BIDIRECTIONAL VISITOR COUNTER USING ARDUINO

J Component Project Report for the course

CSE2006 Microprocessor and Interfacing

by

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Certificate

This is to certify that the Project work titled “Bi directional visitor counter using Arduino” is being submitted by ***Ankit Kumar Jha*****(20BPS1050)*****,*** ***Harsha Vardhan T*** **(20BPS1051)** and ***Anu B Reddy*****(20BPS1114)** for the course **Microprocessor and Interfacing**, is a record of bonafide work done under my guidance. The contents of this project work, in full or in parts, have neither been taken from any other source nor have been submitted to any other Institute or University.

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ABSTRACT

The objective of the paper is to reduce the high and ever-increasing demand of electricity. As the technology advancements predominate in today's digital world, we prefer classier and smarter advancements in simple and basic needs of the human lives, so this paper gives us a solution to make the surroundings smarter and economic.

To achieve the objective, we can install Automatic Room Monitoring in every house or seminar halls and so on. It uses infrared sensors to detect the persons entering and leaving and the room and monitors the room appliances like light, fan and air conditioners. Technology from the purpose of simplicity has turned into technology for necessity. Developing and generating the electricity at small scale is a cumbersome process instead we consume less electricity and conserve it for a sustainable development of energy resources. The proposed model from the paper is able to monitor and control the room appliances respective of the people in the room additionally it can also instantaneously count the number of persons in a room. It has various applications in the field of consuming energy resource and also as a bi – directional visitor counter. Keywords: Arduino UNO, relay, sensor

This project has 2 parts. First is "Person counter" and the other one is "Automatic room light and fan controller". The first part is to count and display the number of persons entering in any room which can be used in large rooms like seminar halls, conference rooms, theatres etc to decide the no of seats remaining. When number of persons inside the room is zero, power supply inside the room can be cut using a TRIAC and when somebody enters the room, the system automatically measures the number of persons in the room accordingly controls the light and fan. During daytime lights will not be operated and during cold season fan may not be operated. This helps to save electricity and reduces our effort. LCD display placed outside the room displays number of people inside the room, temperature and light intensity.

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CHAPTER 1
Introduction

The demand for the electronic device which can control the room appliances has a great surge such that it can be implemented in many real time applications like in hotels, living room, garage and so on. The model can track the number of persons entering and leaving the room and also switches the lights and fans on and off if the room is engaged or vacant respectively. By employing this device in the room reduces the laborious work to search for the switch to light the room at once you enter. The persons entering the room through the entrance will be sensed by the Infrared Sensors (shortly IR sensors) and the signal sensed is sent to the Arduino UNO for processing and controlling the count in the room and also explicitly monitors the lights and fan in the room.

1.1 Purpose

The following are the objectives of this project:

1. Our main objective in this paper includes designing and constructing a visitor counter which will make a controller-based model to count and compute the number of visitors in a building at a particular time. It is also our objective that this controller base model beeps a warning alarm when the capacity of the building is exceeded.

2. This Project ―Microcontroller based room automation is a reliable circuit that takes over the task of controlling the room lights as well as counting the 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 anyone leaves the room then the counter is decremented by one. The same is done with the fan also. 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.

3. The human auditing application or the human-based data collection was unreliable and came at great cost. For instance, in situations where a large number of visitors enter and exit buildings such as conference rooms, law courts, libraries, malls and sports venues, going for human auditors to manually tally the number of visitors may result in inaccurate data collection. For this reason, many organizations have tried to find solutions to mitigate the inaccurate traffic monitoring issues. It is our intention to design and construct this digital bidirectional visitor counter (DBVC) with maximum efficiency and make it very feasible for anyone who wants to design and construct the prototype. Building this circuit will provide information to management on the volume and flow of people in a building.

4. Our project is designed to fit into the present Covid-19 situation. So, the gates of the places in which it is installed would close as soon as the capacity of the facility reaches its 50 percent.

1.2 Scope:

The circuit which we have designed is simple and compact. With the help of some software tools, we were able to develop the required coding and burn it to the Integrated circuit.
The significance of the design and construction in this paper is enshrined in the fact that it provides the assurance of the health and safety of the occupants in a building at all time, since the visitors are guaranteed of traffic decongestion. It also provides accurate data for various research and analytical purposes as it generates the hourly, daily, monthly, and yearly report. The device helps to reduce pressure on building facilities by prompting security, when the capacity of the building is exceeded. It goes a long way to assist rescue teams or security services to come up with strategic procedures in dealing with emergency issues like people trapped in a structure as a result of hijacks and collapsed buildings which occurred recently at the West End Gate Mall in Kenya and Melcom in Ghana respectively.

CHAPTER 2

Design/Implementation

It will count the number of times the door opens and will automatically raise an alarm when it detects the extra persons, but it can be upgraded as per requirements . This is enabled by using an IR sensor that senses the doors movement from left - right or right –left . The door alarm system prototype that we are going to build today can detect entry of up to three to four persons, but it can be upgraded as per requirement. The IR engine accommodates a wide range of mobile device graduation gesturing requirements: simple UP-DOWN-RIGHT-LEFT gestures or more complex sensors can be accurately sensed . Power consumption and noise are minimized with adjustable IR LED timing

2.1 Introduction

The circuit which we have planned is straightforward and conservative. With the assistance of some software tools, we had the option to foster the necessary coding and consume it to the Integrated circuit. This Project ―Microcontroller based room computerization is a dependable circuit that assumes control over the errand of controlling the room lights and fans too, counting the number of people/guests in the room precisely. At the point when someone goes into the room then the counter is increased by one and the light in the room will be turned ON and when any one leaves the room then the counter is decremented by one. The same is done with the fans too. The light will be just turned OFF until all the people in the room go out. The complete number of people inside the room is likewise shown on the seven section shows.
The microcontroller does the above work. It gets the signs from the sensors, and this sign is worked under the control of programming which is put away in ROM. Microcontroller ATMEGA328 continuously monitors the Infrared Receivers. When any article goes through the IR Receiver, then the IR Rays falling on the beneficiary are deterred, this check is detected by the Microcontroller.

2.2 Design Approach

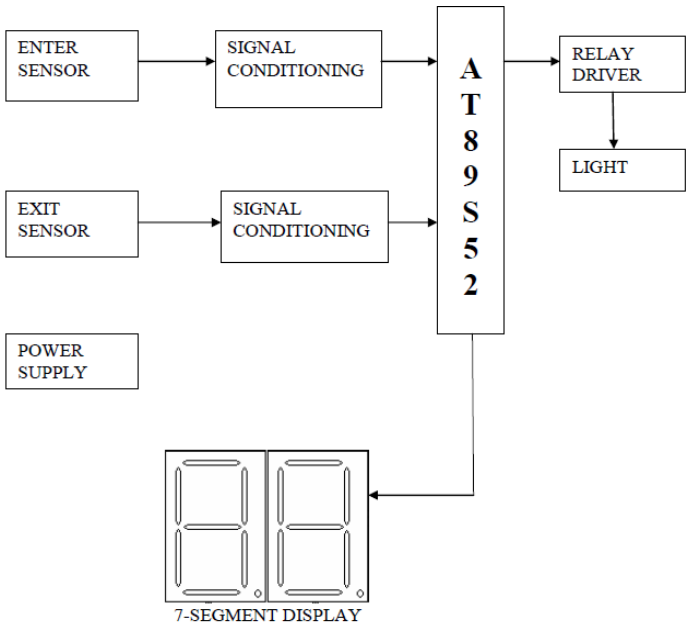

FIGURE -2.1

The basic block diagram of the bidirectional visitor counter with automatic light-controller 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. AT89S52 Microcontroller
4. Relay driver circuit

The circuit consists of IR transmitter and receiver LEDs which are used to sense the entering or leaving of a person to or from the room. The temperature sensor measures the temperature inside the room and the analog signal from the sensor is processed by the microcontroller. Likewise the Light dependant resistor (LDR) generates the analog signal proportional to the available light inside the room. This signal is also processed by the microcontroller. The speed of the fan and brightness of the light is controlled accordingly. Whenever the person leaves the room, the light and fan will be switched OFF.

2.3 Proposed System

The IR sensors are placed at the entrance of the door; it is placed such that one is present behind the other, that is both the sensors can detect the person consecutively. The logic behind the

working of the counting process is simple, when the person crosses the sensor near the door and then to the sensor away, it recognizes as an increment in count.

If the person crosses the sensor placed away from the door and then sensor near the door, then it will be decremented. Increment in the sense, person enters the room whereas decrement denotes the person leaving the room. It is to be noted that both sensors should not be simultaneously detected, so the sensors should be placed apart from each other constricted to the entrance region.

The LCD board gets refreshed at every instance as the time delay kept is very small in few milliseconds so that the count display should not be lagged at any instance. Potentiometer is connected to the LCD so as to adjust the contrast of the LCD display board.

Lights and fans can be connected to the relay such that they get started working at once the relay switch gets closed. The opening and closing of the relay is controlled by the Arduino UNO board. If the count in the room is equal to zero then the relay switch is in open mode. The relay gets closed at once the count is raised greater than 1.

To avoid discrepancies in counting, set a condition in the algorithm such that the count should not precede the limit zero. If count goes less than zero, then set the counting variable to zero again. The digital pins of the Arduino UNO are connected to the LCD display board. IR sensors are connected to analogue ports of the Arduino UNO.

Here is the LTspice simulated circuit of the project:

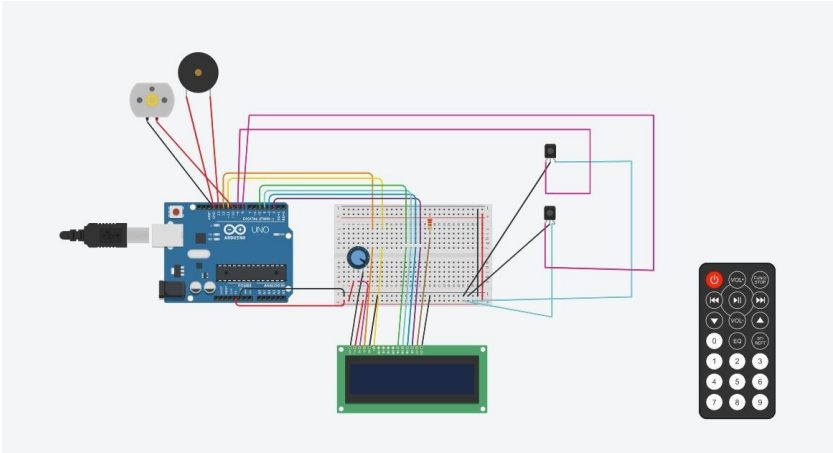

FIGURE - 2.2

2.3.1 Economic Feasibility

As this is a bidirectional visitor counter it just requires less hardware when compared to other hardware projects.And in return it saves a lot of manpower and money which were previously used for counting process and maintaining it.To implement this, is in turn a cost saving process as this requires less capital.As it can automatically turns of the light and fan thus save the cost of

maintaining appliances.Owing to the present conditions it also detects when the percentage of people in the room is more than the decided number,it is a time saving process.
Coming to the present model, it required 1.2k - 1.5k for us to develop it.This can surely replace much of the manpower and in turn a lot more profit can be earned when implemented in a perfect place..

2.3.2 Technical feasibility

Firstly this project can be implemented in auditorium, hall, room ,offices, malls, sports venue etc.The hardware of this project isn't that complex and it should be compatible and feasible with the limits of the current technology.It can be even upgraded using advanced technologies to detect smoke or fire or anything of that sort.The system keeps track of who enters and exits the theater, hall, or other location where it is installed. The system recognises the visitor's entry and exit based on the interrupts from the sensors. The number of visitors present in the room is displayed after the system has been successfully implemented.It is an automatic fan and light controller using the count it has read earlier.This technique can be used in any location where visitors must be counted and regulated on a budget.The system is totally designed using Sensor Technology and embedded system technology. The performance of the design is maintained by the controlling unit.

2.3.3 Operational feasibility

This project, when implemented in a facility, can be operated both as a visitor counter and also as an automatic fan and light controller.Presently it can count upto 1000 people as this is the basic model, it can be upgraded to count more numbers.It can control the electrical appliances of that room where it is implemented.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 an emergency LED which gets switched on when all LEDS fail to switch on.
The only drawbacks of this project is, it fails to count when a group of people enters the facility as it contains less sensors and also it can be upgraded by including more entry and exit sensors thereby making this even more useful.
It can also be upgraded to detect the people's gender and thereby we can get to know the count of males and females separately.It is a much reliable idea in many instances and can be proven useful if implemented successfully.

2.4 Overview of software

There are two main parts in an Arduino UNO code namely, the setup () part and the loop () part. The setup () part gives all the initial setups for the process to begin such as defining the input and output pins and creation of the necessary input variables for processing. This part is executed only once every time the Arduino UNO is booted.The loop() part gives all the necessary instructions to the Arduino UNO that is to be executed repeatedly throughout the working of the Arduino UNO board. The loop() part of the program is executed repeatedly every 0.6 micro seconds. Inside the loop() part, the instructions such as receiving inputs are mentioned.

```
        The Psuedocode printed below is with proper
indents.

        if ((sensor1) and not(sensor2))
##person crosses the sensor 1 and standing before s2
                if (sensor2)
##person crosses the sensor 2 after crossing the sensor 1
                        count=count+1
##as the person crosses both sensors, count rises to 1
                endif
        else if ((sensor2) and not(sensor1))
##person crosses the sensor 2 and standing before s1
                if (sensor1)
##person crosses the sensor 1 after crossing sensor 2
                        count=count-1
##person moves out, count decreases
                endif
        endif
        lcd.print(count)
##displays the count in LCD display
```

Figure 2.4

2.5 Hardware Specification

Arduino UNO: It is a microcontroller board based onATmega328. It has 14 digital input/output pins , 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button.

LCD–display board:- Liquid Crystal Display board of dimension 16x2 where it can display 32 characters in two lines each of 16 characters. It has 16 external holes for connections. These output holes can be connected to the bread board with the help of male to male breakable pins.

LED: A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated.

IR Sensor Module: It is an electronic instrument whichis used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

Breadboard: A breadboard is a construction base for prototyping of electronics. It is used to design circuits with the electronics components.

Resistor: It is an electronic passive device which opposes the flow of current through it.

Connecting wires

2.6 Software Requirements

Arduino 1.8.1: It is a software based on EmbeddedC for assisting the projects based on ARDUINO. Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems.The first step in the software development is deciding the serial number, which indicates the number of input/output ports and the memory size of the microcontroller to be used. Programming flow for software development is provided by designing a flow chart. The software that is used in this design is Embedded-C for the microcontroller.It provides a successful match featuring a highly advanced Integrated Development Environment (IDE), a broad set of hardware libraries, comprehensive documentation, and a lot of ready-to-run examples.

EMBEDDED C , EXPRESS P C B

2.7 Summary

The system mainly uses Arduino UNO board for the process of monitoring, Relay for the process of external switching of the circuit, LCD Display board to display the person in the room and finally the IR Sensors.The circuit diagram of the proposed model is shown in
figure 2.2.The coloured lines specify the wires connecting the circuit elements. To connect various elements in a single port, a bread board is used.

The proposed system is mainly divided into four important sections and they are Sensor, Controller, Counter display and LED. At first the sensor will observe an interruption and provide an input signal to the controller which will run the counter. The counter is incremented or decremented depending on the entry or exit of the person in a particular room and counting is

displayed on a 16x2 LCD through the controller and automatically the lights and fan of the facility are controlled.

Advantages: Power saving , Room or office monitoring, reduces a lot of manpower.

Disadvantages: It cannot count if a group of people enters or exits the facility at the same time,as sensors might not work efficiently during those times.So it could be timetaking if not upgraded to handle those situations.

Applications:

- Home automation
- Office automation
- visitor counting and monitoring
- waiting rooms (Bus or railway station)

Since the technologies are growing day by day there will be more advanced automation techniques which can improve current lifestyles and can save more energy will capture our market. by doing this project we came to the conclusion that even though we have developed a small part of automation in a single room, it can be extended using more components such that it could be installed in bigger rooms. By using the internet services more development can be done.This can be implemented in developing countries which are useful for transformation of homes to smart homes

CHAPTER 3

Result and Analysis / Testing

3.1 Block diagram

This chapter projects the analysis and discussion of results and findings during and after the implementation of design. It describes in detail the final design perspective as well as highlighting the probable defects engulfing the project. A preview to the entirety of this project establishes the essence and need for embedded systems towards technological advancement. The diagram in Figure 3.1 represents the block diagram of the bidirectional visitor counter. This project incorporates the following; microcontroller, IR sensors, transistors, resistors, diodes, LEDs, LCD, and a buzzer. The block diagram gives a preview as to what the project entails.

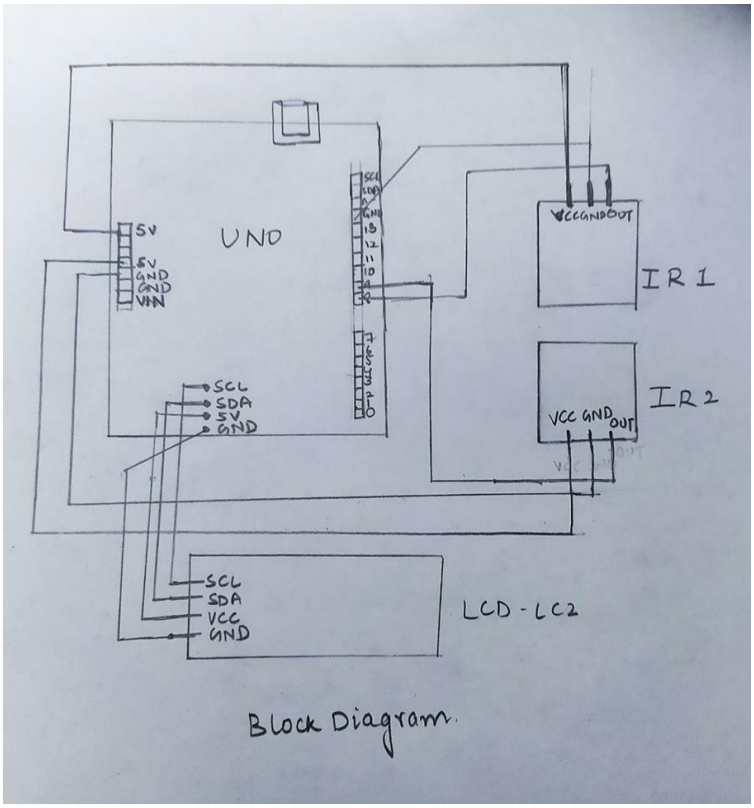

Figure 3.1

This block diagram helps us to understand how the project works.

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 the surface of the object. The other

feature present in the system would be the Visitor counter which is displayed on a PC monitor which will help congestion control in the room . There is also an emergency LED which gets switched on when all LEDS fail to switch on. The same is shown on the PCmonitor. All these features are controlled by the Microcontroller which is programmed using assembly language. And by using these counts from the system, it automatically controls the light and fan in that facility.

3.2 Flowchart

The Complete flow of working is given in the flowchart below in the figure 7. It completely gives a clear-cut idea of the working and the code. It explains the case conditions for the LCD display.

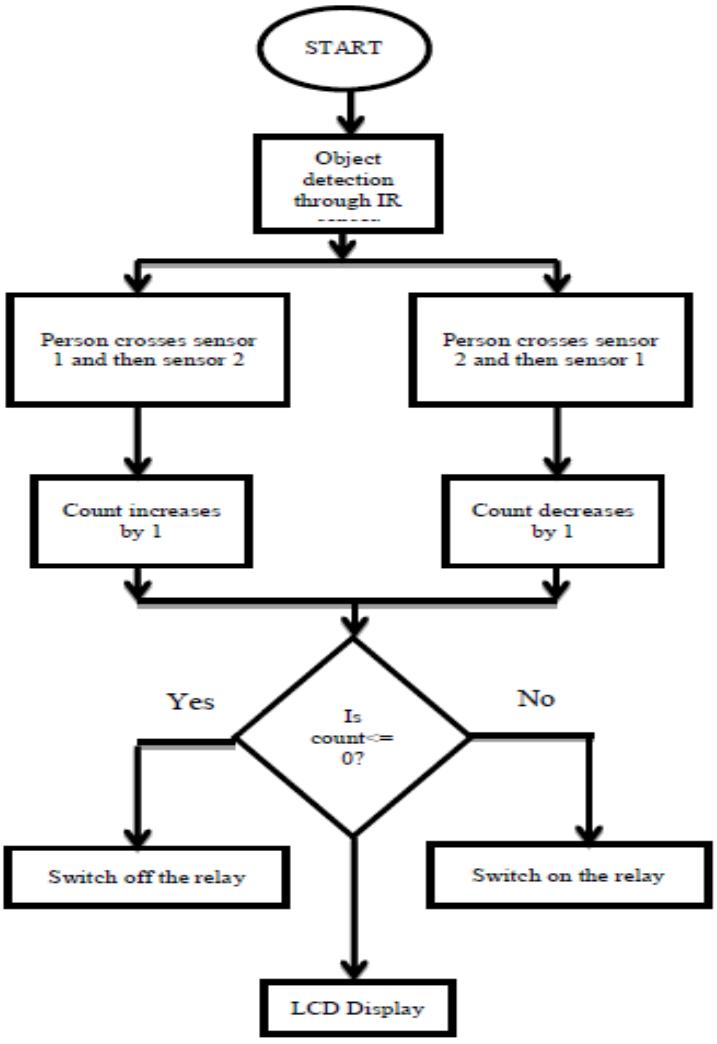

Figure 3.2

3.3 Hardware Implementation-Snapshot Working

Figure 3.3

Figure 3.3.1

Figure 3.3.2

So this is what our Bidirectional Visitor Counter looks like.

As we have already mentioned we use two IR sensors at Entry and Exit respectively.

We can also observe that there's a fan and Red LED light respectively in the above shown images of the project.

Fan gets automatically turned on when there are some people in the room and Red LED light gets turned on when the maximum capacity reaches in the room.

There's also a buzzer included in the project, when there's a maximum capacity it will get triggered and sound will be made thereby alerting that congestion is present in the room.

Case 1:

When there is nobody in the room, the LCD displays the same thing that there is no one in the room.

As there is no one present , the fan will be in OFF position.

Figure 3.4

Present Condition of Fan:

Figure 3.4.1

Case 2:

When Somebody Enters the room , IR sensors gets triggered , as a result the counter gets incremented by 1

Now the LCD displays the count and as a result Fan gets turned ON automatically.

Figure 3.4.2

Present Condition of Fan:

Figure 3.4.3

Case 3:

The room appliances remain switched on even when the person count increases in the room.

LCD display showing the count of two:

Figure 3.4.4

Fan will be in the ON position as there are some people in the room.

Same will be the case for the count more than this from now on.

LCD display showing the count of three:

Figure 3.4.5

Case 4:

When the people entered the room have left and now there's no one left in the room

Now, the counter gets decremented accordingly, so, the LCD displays the same and Fan gets Turned OFF automatically.

Figure 3.4.6

Present Condition of Fan:

Figure 3.4.7

Case 5:

When there's maximum capacity in the room

The device has a safety mode operation in the sense that if the maximum number of persons allowed in the room is exceeded, the message on the LCD changes to "MAXIMUM CAPACITY REACHED" where

For as long as the number of persons exceeds the allowed number of persons in the room, the alarm (Buzzer) will beep each time that another extra person enters the room and the RED LED will flash. If somebody leaves the room, the number of excess persons reduces by 1, 2, 3 and so on until the number falls within the safety range again. At that point, the buzzer will not beep again if someone enters the room. The LCD message also changes back to the original message of "PERSON IN THE ROOM:".

LCD display showing the maximum capacity has reached:

Figure 3.4.8

RED LED light gets turned on:

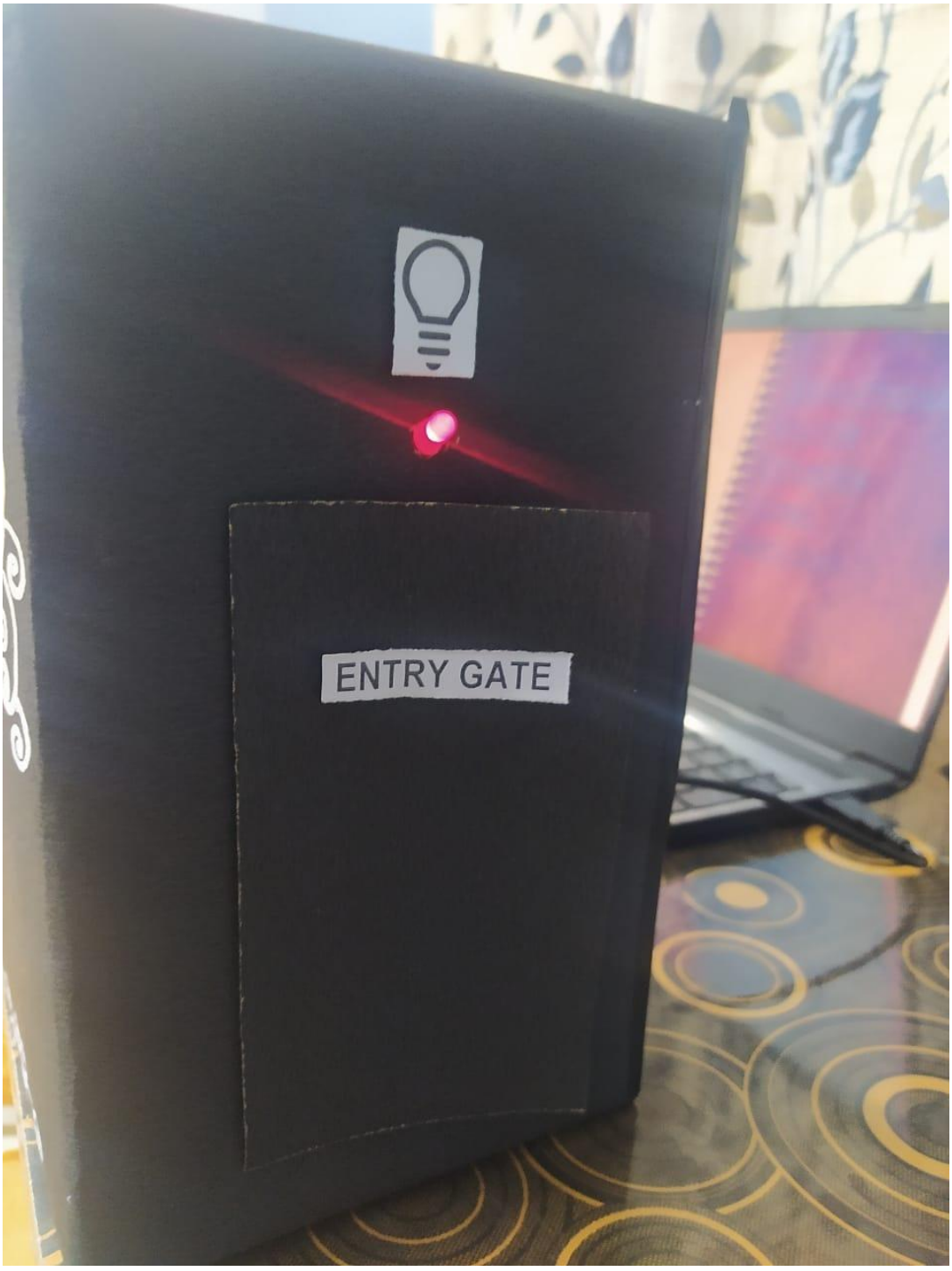

Figure 3.4.9

So the triggering of RED LED light indicates that there is congestion present in the room.

Present Situations**:**

Owing to the present COVID situations, as there should not be any gathering present anywhere, this project proves to be helpful and reliable.

By just watching the display we can come to know that there are many people present in the room and should be taken care of.

3.4 Flow of execution

Lights and fans can be connected to the relay such that they get started working at once the relay switch gets closed. The opening and closing of the relay is controlled by the Arduino UNO board. If the count in the room is equal to zero then the relay switch is in open mode. The relay gets closed at once the count is raised greater than 1.

To avoid discrepancies in counting, set a condition in the algorithm such that the count should not precede the limit zero. If count goes less than zero, then set the counting variable to zero again.

The flow of execution of the proposed model is shown below in the figure 6. Micro controller refers to the Arduino UNO.

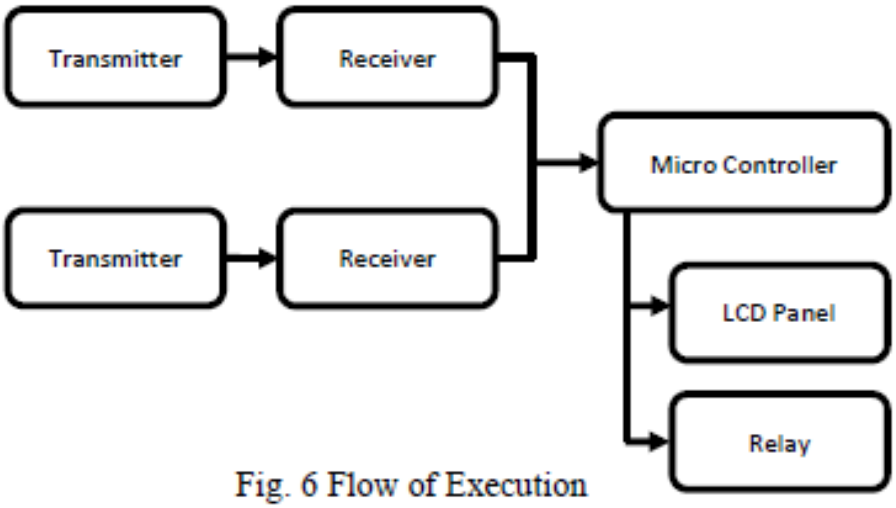

Fig. 6 Flow of Execution

3.5 Summary

This Bidirectional Visitor Counter can be implemented in developing countries which are useful for transformation of homes to smart homes. To supersede the old practice of counting the number of people entering and leaving the room one by one , BVC can be implemented which keeps an eye on the count of persons in the room. In the small scale energy conservation might be seen as small quantity, whereas in the large scale business area like malls, schools, hospitals it is a large quantity as the energy is wasted at a large scale. Additionally adding the extra relays to the system it can control the lights of a seminar hall at sections, such that if the count is around 10, then the first part alone will be lighted, if the count is around 50, the second part will also be lighted and so on. It reduces the burden of management and helps in conserving energy**.** Thus this project will provide more convenience and comfort for the user. More than that it saves an appreciable amount of energy. The only disadvantage is that the initial cost of establishment is high. This project can be implemented in malls, offices, schools, etc.

Small Note**:**

We are convinced, from the above results, that the bidirectional visitor counter is highly efficient and economical. There is no time lag in the operation of the system. The system offers the most favorable operation since it functions continuously without errors. Its program can also be modified to take additional input depending on the function desired by the designer. There is no need for human auditor services.

CHAPTER 4

CONCLUSION AND FUTURE ENHANCEMENT

We conclude and make recommendations in this section based on our results.

We re-iterate the following as noted from our discussions of the results in the above section:

• In demonstration of the project, the infrared sensing part used to detect the passage of visitors worked and automatically control the electrical appliance in the room(Light and Fan)

• 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:

• The sensors should be positioned at the entrance in a way not to attract visitor’s attention.

• The device should be installed at a narrow entrance suitable for only one person to pass through at a

given time.

• An uninterruptible power supply should be introduced to the system to serve as a backup power supply.

In the near future, some institutions that deem it necessary to monitor their crowd may no longer rely solely on human auditors and unsophisticated counter systems to tally the number of visitors. We can also upgrade this project for SMOKE and FIRE detection with perfect technology in the future.

APPENDIX

CODE:

```
#include <Wire.h>
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27, 16, 2); // set the LCD address to 0x27 for a
16 chars and 2 line display
#define in 8                        //for in IR sensor
#define out 9                       //for out IR sensor
#define fan 10                      // for fan output
#define led 13
int count = 0; //for counting the number of person in the room
void setup()
{
    lcd.begin(16, 2); //16X2 LCD(16 column and 2 rows)
    lcd.backlight();
    lcd.print("Visitor Counter"); //to initially print on LCD
    delay(1000);                  //to produce delay of 1 sec
    pinMode(in, INPUT);           //input value stored in "in" variable
    pinMode(out, INPUT);          //output value stored in "out" variable
    pinMode(fan, OUTPUT);         //output value stored in "fan" variable
    pinMode(led, OUTPUT);
    lcd.clear();                  //empty the LCD screen
    lcd.print("Person In Room:"); //printing
    lcd.setCursor(1, 1);          //to move cursor in next line
    lcd.print(count);             // the value of count is printed
}
void loop() //Processing work
{
    int in_value = digitalRead(in);
    //to get the value from IN IR sensor
    int out_value = digitalRead(out);
    //to get the value from OUT IR sensor
    if (in_value == LOW)
    //if person enters the room
    {
        count++;
        //increases the count
        lcd.clear();
        //clear the lcd
```

```
        lcd.print("Person In Room:");
        //printing
        lcd.setCursor(0, 1);
        //to make cursor go to next line
        lcd.print(count); //display the count
        delay(1000);      //to produce 1 sec delay
    }
    else if (out_value == LOW) //if person exits
    {
        count--;       //decreasing count
        if (count > 0) //if there exist any person in the room
        {
            lcd.clear(); //printing the number of person
            lcd.print("Person In Room:");
            lcd.setCursor(0, 1);
            lcd.print(count);
            delay(1000);
        }
        else //but if there exist nobody in the room
        {
            count = 0;
            lcd.clear();                //clear the LCD
            lcd.print("Nobody In Room"); //printing
            digitalWrite(fan, LOW);      //switch of the fan
            lcd.setCursor(0, 1);
            lcd.print("0"); //displaying number 0
            delay(1000);    //to produce delay of 1 sec
        }
    }
    else if (in_value == HIGH && out_value == HIGH && count <= 0)

    //when no one enters or exits and count is 0

    {
        lcd.clear(); //clearing the LCD

        digitalWrite(fan, LOW);
        lcd.clear();
        //switch off the fan

        lcd.print("Nobody In Room");
        //printing
```

```
        lcd.setCursor(0, 1);
        lcd.print("Fan is Off");
        // fan is off
        delay(200);
        //producing 0.2 sec delay
    }
    else if (count > 5) //if there exist any person in the room
    {
        lcd.clear();
        lcd.print("Maximum Capacity");
        lcd.setCursor(0, 1);
        lcd.print("Reached!!");
        digitalWrite(led, HIGH);
        digitalWrite(fan, HIGH);
        delay(1000);
    }
    else if (count <= 5) //if there exist any person in the room
    {
        digitalWrite(fan, HIGH);
        digitalWrite(led, LOW);
        delay(1000);
    }
    else if (true) //if no one enters and no one exits but there is
someone present in the room
    {
        digitalWrite(fan, HIGH);
        //switch on the fan
    }
    else if (out_value == LOW) //if out detected then reduce count value
    {
        count--;
        lcd.clear();
        digitalWrite(fan, HIGH);      //switch on the fan
        lcd.print("Person in room:"); //displaying person in room
        lcd.setCursor(0, 1);
        lcd.print(count);
        delay(1000); //producing 1 sec delay
    }
    else
    {
        digitalWrite(fan, HIGH); //switch on the fan
    }
```

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