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COLLEGE OF ENGINEERING
NAAC Accredited Autonomous Institution
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Thalavapalayam, Karur-639 113, Tamilnadu.

A Minor Project Report on

IOT BASED ADVANCED VISITOR COUNTER SYSTEM

UNDER THE GUIDANCE OF

Mr.PL.SOMASUNDARAM (AP/EEE)

Department of Electrical and Electronics Engineering,

Submitted by

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

M.KUMARASAMY COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to Anna University, Chennai)

THALAVAPALAYAM,

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M.KUMARASAMY COLLEGE OF ENGINEERING

(Autonomous Institution affiliated to Anna University, Chennai)

BONAFIDE CERTIFICATE

Certified that this report titled **"IOT BASED ADVANCED VISITOR COUNTER SYSTEM"** is the bonafide work of **ABINAYA.P (20BEE4001), DHARUNISH.A.P (20BEE4015), SANTHOSH.K (20BEE4079)** out the work during the academic year (2021-2022) under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other project report.

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Submitted for Minor project –II (18EEP202L) Viva-Voice examination held at M.Kumarasamy College of Engineering,Karur-639113 on ……..

DECLARATION

We affirm that the Minor Project report titled **"IOT Based Advanced Visitor Counter System"** being submitted in partial fulfillment for the award of **Bachelor of Engineering** in **Electrical and Electronics Engineering**, is the original work carried out by us.

STUDENT NAME

ABINAYA P _____

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VISION AND MISSION OF THE INSTITUTION

VISION

- To emerge as a leader among the top institutions in the field of technical education

MISSION

- Produce smart technocrats with empirical knowledge who can surmount the global challenges.
- Create a diverse, fully-engaged, learner-centric campus environment to provide quality education to the students.
- Maintain mutually beneficial partnerships with our alumni, industry and professional associations.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

VISION

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- Produce hi-tech professionals in the field of Electrical and Electronics Engineering by inculcating core knowledge.
- Produce highly competent professionals with thrust on research.
- Provide personalized training to the students for enriching their skills.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- **PEO1:** Graduates will have flourishing career in the core areas of Electrical Engineering and allied disciplines.
- **PEO2:** Graduates will pursue higher studies and succeed in academic/research careers.
- **PEO3:** Graduates will be a successful entrepreneur in creating jobs related to Electrical and Electronics Engineering /allied disciplines.
- **PEO4:** Graduates will practice ethics and have habit of continuous learning for their success in the chosen career.

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After the successful completion of the B.E. Electrical and Electronics Engineering degree program, the students will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

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PROGRAM SPECIFIC OUTCOMES (PSOs)

The following are the program specific outcomes of Engineering Students:

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PSO2: Apply relevant models, resources and emerging tools and techniques to provide solutions to power and energy related issues & challenges.

PSO3: Design, Develop and implement methods and concepts to facilitate solutions for electrical and electronics engineering related real world problems.

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Our sincere thanks to **Thiru.M.Kumarasamy, Chairman** and **Dr.K.Ramakrishnan, B.E, Secretary** of **M.Kumarasamy College of Engineering** for providing extra ordinary infrastructure, which helped us to complete the Minor project in time.

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We would like to express my deep gratitude to our Minor Project Guide **Mr.PL.Somasundaram, Assistant Professor, M.E., Department of Electrical and Electronics Engineering,** for his constant encouragement, kind co-operation, valuable suggestions and support rendered in making our project a success.

We glad to thank all the **Faculty Members** of **Department of Electrical and Electronics Engineering** for extending a warm helping hand and valuable suggestions throughout the project.

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ABSTRACT

This project presents the design and construction of a IOT based digital visitor counter system. It is a reliable circuit that takes over the task of counting number of persons / visitors in the room (like visiting hall) very accurately and display the count not only in LCD but also in our smartphone using Godaddy cloud server. 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 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.

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LIST OF ABBREVIATIONS

S.No	ABBREVIATION	EXPANSION
1.	LCD	Liquid Crystal Display
2.	IOT	Internet Of Things
3.	IR	Infrared Red
4.	DC	Direct Current
5.	USB	Universal Serial Bus
6.	LED	Light Emitting Diode
7.	AC	Alternate Current
8.	EEPROM	Electrically Erasable Programmable Read Only Memory

CHAPTER 1

INTRODUCTION

1.1 Introduction

We have pleasure in introduction our new project "*IOT BASED ADVANCED VISITOR COUNTER SYSTEM".* This project is useful for monitoring the total number of visitors entering, exiting, and current visitors available from any part of the world using the Godaddy IoT cloud platform. Infrared or IR Sensors are used to count the total number of incoming and outcoming visitors. The Visitors' data is uploaded automatically to Godaddy cloud using the NodeMCU ESP8266 Wi-Fi Module.

1.2 Necessity

For automatic control of electrical appliances.

For saving electricity by using required amount of energy

Example : When there is no one in the room the appliances will be turned off.

For checking whether someone entered in the private space of the company/bank.

If the data on display unit is zero the security guards can shut the gate easily.

1.3 Scope of the work

By using this circuit and proper power supply we can implement various applications such as fans, tube lights etc…

We can use metal detectors and cameras for security reasons.

We can use sensors with has advanced technology than IR sensors.

We can able to analyze interest of customers in particular sections in the mall by seeing their count and we can able to plan accordingly for the development.

CHAPTER 2

SYSTEM MODEL

2.1 Introduction

Many electronic and electrical devices are used to make easy life style. There are many changes in human life due to the use of electronics, the tedious job become simple, the time required is also get shorted and many more advantages are observed. The visit counter is a one of those instruments which help to count the exact number of visitors at occasion where ever it is necessary. If we count the numbers, some time manual errors are introduced in it and we are unable to get correct information. But this can overcome with the use of our project.

2.2 Block Diagram

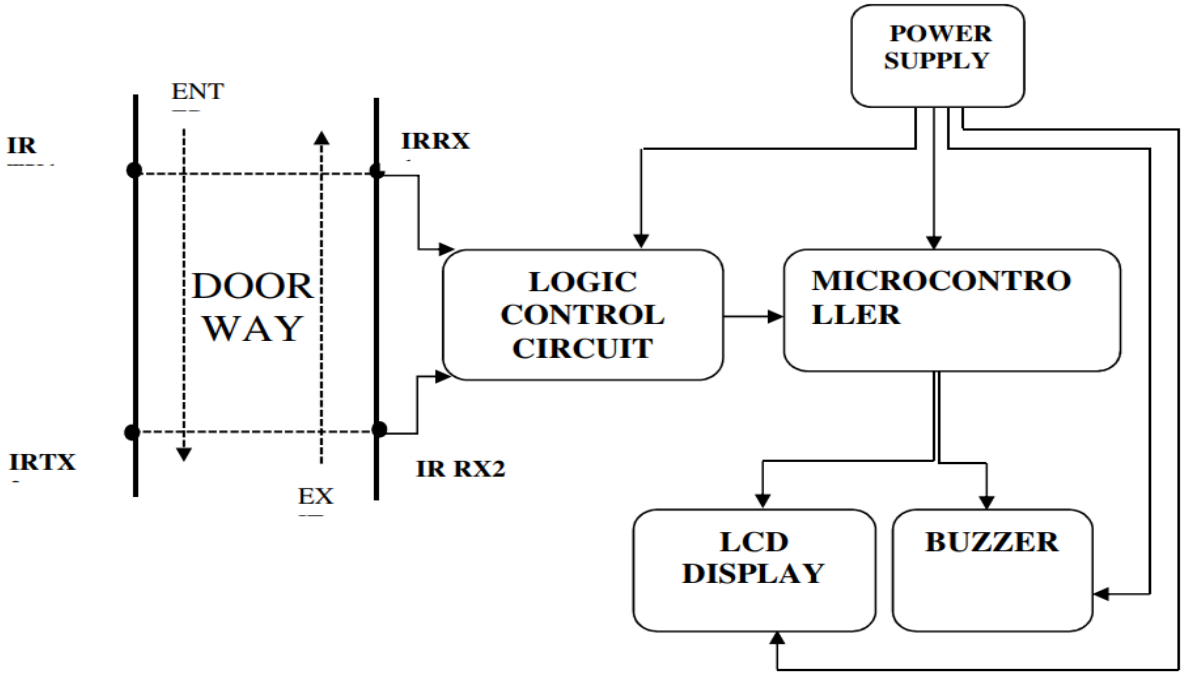


Figure 2.1 Block diagram of the system

2.3 Description of Various blocks

The basic block diagram of the IOT based advanced visitor counter with automatic light controller is shown in the above figure. Mainly this block diagram consists of the following essential blocks.

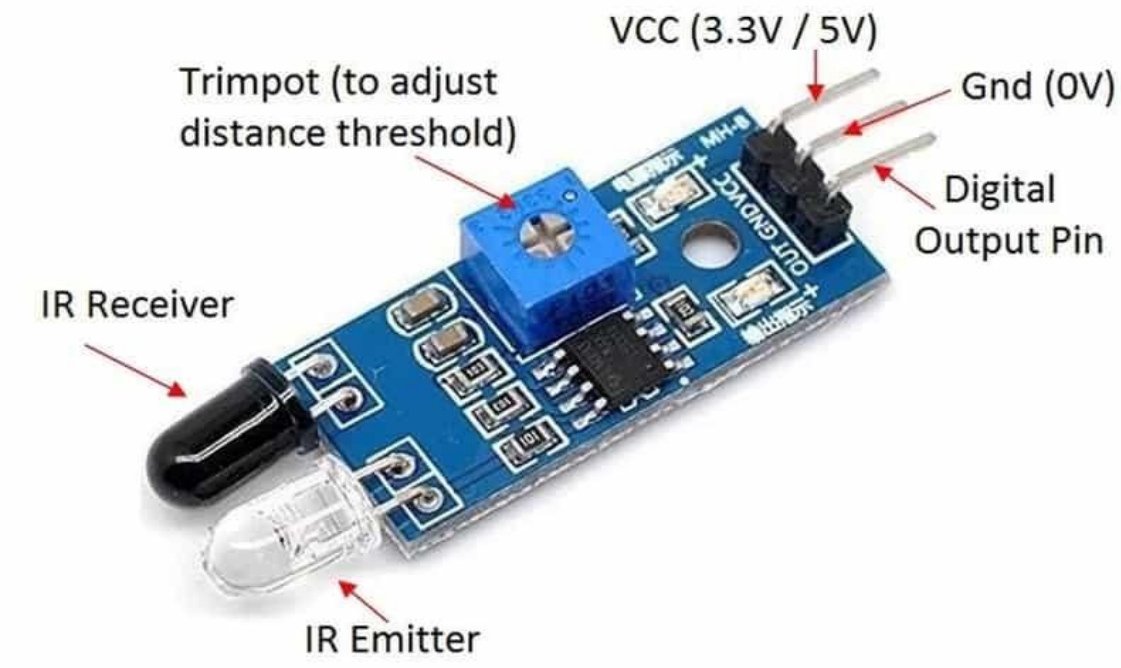
Power Supply

Here we used +5V dc power supply by using adapter which converts 100-240 V to 12V which was plugged into the Arduino board. The Arduino can be powered via the USB connection or with an external power supply. The power source is selected automatically. External (non USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1 mm center positive plug into the board's power jack. Leads from a battery can be inserted in the Ground and V_{in} pin headers of the POWER connector. The board can operate on an external supply of 6 to 20 volts. If supplied with less than 7V. however, the 5V pin may supply less than five volts and the board may be unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts. The main function of this block is to provide the required amount of voltage to essential circuits. +5V is given to 2 IR sensors and to a LCD display.

IR Sensors

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR

light received.



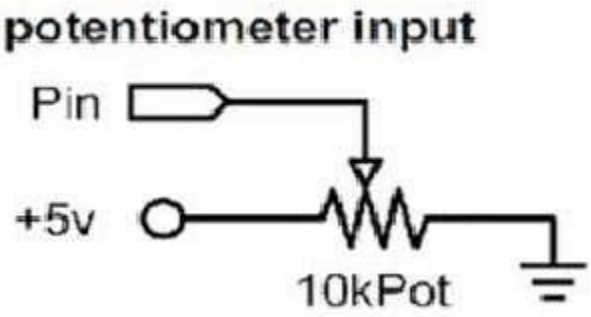
IR LED

An IR LED, also known as IR transmitter, is a special purpose LED that transmits infrared rays in the range of 760 nm wavelength. Such LEDs are usually made of gallium arsenide or aluminum gallium arsenide. They, along with IR receivers are commonly used as sensors.

The appearance is same as a common LED. 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.

10k POTENTIOMETER

Potentiometer (Pot) is another class of variable resistors and is used as an adjustable voltage divider. It consists of a fixed resistance track having connections at both ends and a sliding contact, called wiper, which moves along this track by turning the spindle. If only one of the connections and wiper are used, it behaves as a variable resistor or rheostat. In case wiper is not used, it will offer fixed resistance across the two connections. They are specified by their fixed value resistance.



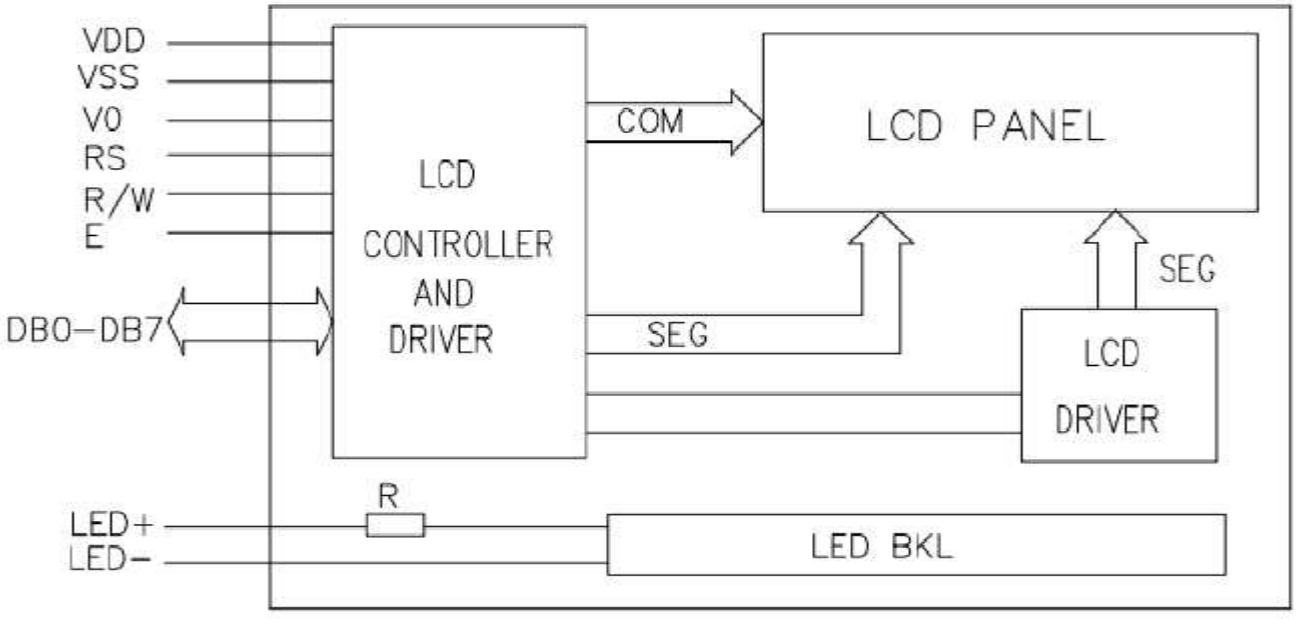
MICROCONTROLLER

The Arduino Uno has a number of facilities for communicating with a computer , another Arduino or other microcontrollers. It has 14 digital I/O pins, of which 6 can be used as PWM outputs and 6 analog input pins. These I/O pins account for 20 of the pins. As stated before, 20 of the pins function as I/O ports. This means they can function as an input to

the circuit or as output. Whether they are input or output is set in the software. 14 of the pins are digital pins, of which 6 can function to give PWM output: 6 of the pins are for analog input/output. Two of the pins are for the crystal oscillator. This is to provide a clock pulse for the Atmega chip. A clock pulse is needed for synchronization so that communication can occur in synchrony between the Atmega chip and a device that it is connected to The chip needs power so 2 of the pins, V_{cc} and GND, provide it power so that it can operate. It is the major component of our project since it controls all the functional elements of the system.

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



LCD Display Block Diagram

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.

BUZZER

An audio signaling device like a beeper or buzzer may be electromechanical or piezoelectric or mechanical type. The main function of this is to convert the signal from audio to sound. Generally, it is powered through DC voltage and used in timers, alarm devices, printers, alarms, computers, etc. Based on the various designs, it can generate different sounds like alarm, music, bell & siren. The working principle of a buzzer depends on the theory that, once the voltage is given across a piezoelectric material, then a pressure difference is produced. A piezo type includes piezo crystals among two conductors. Once a potential disparity is given across these crystals, then they thrust one conductor & drag the additional conductor through their internal property. So this continuous action will produce a sharp sound signal.

BUZZER

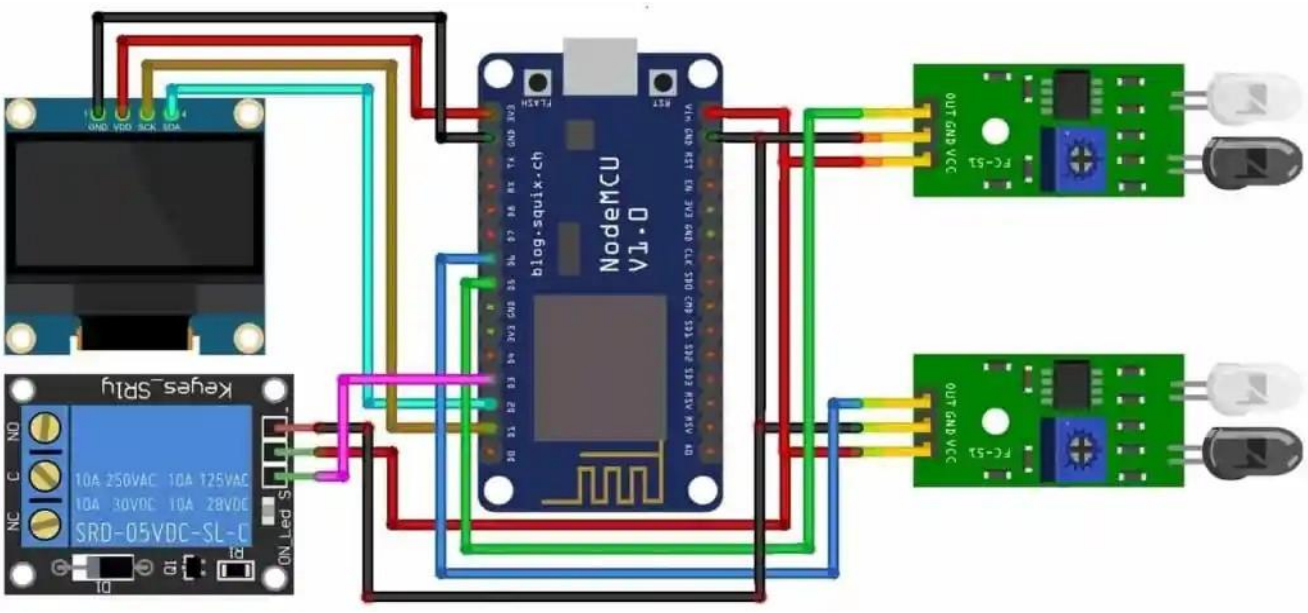
CHAPTER 3

HARDWARE DESCRIPTION

3.1 Introduction

Electricity is one of the most important resource in this century. Many times we need to monitor the Electricity is one of the most important resources in this century. Many times we need to monitor the person/people visiting some place like Auditorium. You can use this ESP8266 NodeMCU based IoT Bidirectional Visitor counter in the hall, shopping mall, office entrance gate to count the total number of visitors. This device counts the total number of visitors entering through the gate & also counts the total number of visitors exiting through the different gates. Basically, it calculates the total number of current visitors by subtracting the outgoing visitor from the incoming visitor. When a single person enters the room, the light turns on automatically. Whenever there are no visitors present in the room, the light turns off automatically.

3.2 Circuit diagram



3.2 Circuit Diagram of the System

3.3 Hardware Components

We can make this IoT Based Advanced Visitor Counter system using ESP8266 Wi-Fi Module, a pair of IR Sensor, SSD1306 OLED Display, and a Relay Module. The Circuit Diagram for IoT Based Advanced Visitor Counter system using NodeMCU ESP8266 is very simple. I designed the circuit diagram for this project using Fritzing Software. Connect the I2C Pins (SDA & SCL) of 0.96″ SSD1306 OLED Display with NodeMCU D2 & D1 Pins. Interface the output pin of the pair of IR Sensors to the D5 & D6 pin of NodeMCU. We will use one of the IR Sensors in the Entrance gate for counting incoming visitors and the other in the exit gate for counting the outgoing visitor. Similarly, connect a 5V Relay Module to the D4 Pin of ESP8266. Both the IR Sensors and Relay Module works at 5V VCC. You can supply a 5V power supply from a NodeMCU V_{in} pin

Setting Up Godaddy Cloud Server

We need to set up the Godaddy cloud server App to receive the Visitor Counter data from the ESP8266 NodeMCU board. To set up Godaddy

Click on **create** a new project

Provide the Name of your project as "IoT Visitor Counter"

Choose **NodeMCU** Dev Board

Select connection type as **Wi-Fi**, then click on Create Button.

They sent the Godaddy cloud server authentication token to your email address.

Now, click on the (+) icon at the top right corner of the screen.

Search for the "Value Display" widget and add 3 of them to your main screen.

Also, add Super Chart Widget to the main screen.

Click on the First Value Display.

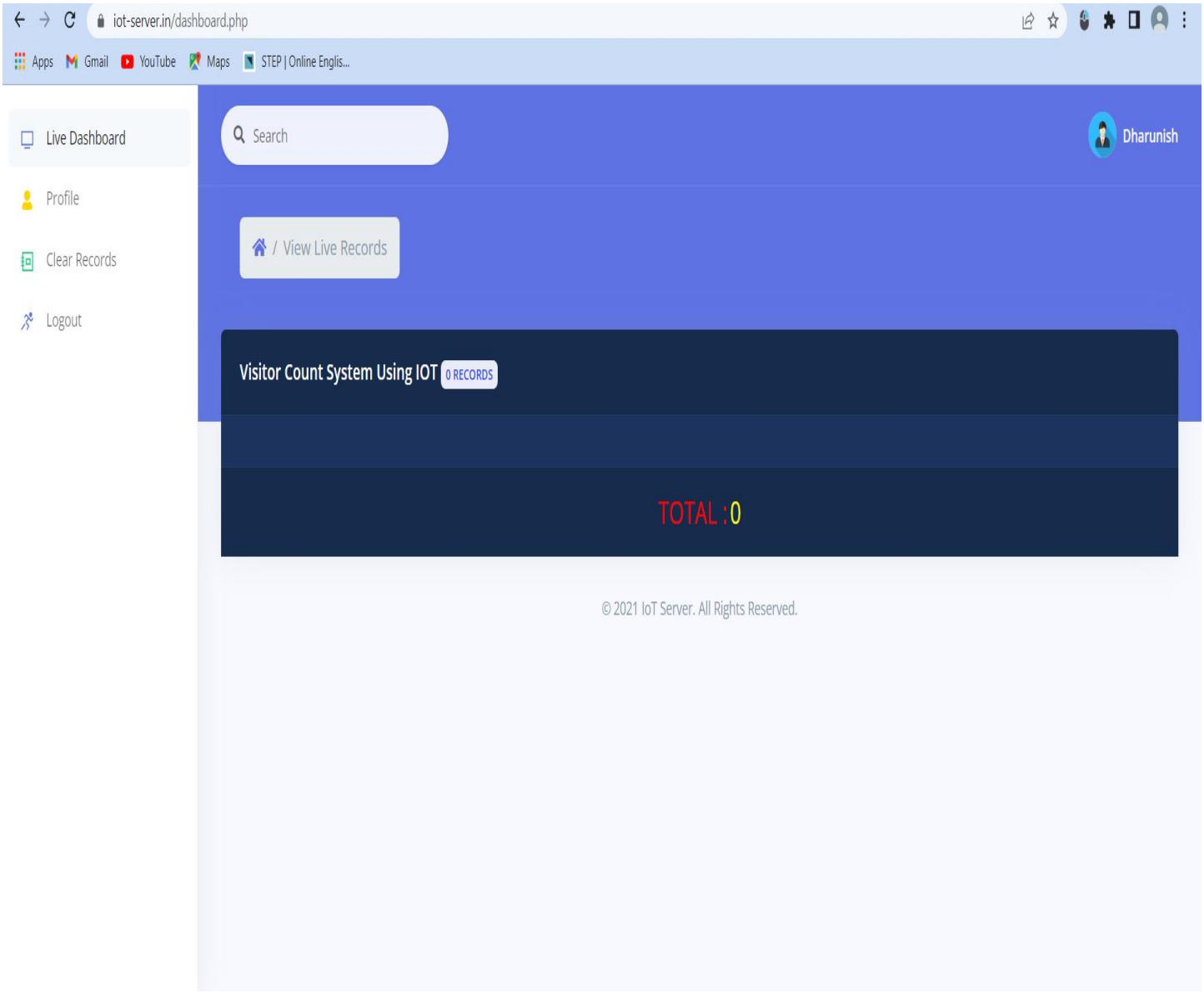
Name it as "Visitors Now"

Set the Input Pin to Virtual Pin V3, Enter input Range & Choose the refresh rate as 1sec.

You can set colors and fonts size according to your need.

Similarly, do the same for Visitors In, Out.

Finally, the Godaddy cloud server setup for IoT Bidirectional Visitor Counter using NodeMCU ESP8266 is completed



COST OF THE PROJECT

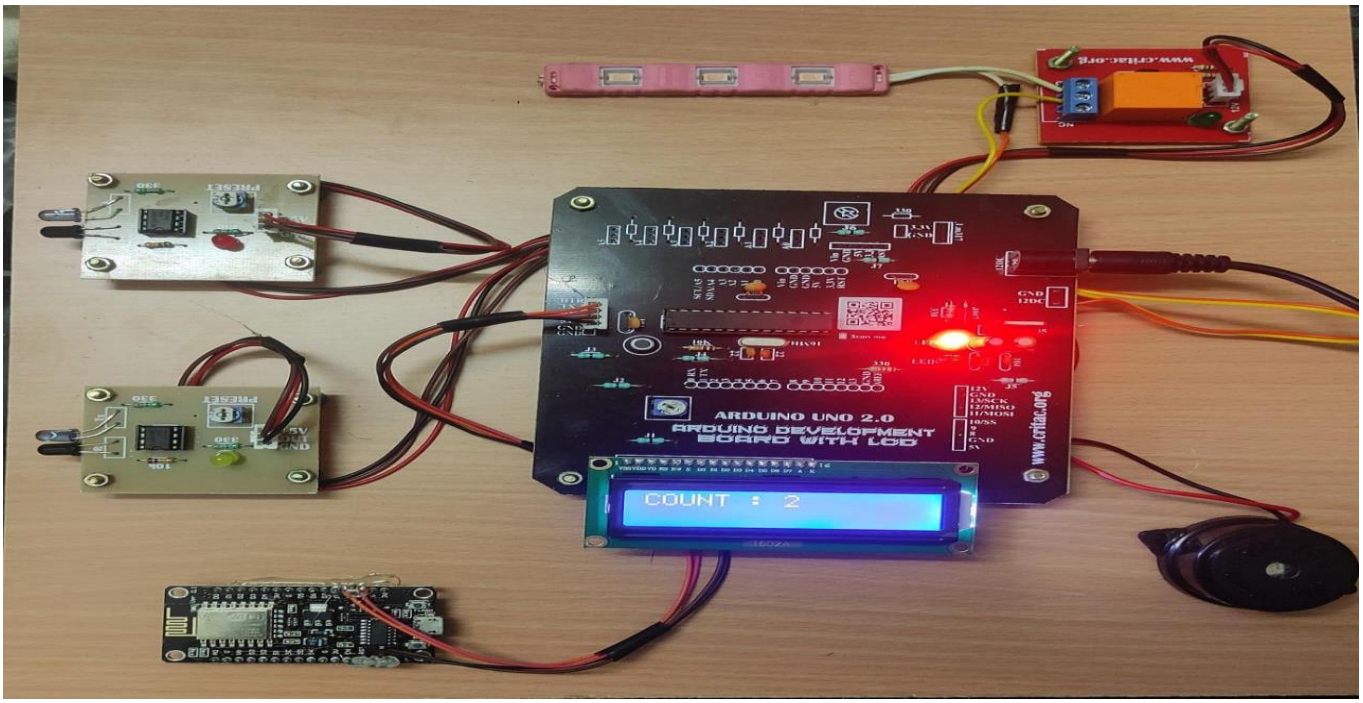
COMPONENTS USED	COST IN RS
Arduino UNO	550
IR Sensors	120
NODEMCU/ESP8266	450
Relay Driver	100
Buzzer	50
LCD Display	300
Power Supply Adapter	250
TOTAL	Rs:1820

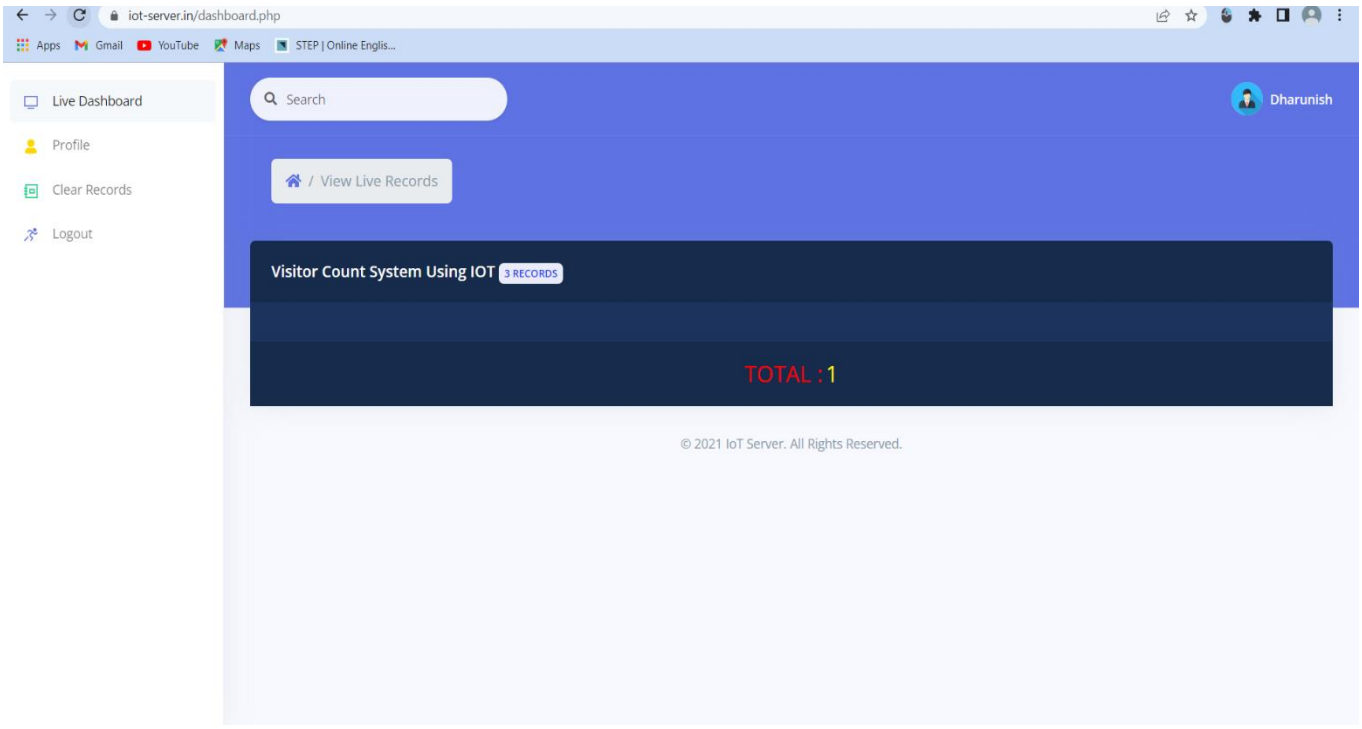
3.1 Hardware Components and its Cost

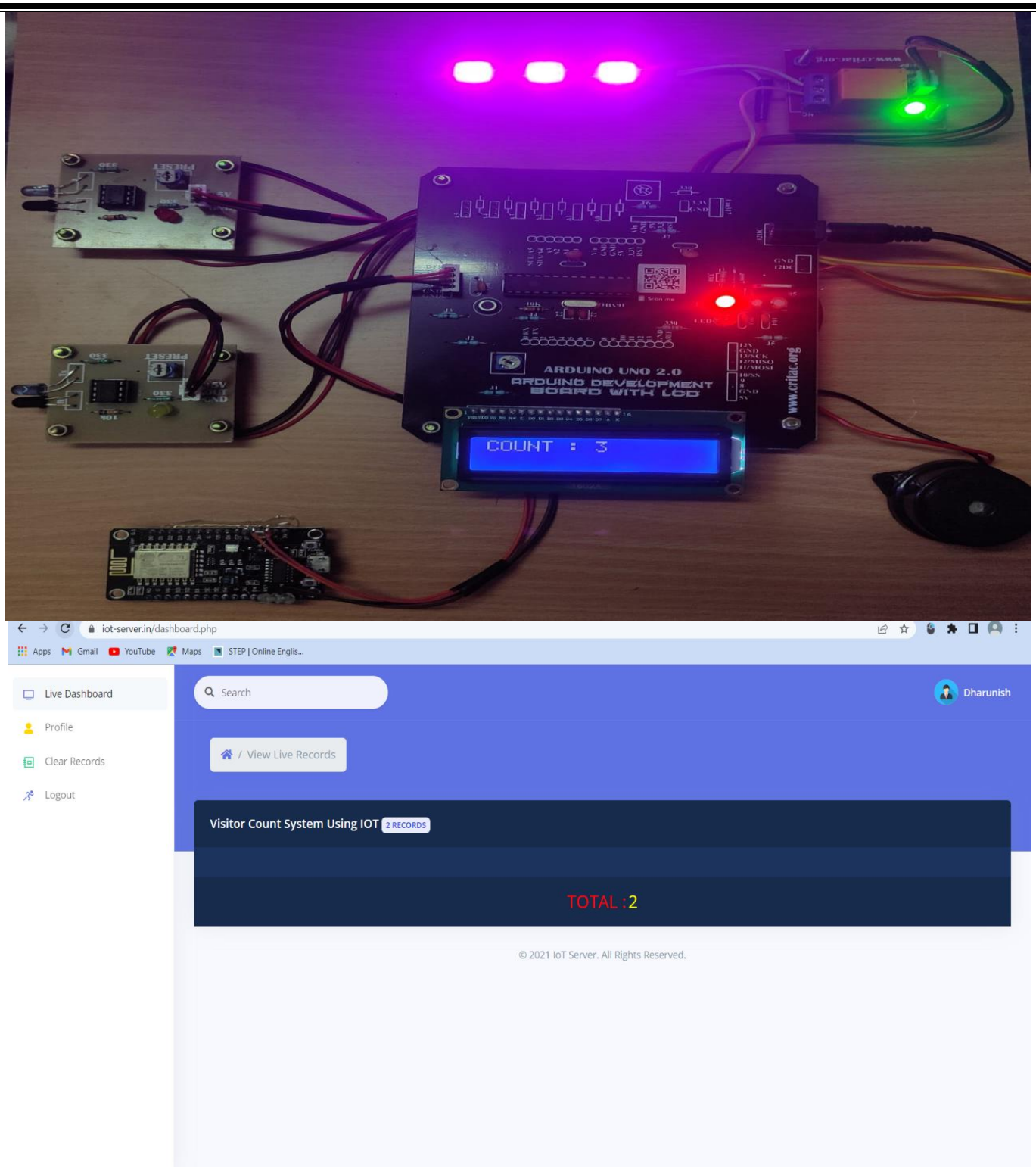
CHAPTER 4

RESULT AND DISCUSSION

4.1 Hardware Implementation







4.1 Experimental Setup

SOFTWARE IMPLEMENTATION

```
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>
#include <Godaddy.h>
#include <ESP8266WiFi.h>
#include <GodaddySimpleEsp8266.h>

#define SCREEN_WIDTH 128    // OLED display width, in pixels
#define SCREEN_HEIGHT 64    // OLED display height, in pixels
#define OLED_RESET -1       // Reset pin # (or -1 if sharing Arduino reset pin)
Adafruit_SSD1306 display(SCREEN_WIDTH, SCREEN_HEIGHT, &Wire, OLED_RESET);

char auth[] = "xxxxx-xxxxx-xxxx";         // You should get Auth Token in the Godaddy App.
char ssid[] = "xxxxx-xxxxx-xxxx";                    // Your WiFi credentials.
char pass[] = "xxxxx-xxxxx-xxxx";

#define inSensor 14 //D5
#define outSensor 12 //D6

int inStatus;
int outStatus;

int countin = 0;
int countout = 0;
```

```
int in;
int out;
int now;

#define relay 0 //D3
WidgetLED light(V0);

void setup()
{
  Serial.begin(115200);
  Godaddy.begin(auth, ssid, pass);
  delay(1000);  // wait a second
  display.begin(SSD1306_SWITCHCAPVCC, 0x3C); //initialize with the I2C addr 0x3C (128x64)
  delay(2000);
  pinMode(inSensor, INPUT);
  pinMode(outSensor, INPUT);
  pinMode(relay, OUTPUT);
  digitalWrite(relay, HIGH);

  Serial.println("Visitor Counter Demo");
  display.clearDisplay();
  display.setTextSize(2);
  display.setTextColor(WHITE);
  display.setCursor(20, 20);
  display.print("Visitor");
  display.setCursor(20, 40);
  display.print("Counter");
  display.display();
```

```
  delay(3000);
}

void loop()
{
  Godaddy.run(); // Initiates Blynk
  inStatus =  digitalRead(inSensor);
  outStatus = digitalRead(outSensor);
  if (inStatus == 0)
  {
    in = countin++;
  }

  if (outStatus == 0)
  {
    out = countout++;
  }

  now = in - out;

  if (now <= 0)
  {
    digitalWrite(relay, HIGH);
    light.off();
    display.clearDisplay();
    display.setTextSize(2);
    display.setTextColor(WHITE);
    display.setCursor(0, 15);
    display.print("No Visitor");
```

```
  display.setCursor(5, 40);
  display.print("Light Off");
  display.display();
  Serial.println("No Visitors! Light Off");
  delay(500);
}
else
{
  digitalWrite(relay, LOW);
  light.on();

  display.clearDisplay();
  display.setTextColor(WHITE);

  display.setTextSize(1);
  display.setCursor(15, 0);
  display.print("Current Visitor");
  display.setTextSize(2);
  display.setCursor(50, 15);
  display.print(now);

  display.setTextSize(1);
  display.setCursor(0, 40);
  display.print("IN: ");
  display.print(in);

  display.setTextSize(1);
  display.setCursor(70, 40);
  display.print("OUT: ");
```

```
    display.print(out);

    display.display();
    Serial.print("Current Visitor: ");
    Serial.println(now);
    Serial.print("IN: ");
    Serial.println(in);
    Serial.print("OUT: ");
    Serial.println(out);
    delay(500);
  }
  Godaddy.virtualWrite(V1, in); // Visitors In
  Godaddy.virtualWrite(V2, out); // Visitors Out
  Godaddy.virtualWrite(V3, now); // Current Visitors
  delay(1000);
}
```

4.2 Working of Project model

When the system is powered ON, the microcontroller initially initializes the stack pointer and all other variables. It then scans the input pins (P2.0 and P2.1).

In the meantime, when there is no object in front of the IR Sensors, the light from the IR LED would not fall on the Photo Diode of the first sensor pair and hence, the Photo Diode doesn't conduct.

As a result, the output of the IR sensors is LOW. In other words, ports P2.0 and P2.1 are at logic LOW level. If there is a person in front of the IR Sensors, IR light from the IR LED reflects from the person and falls on the Photo Diode.

As a result, the Photo Diode starts conducting and the output of the sensor becomes HIGH. In other words, the ports P2.0 and P2.1 are at logic HIGH level.

Now when a transition takes place, i.e. a logic HIGH level is received, first at port P2.0 and then at P2.1, the microcontroller sees this as an interruption to sense the passage or entry of a person or an object in front of the IR LED and the Photo Diode.

As per the program, the count value is increased and this value is displayed on the 16 x 2 LCD Display.

If the microcontroller senses logic HIGH, first on the P2.1 and then on P2.0, it assumes that the person is leaving the room and as per the program, the microcontroller decreases the count as displays the same on the LCD.

The program ensures that the count is increased or decreased only when both the sensors detect the person and this outcome can also be seen in the Godaddy cloud server in (n+1) as result.

If the IR sensor 1 detects first next to IR sensor 2 then it indicates that the person is entering into the hall whereas if the IR sensor 2 detects first next to IR sensor 1 then it indicates that the person is leaving the hall.

The corresponding outcome shown in the display differ with the server outcome since the first outcome of the system is used for the checking process and hence the sever outcome assumed to be n+1 compared to n LCD outcome of the system.

CHAPTER 5

CONCLUSION AND FUTURE SCOPE

5.1 CONCLUSION

The theme of the project when merged with certain established technologies can be quite effective in number of countries like Germany, Japan and France etc which control the train. The project is useful in developing countries and this project has a bright future. This project helps us to control the light fan and home appliances automatically and counts the number of persons entering and leaving the room by modifying this circuit and using four relays we can achieve a task, of opening and closing the door and can be implemented to every high voltage controllable appliance which has to automated by sensing

5.2 Future Scope

We can send this data to a remote location using mobile or internet. Voice alarm system can be added to indicate that room is full and persons can't enter inside. We can increase the maximum number of persons that can be counted by implementing the EEPROM in Arduino. We can add a Bluetooth module for communication This can be basic for home automation system Making android app and connecting and operation can be done Using for INTERNET OF THINGS(IOT) The board may be extended and module can be upgraded. By using this circuit and proper power supply we can implement various applications such as fans, tube lights, etc. By modifying this circuit and using two relays we can achieve a task of opening and closing the door.

5.3 Applications

The IOT Based Advanced Visitor Counter circuit can be used domestically to get an indication of number of persons entering a party.

It can be used at official meetings.

It can be used at homes and other places to keep a check on the number of persons entering a secured place.

It can also be used as home automation system to ensure energy saving by switching on the loads and fans only when needed.

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