falling on the receiver are obstructed , this obstruction is sensed by the Microcontroller.

Chapter-2

DIAGRAM & IT'S DESCRIPTION

1. Block Diagram Description

2.1 Block Diagram:

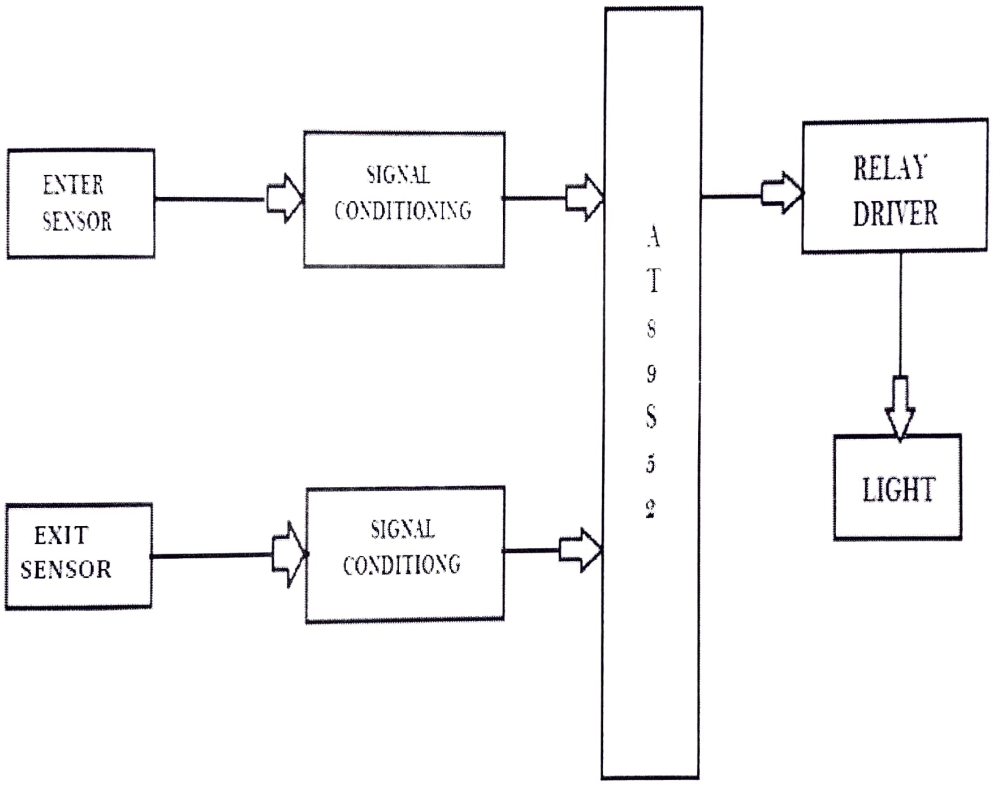


Figure 2.1 Block Diagram

2.2 Block Diagram Description:

The basic block diagram of the bidirectional visitor counter with Energy Saving Scheme Using IR Sensors is shown in the above figure. Mainly this block diagram consists of the following essential blocks.

1. Power Supply
2. Entry and Exit sensor circuit
3. Arduino UNO
4. Relay driver circuit

1. Power Supply:

Here we used +12V and +5V dc power supply. The main function of this block is to provide the required amount of voltage to essential circuits. +12 voltage is given. +12V 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.

2. Enter and Exit Circuits:

This is one of the main parts of our project. The main intention of this block is to sense the person. For sensing the person and light we are using the light dependent register (LDR). By using this sensor and its related circuit diagram we can count the persons.

3. Microcontroller:

Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worring too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

4. Relay Driver Circuit:

his block has the potential to drive the various controlled devices. In this block mainly we are using the ransistor and the relays. One relay driver circuit we are using to control the light. Output signal from T89S52 is given to the base of the transistor, which we are further energizing the particular relay. ecause of this appropriate device is selected and it do its allotted function.

Chapter-3

CIRCUIT DESCRIPTION

1. Arduino Circuit
2. Relay Circuit
3. Buzzer Circuit
4. IR Circuit

3.1 Circuit Description:

Suppose you are designing this project then the first thing you are gonna need is the circuit diagrams for the project so here I am gonna show you all the circuit diagrams step by step so let's start:

» First thing we are gonna need is the interfacing of Arduino with LCD. LCD used in this project is 16 x 2.

» I have first designed the simulation in Proteus as its always better to design the simulation before going into real hardware.

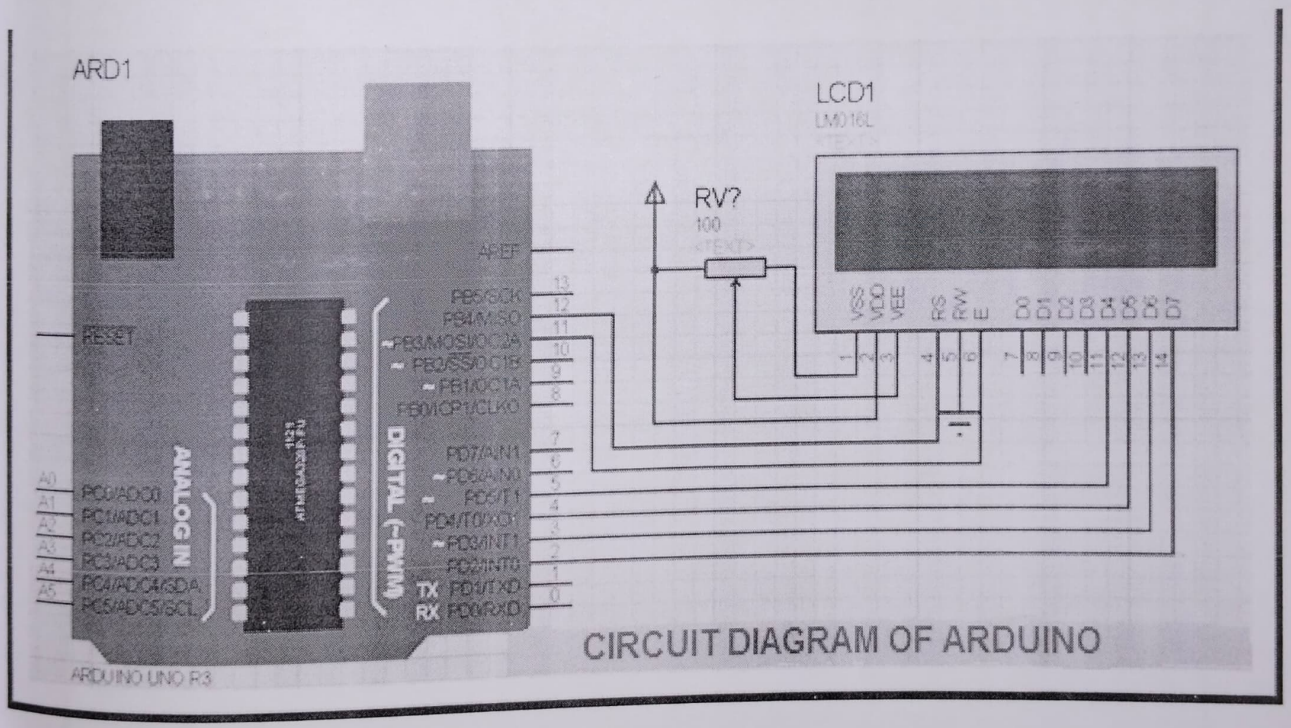


Figure 3.1 Arduino Circuit Diagram

» Next thing we are gonna need is the two relay board. Using these relays we are gonna turn ON or OFF our loads.

» Here's the circuit diagram for 2 relay board.

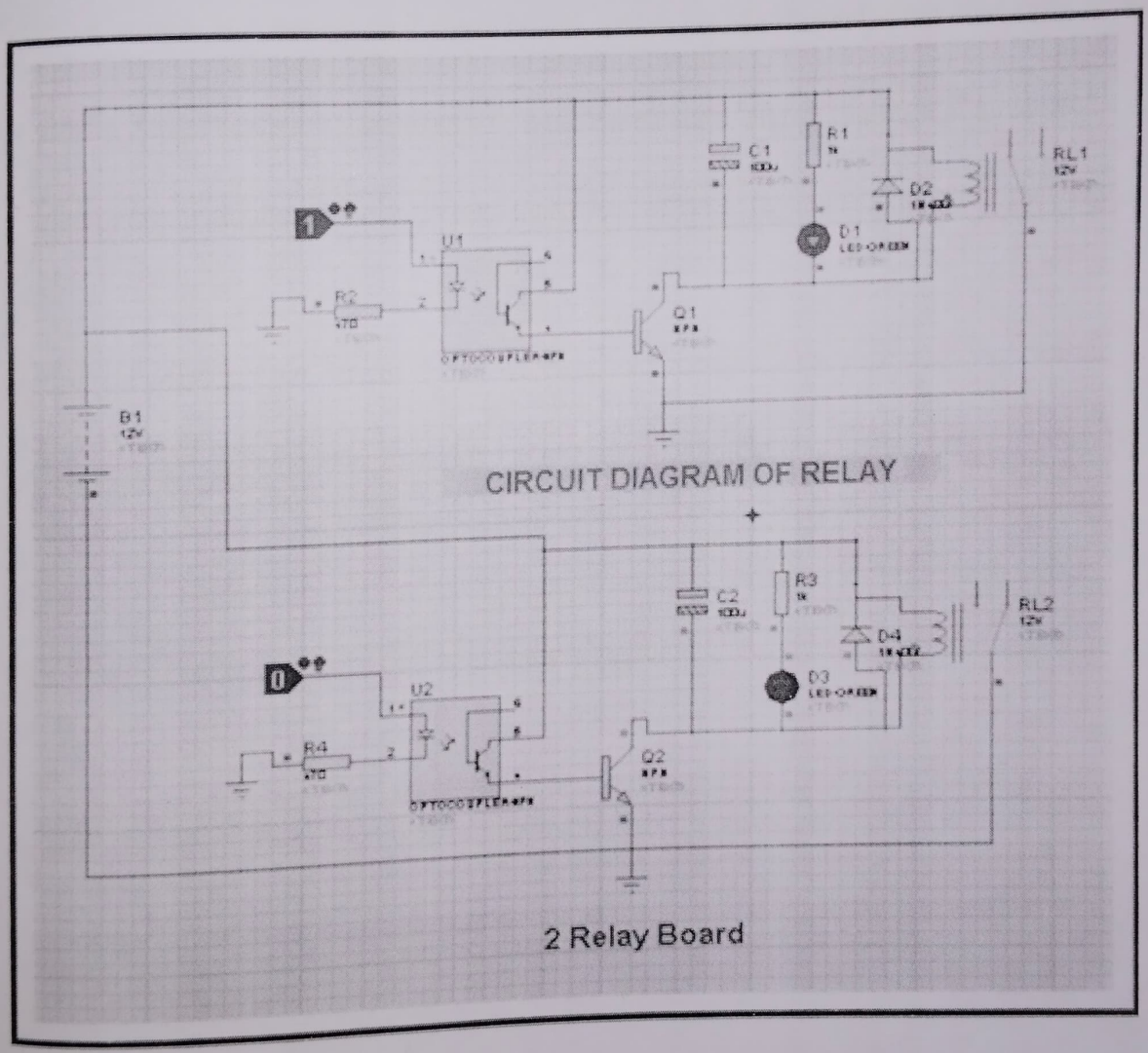


Figure 3.2 Relay Circuit Diagram

» As you can see in the above figure, I have used two relay board, where both the relays are controlled bt simple logic operators.

» Now instead of these logic operators, you need to give Arduino Pins here.

» I have made the first relay ON while the second relay is OFF.

» In the above figure, relay outputs are open so you can place anything here as its gonna act as switch. So, in our case the loads will be placed after this relay.

» Next circuit design which we need to understand is the buzzer circuit design.

» Its quite simple and similar to 2 relay board. I have also published a detailed post on How to Design a Buzzer in Proteus ISIS, which will be quite helpful.

» Here' I am gonna explain it lightly, so let's have a look at the circuit diagram of buzzer:

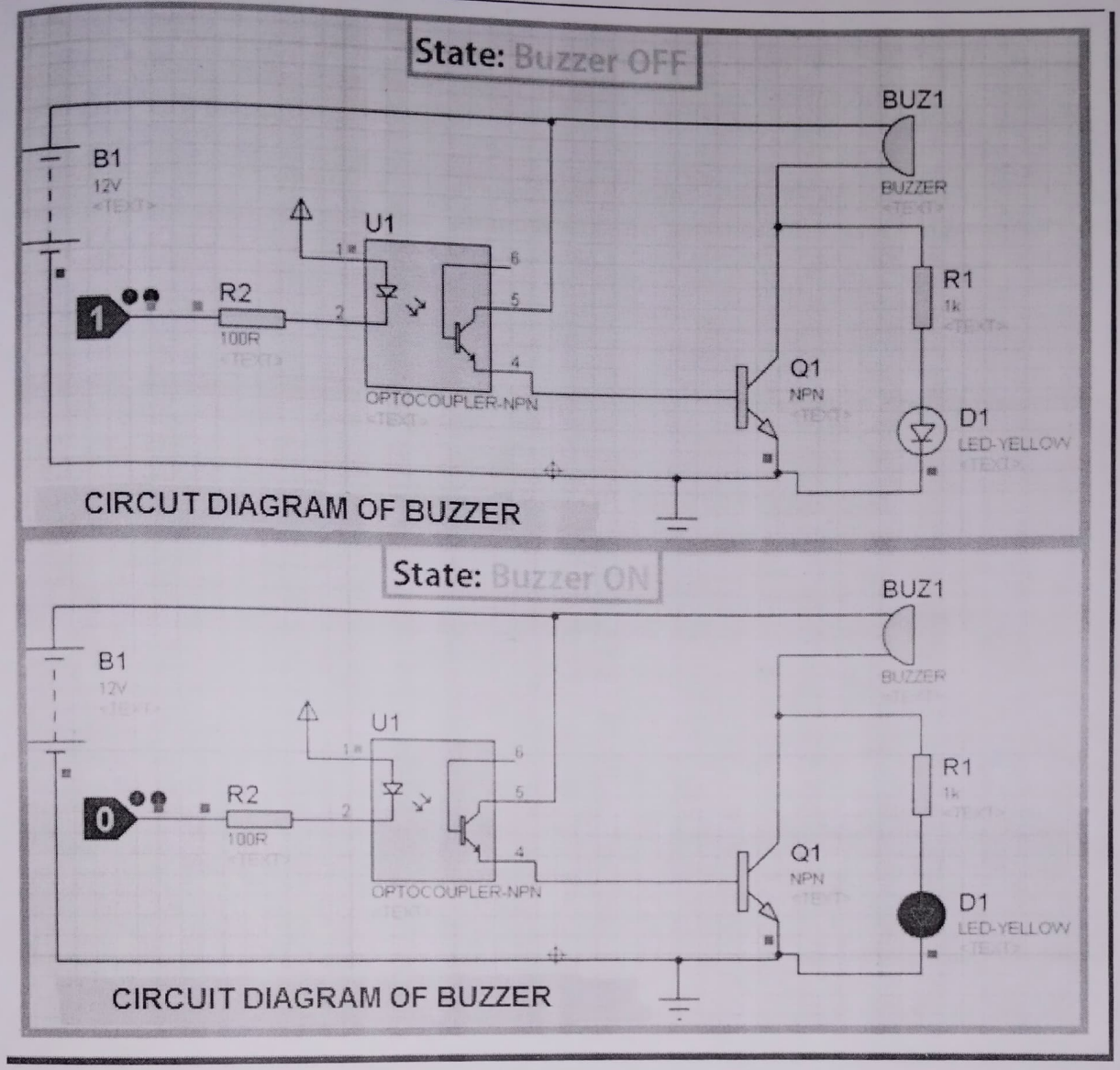


Figure 3.3 Buzzer Circuit Diagram

» You can quite easily understand the above figure, where I have shown both the ON and OFF states of buzzer.

3.2 Circuit Diagram Of IR Sensor

» In this project, I have used two IR sensors, both are placed on the door one after another. You can read more about the designing of IR Sensor on my post Circuit Diagram of IR Sensor using 555 Timer.

» I have named them Entering IR Sensor and Leaving IR Sensor.

» The logic behind these two sensors is that, when someone enters in the room then he will first pass the Entering IR Sensor and then will hit the Leaving IR Sensor and if someone is leaving the room then he will first pass the Leaving IR Sensor and then will cut the Entering.

» So, in this way I am counting the persons if someone entering in the room I simply increment and if someone's leaving then I decrement.

» Now, if number of people in the room becomes zero then I turn OFF all the lights and the fan, and if there even one person in the room then I turn ON the lights and fan.
» Here's the circuit diagram of IR Sensor:

» IR transmitter and Receiver are not available in Proteus so that's why I have used the button so when you press the button, its like someone cut the beam of IR sensor, and you will get below result:

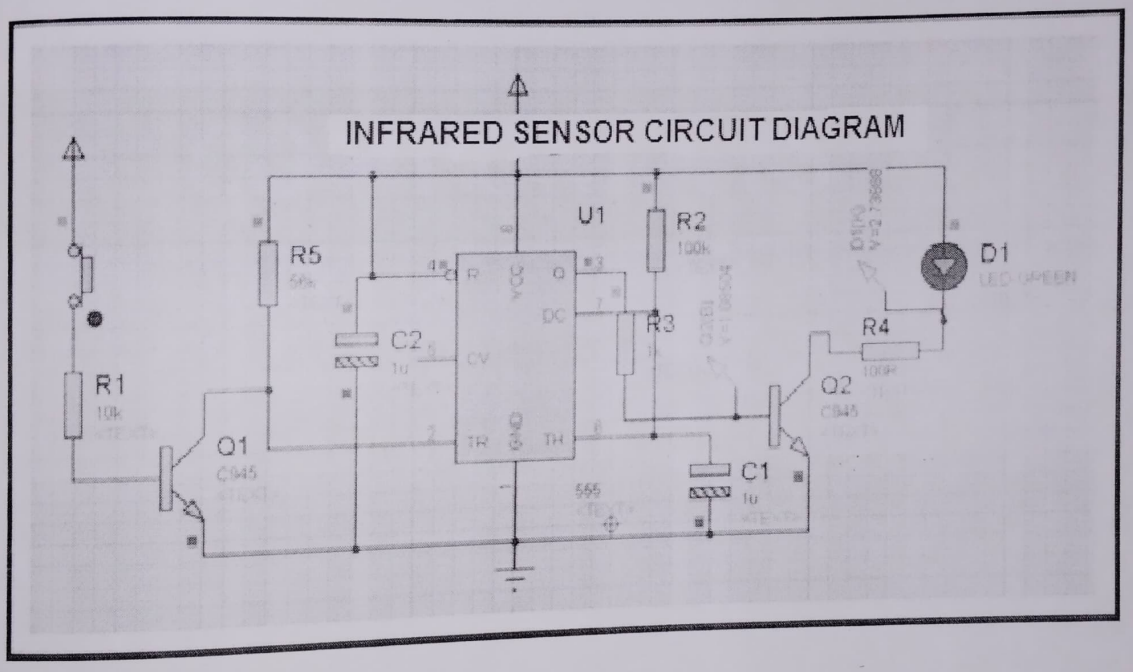


Figure 3.4 IR Circuit Diagram

Chapter-4

COMPONENTS

1. Components &
   Their Description

4.1 Description of Components:

1. ARDUINO UNO:

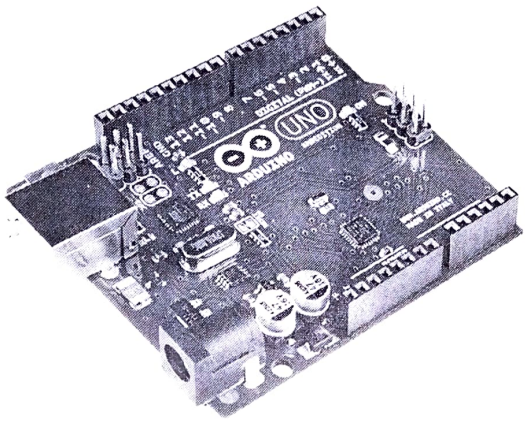


Figure 4.1 Arduino UNO

General Pin functions:

- **LED**: There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
- **VIN**: The input voltage to the Arduino/Genuino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.
- **5V**: This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage the board.
- **3V3**: A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.
- **GND**: Ground pins.
- **IOREF**: This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A properly configured shield can read the IOREF pin voltage

and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.

- **Reset**: Typically used to add a reset button to shields which block the one on the board.

Special Pin Functions:

Each of the 14 digital pins and 6 Analog pins on the Uno can be used as an input or output, using pin Mode (),digital Write (), and digital Read () functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller. The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analog Reference () function.[7]

In addition, some pins have specialized functions:

- **Serial**: pins 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- **External Interrupts**: pins 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.
- **PWM**(Pulse Width Modulation) 3, 5, 6, 9, 10, and 11 Can provide 8-bit PWM output with the analog Write () function.
- **SPI**(Serial Peripheral Interface): 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- **TWI**(Two Wire Interface): A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.
- **AREF**(Analog REFerence: Reference voltage for the analog inputs

2. TSOP1738 (Infrared Sensor):

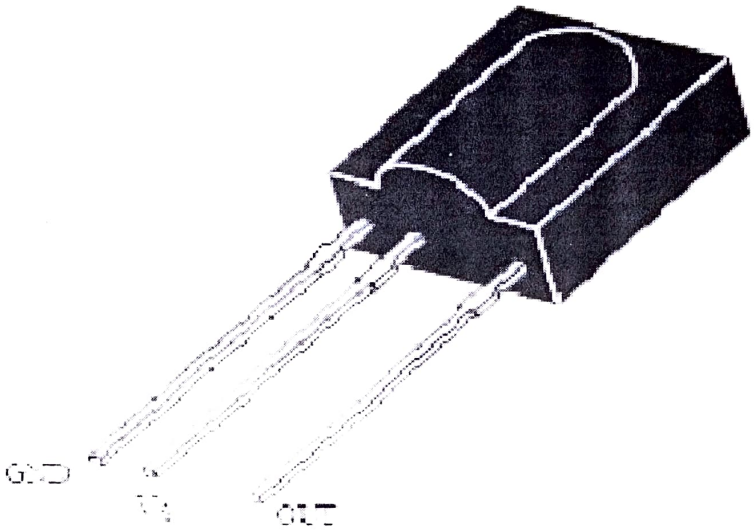


Figure 4.2 IR Sensor

Description:

The TSOP17.. – Series are miniaturized receivers for infrared remote control systems. PIN diode and preamplifier are assembled on lead frame, the epoxy package is designed as IR filter. The demodulated output signal can directly be decoded by a microprocessor. TSOP17... is the standard IR remote control receiver series, supporting all major transmission codes.

Features:

1. Photo detector and preamplifier in one package
2. Internal filter for PCM frequency
3. Improved shielding against electrical field disturbance
4. TTL and CMOS compatibility
5. Output active low

6. Low power consumption
7. High immunity against ambient light
8. Continuous data transmission possible (up to 2400 bps)

3. 555 (Timer IC):

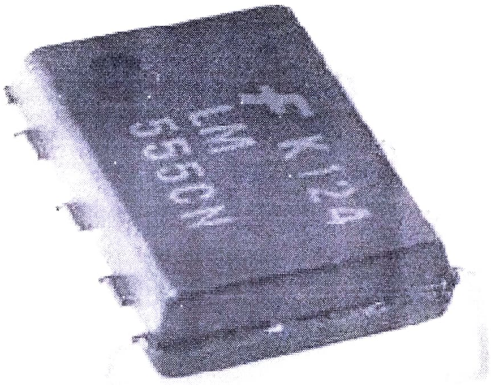


Figure 4.3 Timer IC

Description:

The LM555 is a highly stable device for generating accurate time delays or oscillation. Additional terminals are provided for triggering or resetting if desired. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor. For actable operation as an oscillator, the free running frequency and duty cycle are accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output circuit can source or sink up to 200mA or drive TTL circuits

Features:

1. Direct replacement for SE555/NE555
2. Timing from microseconds through hours
3. Operates in both as table and monostable modes
4. Adjustable duty cycle
5. Output can source or sink 200 mA Output and supply TTL compatible Temperature stability better than 0.005% per °C
6. Normally on and normally off output
7. Available in 8-pin MSOP package

Applications:

1. Precision timing
2. Pulse generation
3. Sequential timing

4. LTS 542 (7-Segment Display) Description:

Figure 4.4 LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.
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. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

5. LM7805 (Voltage Regulator):

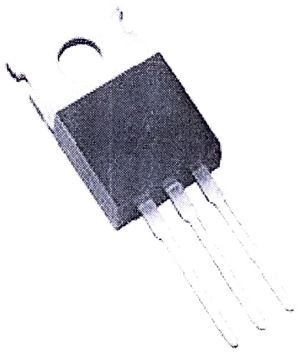


Figure 4.5 Voltage Regulator

Description:

The KA78XX/KA78XXA series of 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:

1. Output Current up to 1A
2. Output Voltages of 5, 6, 8, 9, 10, 12, 15, 18, 24V
3. Thermal Overload Protection
4. Short Circuit Protection

6. Relay Circuit:

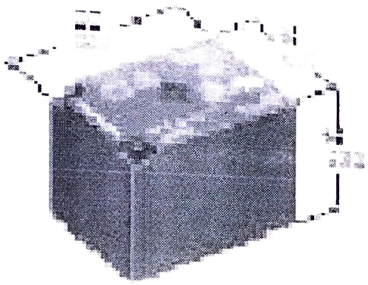


Figure 4.6 Relay Circuit

A single pole dabble throw (SPDT) relay is connected to port RB1 of the microcontroller through a driver transistor. The relay requires 12 volts at a current of around 100ma, which cannot provide by the microcontroller. So the driver transistor is added. The relay is used to operate the external solenoid forming part of a locking device or for operating any other electrical devices. Normally there lay remains off. As soon as pin of the microcontroller goes high, the relay operates. When the relay operates and releases. Diode D2 is the standard diode one mechanical relay to prevent back EMF from damaging Q3 when the relay releases.

7. 12-0-12 Step Down Transformer:

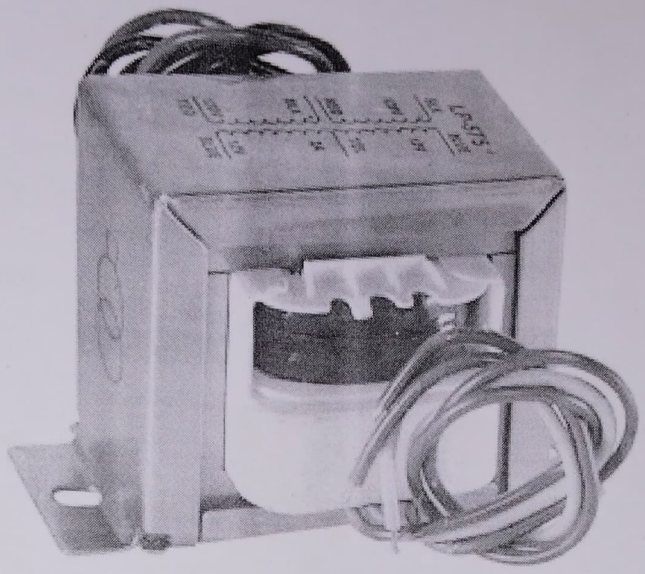


Figure 4.7 Step Down Transformer

It is a general purpose chassis mounting mains transformer. Transformer has 240 V primary windings and centre tapped secondary winding. The transformer has flying colored insulated connecting leads (Approx 100 mm long). The Transformer act as step down transformer reducing AC - 240V to AC - 12V.

The Transformer gives two outputs of 24V, 12V and 0V. The Transformer's construction is written below with details of Solid Core and Winding.

The transformer is a static electrical device that transfers energy by inductive coupling between its winding circuits. A varying current in the primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic flux through the secondary winding. This varying magnetic flux induces a varying electromotive force (E.M.F) or voltage in the secondary winding. The transformer has cores made of high permeability silicon steel. The steel has a permeability many times that of free space and the core thus serves to greatly reduce the magnetizing current and confine the flux to a path which closely couples the windings.

Features :

- Soft Iron Core.
- 1 Amp Current Drain.

Applications :

- DIY projects Requiring In-Application High current drain.
- On chassis AC/AC converter.
- Designing a battery Charger.

8. BC547B Transistor:

Figure 4.8 Transistor

BC547 is a NPN transistor hence the collector and emitter will be left open (Reverse biased) when the base pin is held at ground and will be closed (Forward biased) when a signal is provided to base pin. BC547 has a gain value of 110 to 800, this value determines the amplification capacity of the transistor. The maximum amount of current that could flow through the Collector pin is 100mA, hence we cannot connect loads that consume more than 100mA using this transistor. To bias a transistor we have to supply current to base pin, this current (I_B) should be limited to 5mA.

When this transistor is fully biased then it can allow a maximum of 100mA to flow across the collector and emitter. This stage is called Saturation Region and the typical voltage

allowed across the Collector-Emitter (V_{CE}) or Base-Emitter (V_{BE}) could be 200 and 900 mV respectively. When base current is removed the transistor becomes fully off, this stage is called as the Cut-off Region and the Base Emitter voltage could be around 660 mV.

9. Resistors:

Figure 4.9 Resistor

The electrical resistance of a circuit component or device is defined as the ratio of the voltage applied to the electric current which flows through it:

If the resistance is constant over a considerable range of voltage, then Ohm's law, $I = V/R$, can be used to predict the behavior of the material. Although the definition above involves DC current and voltage, the same definition holds for the AC application of resistors.

A Resistor is a heat-dissipating element and in the electronic circuits it is mostly used for either controlling the current in the circuit or developing a voltage drop across it, which could be utilized for many applications. There are various types of resistors, which can be classified according to a number of factors depending upon:

Material used for fabrication

Wattage and physical size

Intended application

Ambient temperature rating Cost

Basically the resistor can be split in to the following four parts from the construction viewpoint.

1. Base
2. Resistance element
3. Terminals
4. Protective means.

The following characteristics are inherent in all resistors and may be controlled by design considerations and choice of material i.e. Temperature co-efficient of resistance, Voltage co-efficient of resistance, high frequency characteristics, power rating, tolerance & voltage rating of resistors. Resistors may be classified as

1. Fixed
2. Semi variable
3. Variable resistor.

10. Capacitors:

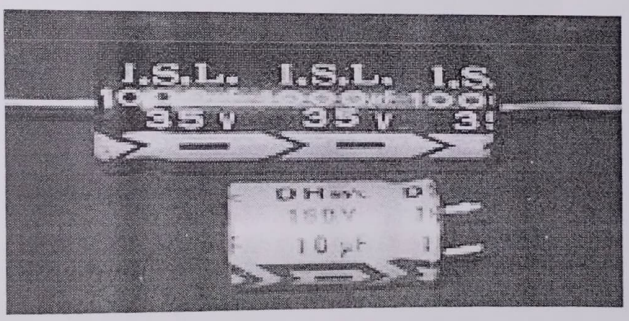


Figure 4.10 Capacitor

The fundamental relation for the capacitance between two flat plates separated by a dielectric material is given by:-

$$C=0.08854KA/D$$

Where: -C= capacitance in pf.

K= dielectric constant

A=Area per plate in square cm.

D=Distance between two plates in cm

Design of capacitor depends on the proper dielectric material with particular type of application. The dielectric material used for capacitors may be grouped in various classes like Mica, Glass, air, ceramic, paper, Aluminum, electrolyte etc. The value of capacitance never remains constant. It changes with temperature, frequency and aging. The capacitance value marked on the capacitor strictly applies only at specified temperature and at low frequencies.

11. LED (Light Emitting Diodes):

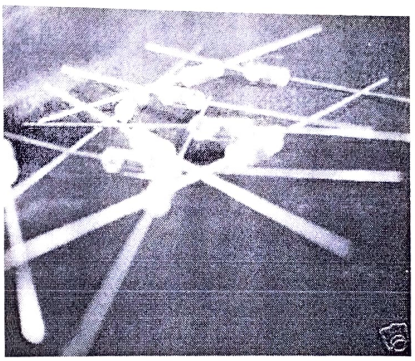


Figure. 4.11 LED

As its name implies it is a diode, which emits light when forward biased. Charge carrier recombination takes place when electrons from the N-side cross the junction and recombine with the holes on the P side. Electrons are in the higher conduction band on the N side whereas holes are in the lower valence band on the P side. During recombination, some of the energy is given up in the form of heat and light. In the case of semiconductor materials like Gallium arsenide (GaAs), Gallium phosphate (Gap) and Gallium arsenide phosphate (GaAsP) a greater percentage of energy is released during recombination and is given out in the form of light. LED emits no light when junction is reversing biased.

12. Transistors:

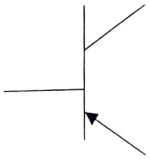
Figure 4.12 Transistor

A transistor consists of two junctions formed by sandwiching either p-type or n-type semiconductor between a pair of opposite types. Accordingly, there are two types of transistors namely: -

(1) n-p-n transistor

(2) p-n-p transistor

(NPN)



(PNP)

An n-p-n transistor is composed of two n-type semiconductors separated by a thin section of p type. However a p-n-p transistor is formed by two p sections separated by a thin section of n-type. In each type of transistor the following points may be noted.

- There are two p-n junctions; therefore a transistor may be regarded as combination of two diodes connected back to back.
- There are three terminals taken from each type of semiconductor.

» The middle section is a very thin layer, which is the most important factor in the functioning of a transistor.

» Transistor can be used as an Amplifier also.

A transistor raises the strength of a weak signal and thus acts as an amplifier. The weak signal is applied between emitter base junction and output is taken across the load RC connected in the collector circuit (in common emitter configuration). In order to achieve faithful amplification, the input circuit should always remain forward biased. To do so, a dc voltage is applied in the input in addition to the signal. This dc Voltage is known as biasing voltage and its magnitude and polarity should be such that it always keeps the input circuit forward biased regardless of the polarity to the signal to be amplified.

As the input circuit has low resistance a small change in signal voltage causes an appreciable change in emitter current. This causes change in collector current (by a factor called current gain of transistor) due to transistor action. The collector current flowing through a high load resistance RC produces a large voltage across it. Thus a weak signal applied to the input circuit appears in the amplified form in the collector circuit. This is how a transistor acts as an amplifier.

Transistor may be used in different configuration like CB (common base) & CC (common collector) according to requirements of amplifier (impedance matching, buffer amplifier etc.).

Chapter-5

PROJECT FLOWCHART

FLOWCHART:

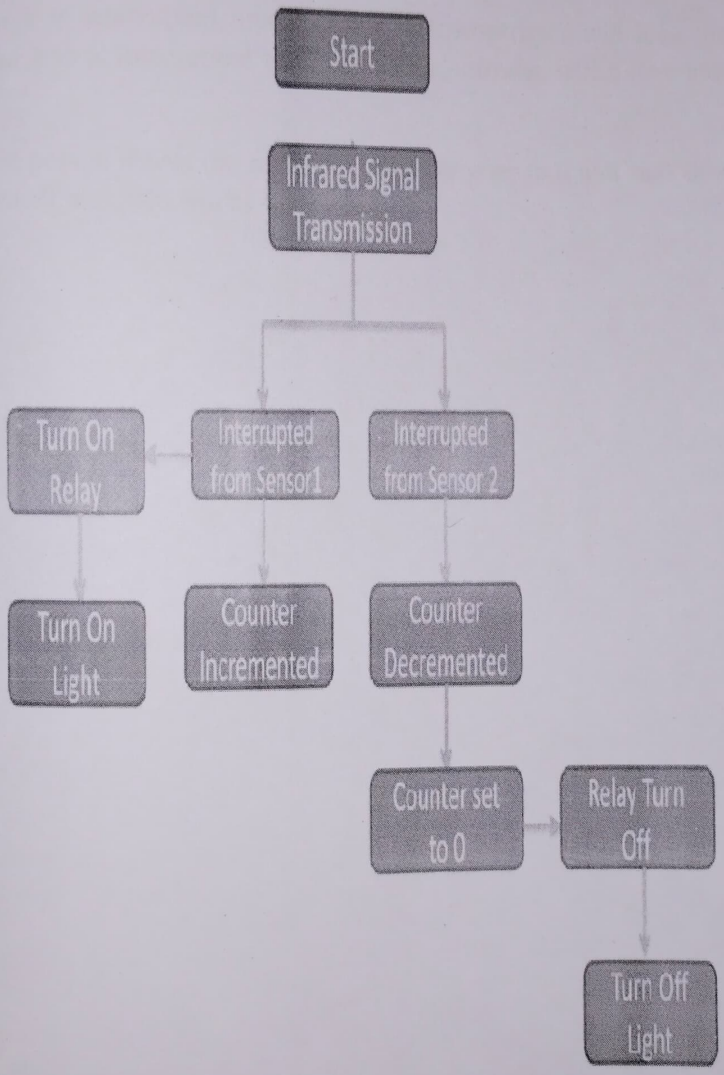


Figure 4.1 Flowchart

If the sensor 1 is interrupted first then the microcontroller will look for the sensor 2, and if it is interrupted then the microcontroller will increment the count and switch on the relay, if it is first time interrupted.

If the sensor 2 is interrupted first then the microcontroller will look for the sensor 1, and if it is interrupted then the microcontroller will decrement the count.

When the last person leaves the room then counter goes to 0 and that time the relay will turn off, and light will be turned off.

Chapter-6

PROJECT PROGRAM

PROJECT PROGRAM:

```
#include <LiquidCrystal.h>
#include <OneWire.h>
#include <DallasTemperature.h>
#define ONE_WIRE_BUS 8
OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature sensors(&oneWire);
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);
float celsius, fahrenheit;
int Sensor1 = A0;
int Sensor2 = A1;
int Bulb = A5;
int Fan = A4;
int Buzzer = A3;
int Counter = 0;
int Sen1Check = 0;
int Sen2Check = 0;
void setup(void)
{
Serial.begin(9600);
digitalWrite(Bulb, HIGH);
digitalWrite(Fan, HIGH);
digitalWrite(Buzzer, HIGH);
pinMode(Sensor1, INPUT);
pinMode(Sensor2, INPUT);
pinMode(Bulb, OUTPUT);
pinMode(Fan, OUTPUT);
pinMode(Buzzer, OUTPUT);
lcd.begin(20, 4);
lcd.setCursor(0, 1);
lcd.print("Temp = ");
lcd.setCursor(0, 0);
lcd.print("Counter = ");
lcd.setCursor(12, 0);
lcd.print("Persons");
}
void loop()
{
CheckEntry();
CheckLeaving();
lcd.setCursor(7, 1);
sensors.requestTemperatures();
lcd.println(sensors.getTempCByIndex(0));
lcd.setCursor(12, 1);
```

```
lcd.print(" degC");
lcd.setCursor(10, 0);
if(Counter >= 0){lcd.print(Counter);}
if(Counter < 0){Counter = 0;}
if(Counter > 0) {
digitalWrite(Bulb, LOW);
digitalWrite(Fan, LOW);
digitalWrite(Buzzer, HIGH);
lcd.setCursor(0, 2);
lcd.print("Fan : ON ");
lcd.setCursor(0, 3);
lcd.print("Bulb : ON ");
}
if(Counter < 1)
{
digitalWrite(Bulb, HIGH);
digitalWrite(Fan, HIGH);
digitalWrite(Buzzer, HIGH);
lcd.setCursor(0, 2);
lcd.print("Fan : OFF");
lcd.setCursor(0, 3);
lcd.print("Bulb : OFF");
}
}
void CheckEntry()
{
if(((digitalRead(Sensor1) == LOW) || (Sen1Check == 1)) && (Sen2Check == 0)) {
while(digitalRead(Sensor1) == LOW);
Sen1Check = 1;
if(digitalRead(Sensor2) == LOW)
{
Counter++;
Sen1Check = 0;
while(digitalRead(Sensor2) == LOW);
}
}
}
void CheckLeaving()
{
if(((digitalRead(Sensor2) == LOW) || (Sen2Check == 1)) && (Sen1Check == 0))
{
while(digitalRead(Sensor2) == LOW);
Sen2Check = 1;
if(digitalRead(Sensor1) == LOW)
{
Counter = Counter - 1;
```

```
Sen2Check = 0;
while(digitalRead(Sensor1) == LOW);
}
}
                    }
```

Chapter-7

FUTURE EXPANSION

FUTURE EXPANSION:

1. By using this circuit and proper power supply we can implement various applications Such as in fans, tube lights, air conditioners, heaters, etc.
2. By modifying this circuit and using two relays we can achieve a task of opening and closing the door.

Chapter-8

ADVANTAGES, LIMITATIONS & APPLICATIONS

ADVANTAGES & LIMITATIONS & APPLICATION:

Advantages:

1. Low cost
2. Easy to use
3. Implement in single door

Limitations:

It is used only when one single person cuts the rays of the sensor hence it cannot be used when two person cross simultaneously.

Applications:

1. For counting purposes
2. For automatic room light control

Chapter-9

REFERENCE BOOKS & WEBSITES

REFERENCE BOOKS & WEBSITE:

Reference Books:

1. Programming in ANSI C: E BALAGURUSAMY
2. The 8051microcontroller and embedded systems: MUHAMMAD ALI MAZIDI
3. JANICE GILLISPIE MAZIDI
4. The 8051 microcontroller: KENNETH J. AYALA

Website:

1. www.datasheets4u.com
2. www.8051.com