DESIGN AND IMPLEMENTATION OF BTS ROOM IN CABINET CONTROLLER

By

Razu Biswas

ID: 163-33-346

Ariful Islam

ID:163-33-3676

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Supervised By

Md. Mahbub-Ud-Jaman

Lecturer

Faculty of Engineering

Daffodil International University

Daffodil International University

Dhaka, Bangladesh

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TO

OUR BELOVED PARENTS

&

HONOURABLE

Lecturer Md. Mahbub-Ud-Jaman

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ABSTRACT

our project name is a design and implementation of monitoring and survellence of BTS room in cellular network. The main purpose in our project is high protection of BTS room. Various kind of expensive electrical and electronic devices has in BTS room. We need security in the BTS room for protect the device. In thisBTS system the room is located at place where illegal human intrusion, fire, stolen and many other unexpected incidents can occurs.so remote monitoring is a must needed service for these rooms. Security system is an active process because when any accident occurs in the BTS room, to active sound alarm and GSM system gives the SMS for being conscious about security system. Then it immediately alerts the consumer by sending SMS to specified mobile phone and alert the people at BTS room by activating the alarm and display the message on LCD display to take the necessary action. This paper provides the design method on both software and hardware.

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LIST OF ABBREVIATIONS

GSM   Global System for Mobile

PCB   Printed circuit Board

SMS   Short message service

SIM   Subscriber identity module

LED   Light emitting Diode

LCD   Liquid Crystal Display

BTS Base Transceiver Station

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Now-a-days, main problem in the BTS room interred illegal people, temperature increasing in the BTS room, smoke fire and stolen of battery etc. Various kind of expensive electrical and electronic device has in BTS room. We need security in the BTS room for protect the device. Because of this problem has a possibility of accident in the BTS room. In this project we used five types of sensor, like: Battery Sensor, Smoke Sensor, Temperature Sensor, Door Sensor, Battery Protection Sensor.

We can protect the BTS room by using BTS security system. Security system is an active process if any problems occur in the BTS room, to active sound alarm and SMS will send to the customer mobile phone. BTS room for this reason is saved from the accidents.

1.2 OBJECTIVE

Main objective of this projects are below:

1.Battery charging control.

2.Battery protection.

3.Temperature control and alarm.

4.Smoke detection.

5.Alarm generate when door open.

6.And sent every alarm to mobile phone using GSM.

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1.3 METHODOLOGY

Fast of all we collect all related data from Google and YouTube

1. Make a circuit diagram and Block diagram using Eagle Software.
2. Create a component list.
3. Collect all parts from market.
   - Develop hardware.
   - Develop software.
   - Run program.
   - Collect Result.

1.4 BACKGROUND STUDY

BTS rooms are commonly fixed with refined and clearly expensive electrical and electronics devices which need steady assessment to guarantee that those devices are safe and operational.

Studying the area of these rooms it can be found that these rooms are situated in such a position where illegal human intrusion, fire and many other unexpected occurrences can happen.so remote observing is a must necessity required help for these rooms.

An intelligent alarm system can easily assist in this occurrence by studying all the factors of keeping the room security from the unexpected situations. The system should be such that it can monitoring room temperature all the time and creates alarm when the temperature goes above the set temperature as the ambient temperature requirement is -5 degree Celsius and is commanded to be always kept between 15 degrees Celsius to 30 degrees Celsius.

It likewise can identity if any kind of smoke, thus a fire happens in the room and eventually creates an alarm. Framework is likewise furnished with sensors which can recognize any benevolent water drainage in the room. Any kind of human intrusion though the door can likewise be easily tracked by this framework.

1.5 ORGANIZATION OF THE REPORT

This thesis report has seven chapters in altogether. Thechapter firstdefines an idea about our project "design and implementation of monitoring and surveillance of BTS room", Brief description of the project, Objective and methodology, Background Study. The second chapter about history, block diagram, circuit diagram, list of components. The chapter third about component description of our system. The chapter fourth hardware implementation. The chapter five software analysis and program explanation hardware implementation. Then chapter six describes result & discussion properly. Finally, chapter seven gives the concluding remarks, limitation of our system and suggestion for the future works.

CHAPTER 2

SYSTEM REVIEWS

2.1 INTRODUCTION

Cellular communication turns into the significant method of communication in present century. With the development of this phase of communication the globalization procedure is likewise in its peak of speed. The development of cellular communication is largely dependent on the development and stability of Base Transceiver Station (BTS) room. So for the purpose of the development of cellular communication a large amount to BTS rooms are installed throughout the world. To confirm proper support from BTS rooms there must be a security system to escape any unnecessary vulnerability.

Thus, multiple alarm system is designed to secure the BTS rooms from any undesired situations. This system is planned with a PIC Microcontroller as a main controller and a few sensors are interfaced with it to give high temperature alarm, smoke alarm, door alarm and water alarm. All these alarms are interfaced with the alarm box in the BTS room which gives the present status directly to Network Management Centre (NMC) of a Global System for Mobile (GSM) communication network.

In this chapter we will discuss aboutBlock diagram & circuit diagram of our System.

2.2 GENERAL BLOCK DIAGRAM

The block diagram of design and implementation of monitoring and survellenceof BTS room in cellular network as show in fig-2.1. using Arduino Nano, we can operate the five type of sensor (smoke sensor, door sensor, battery sensor, temperature sensor, battery protection sensor), GSM Module (SIM 800L), Buzzer and LCD Display. Security system is an active process if any problems occur in the BTS room, at this time control unit (Arduino Nano) will read sensor output and to active sound alarm and SMS will send to the customer mobile phone, send status message commands to LCD module.
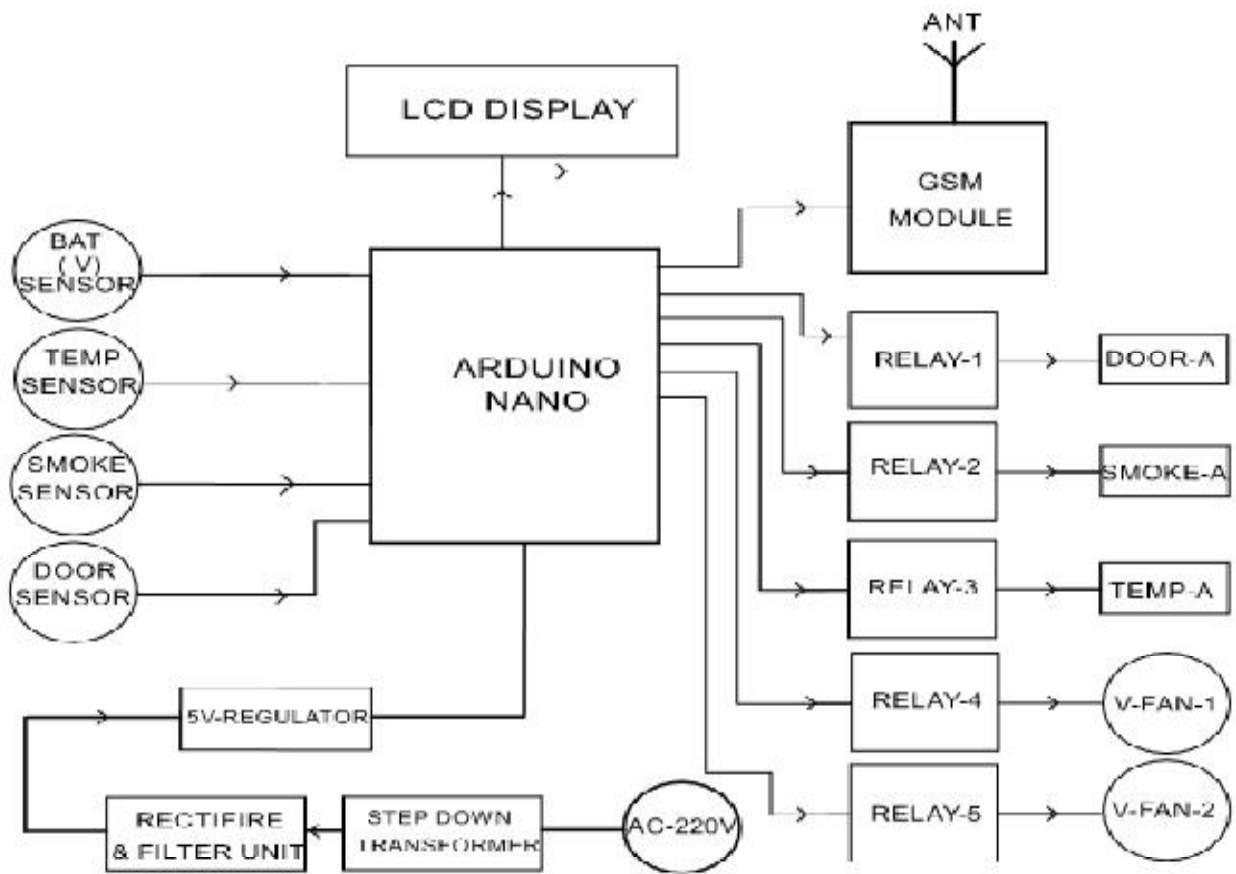
FIG.2.1:DESIGN AND IMPLEMENTATION OF MONITORING AND SURVELLENCE PF BTS
ROOM IN CELLULAR NETWORK

2.3 CIRCUIT DIAGRAM
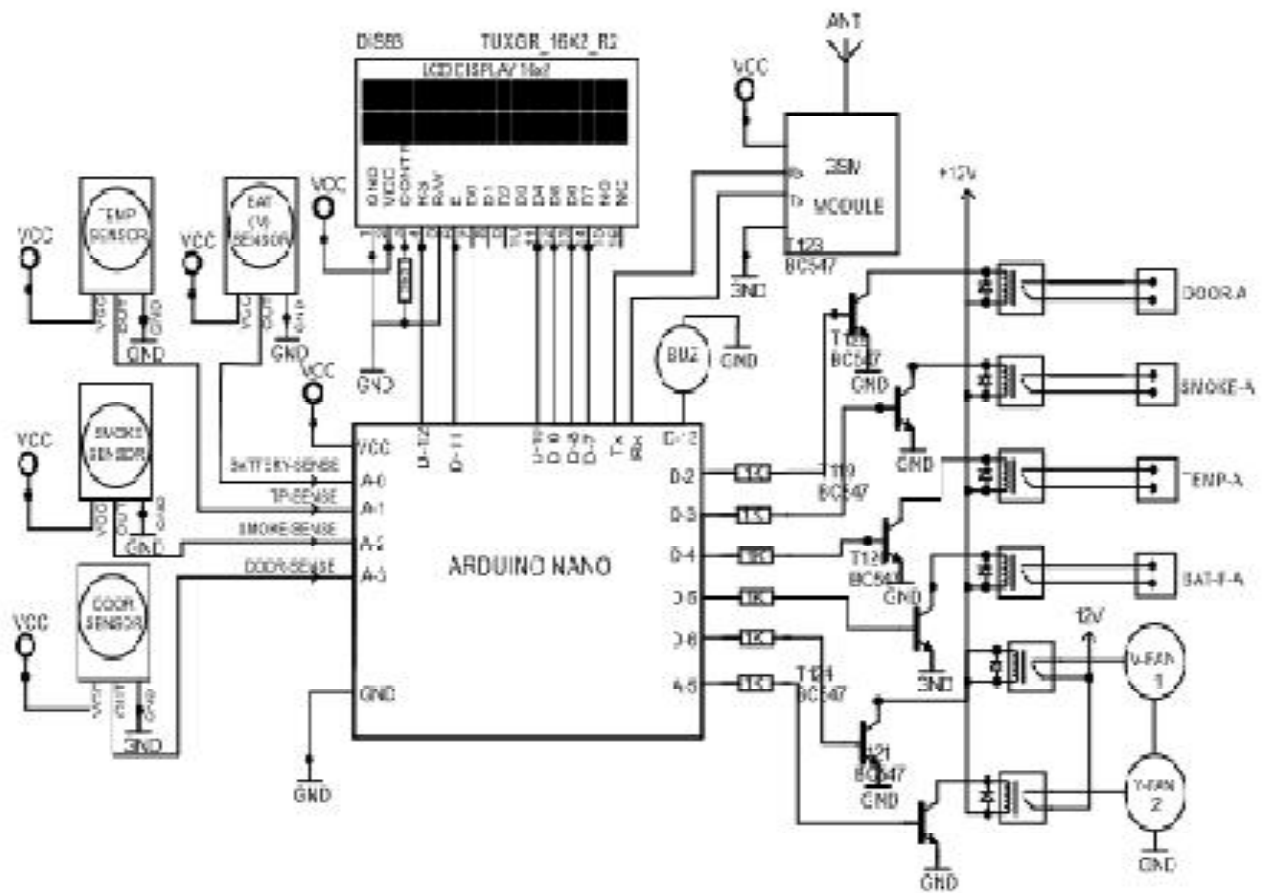
FIG.2.2:DESIGN AND IMPLEMENTATION OF MONITORING AND SURVELLENCE OF BTS ROOM CELLULAR NETWORK

2.3.1: WORKING PROCESS OF OUR CIRCUIT

The BTS room security System is made up of the following major components, Arduino Nano,LCD Display, Buzzer, GSM Module (SIM800L), Smoke Sensor (MQ2), BatterySensor, Temperature Sensor, DoorSensor, Battery Protection Sensor. Figure-2.2 shows the design and implementation of monitoring and survellence of BTS room cellular network. The characteristics of circuit diagram in the below.

2.3.1.a : BATTERY SENSOR:

Battery Sensor, whose output is connected to analog pin A0 of control unit. The Battery Sensor is very important component in the BTS room security system.

2.3.1.b: TEMPERATURE SENSOR:

Temperature Sensor, whose output is connected to analog pin A1 of control unit.The Temperature Sensor is very important component in the BTS room security system. For controlling the temperature in BTS room we use two ventilation fan. When the temperature of BTS room will normal then one ventilation fan will rotate.

But when the temperature wills 42 degrees above then temperature sensor sendsoutput signal to microcontroller. Microcontroller output signal send buzzer. the buzzer alarm will below by microcontroller output, LCD show it and GSM Module send the SMS and alert the system. At this time control unit (Arduino Nano) will read sensor output and to active sound alarm and SMS will send to the customer mobile phone, send and status message commands to LCD module.

2.3.1.b: SMOKE SENSOR:

The sensor MQ6 has six pins, four of them are used to fetch signal, and other two are used for providing warming current.Smoke Sensor, whose output is connected to analog pin A2 of control unit. The unit detects 200ppm to 10000ppm of natural gas, smoke, LPG, propane, LNG etc.

The Smoke Sensor is very important component in the BTS room security system. When gas leak (smoke, LPG, propane etc.) occurs in the BTS room, then to active sound alarmand GSM system gives the SMS for being conscious about security system. SMS will send to the customer mobile phone, send and status message commands to LCD module. BTS room for this reason is saved from the accident.

2.3.1.c: DOOR SENSOR:

Door Sensor, whose output is connected to analog pin A3 of control unit. The Door Sensor is very important component in the BTS room security system. There are various kind of expensive device in the BTS room. So all the illegal human intrusion will forbid at BTS room. If any illegal peoples enter the BTS room, to active sound alarm, SMS alert, and status message commands to LCD module.

2.3.1.c: BATTERY PROTECTION SENSOR:

Battery Protection Sensor, whose output is connected to analog pin A4 of control unit. The Battery Protection Sensor is very important component in the BTS room security system. So high expensive battery is used in the BTS room. For that reasons to protect battery we used two wire connections. It also reduces to stolen the battery. If any one touch the battery, then battery protection sensor sends output signal to microcontroller. Microcontroller output signal send Buzzer then activate the Buzzer. At this time control unit (Arduino Nano) will read sensor output and to active sound alarm and SMS will send to the customer mobile phone, and status message commands to show LCD module.

2.4 LIST OF COMPONENTS

SI NO	COMPONENT NAME	QUANTITY	USED
1.	LCD DISPLAY	1	To show the sensor's behavior.
2.	TEMPERATURE SENSOR	1	To Detect Temperature
3.	ARDUINO NANO	1	To Control the System.
4.	12V STEP DOWN TRANSFORMER	1	
5.	12 VOLT RELAY	6	The flow of electric current
6.	SMOKE SENSOR	1	To Detect Smoke
7.	IR MODULE	1	To Send the SMS at mobile.
8.	BC 547 TRANSISTOR	6	Amplifier
9.	LED	7	
10.	POWER SWITCH	1	To power on-off
11.	7805 REGULATOR	1	To regulate 12 to 5v
12.	RESISTOR	4	To offer resistance
13.	RESISTOR – 2.2K	1	To offer resistance
14.	DC FAN	2	To colling

15.	RECHAGRABLE BATTERY	1	
16.	GSM DOMULE	1	To Send the SMS at mobile.
17.	TIP 122	1	To regulate 12v

2.5 CONCLUSION

The main purpose of our project is high protection of BTS room. We need security in the BTS room for protect the device. If any problem occurs in BTS room then, to activate sound alarm, SMS alert and show LCD display.

CHAPTER 3

COMPONENT DESCRIPTION

3.1 INTRODUCTION

System hardware composed of design and implementation of monitoring and survellance of BTS room, Microcontroller with GSM module, display.In this chapter we will discuss about component description, features, working procedure and cost analysis of our all component.

3.2 DESCRIPTION OF SENSOR (MQ2)
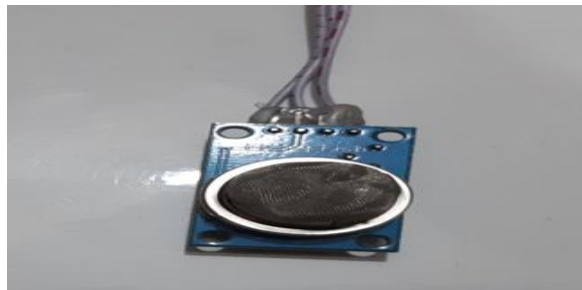
FIG.3.1: MQ2 SENSOR

MQ2 Sensor is the foundation of this gadget and it detects the nearness or nonappearance of the LPG gas. This indicator has a quick response and incites a steady and long lifetime. It gives high affectability not exclusively to LPG yet additionally to iso-butane and propane. It has low affectability to liquor and smoke. The fundamental stature of the sensor is 23 ± 5% mm and it has a width of 20 ± 5% mm. The identifier can distinguish the gas fixations somewhere in the range of 200 p.m. to 10000 p.m. In this identifier the MQ-2 sensor goes about as the detecting component and can be considered the sense organ of the framework. In the event that a gas is watched, at that point the sensor nourishes the yield as high and when no gas is found then it makes a low turnout. The fundamental working of the sensor can be keyed out as when the gas collaborates with the indicator, it gets ionized into its fixings and it is involved by the

detecting segment. This retention changes the potential distinction and a present therefore courses through the associating leads and this current is named as warming current.

The benefit of detecting opposition changes as the present coursing through it changes and consequently the gas break is watched. The sensor can likewise detect iso-butane, propane, LNG and tobacco smoke.

3.2.1 APPLICATIONS OF SENSOR

They are utilized in gas spillage recognizing hardware in industry and family, are reasonable for identifying of LPG,Propane, LNG, iso-butane, maintain a strategic distance from the commotion of liquor and cooking exhaust and tobacco smoke.

3.2.2 FEATURES OF SENSOR

1. High sensitivity to iso-butane, LPG, propane..
2. Small sensitivity to tobaccosmoke, alcohol.
3. Stable and long life.
4. Simple drive circuit.
5. Fast Response.

3.2.3 SPECIFICATIONS OF SENSOR(MQ2)

Standard work condition

Symbol	Parameter name	Technical condition	remarks
V_C	Circuit voltage	5V±0.1	AC or DC
V_H	Heating voltage	5V0±0.1	AC or DC
P_L	Load resistance	20KΩ	
R_H	Heating resistance	33Ω ±5%	Room temperature
P_H	Heating consumption	Less than 750mw	

Environment condition

symbol	Parameter name	Technical condition	remarks
T_{ao}	Using tem	-10°C-50°C	
T_{as}	Storage tem	-20°C -50°C	
R_H	Related humidity		
O_2	Oxygen concentration	21% oxygen concentration can affect sensitivity	Minimum value is over 2%

Sensitivity characteristics

Symbol	Parameter name	Technicalparameter	Remarks
RS	Sensing resistor	10-60	Detecting
A(1000ppm/4000ppmLPG)	Concentration slop rate	0.6	concentration scope:
Standard detecting condition	Tem:20°C± 2°C Humidity:65%±5%		200-10000ppm LPG ,Propane ,iso-butane
Preheat time	Over 24 hour		

3.2.4 SENSITIVITY ADJUSTMENT:

Now, we can develop the concentration of gas from the value figure:
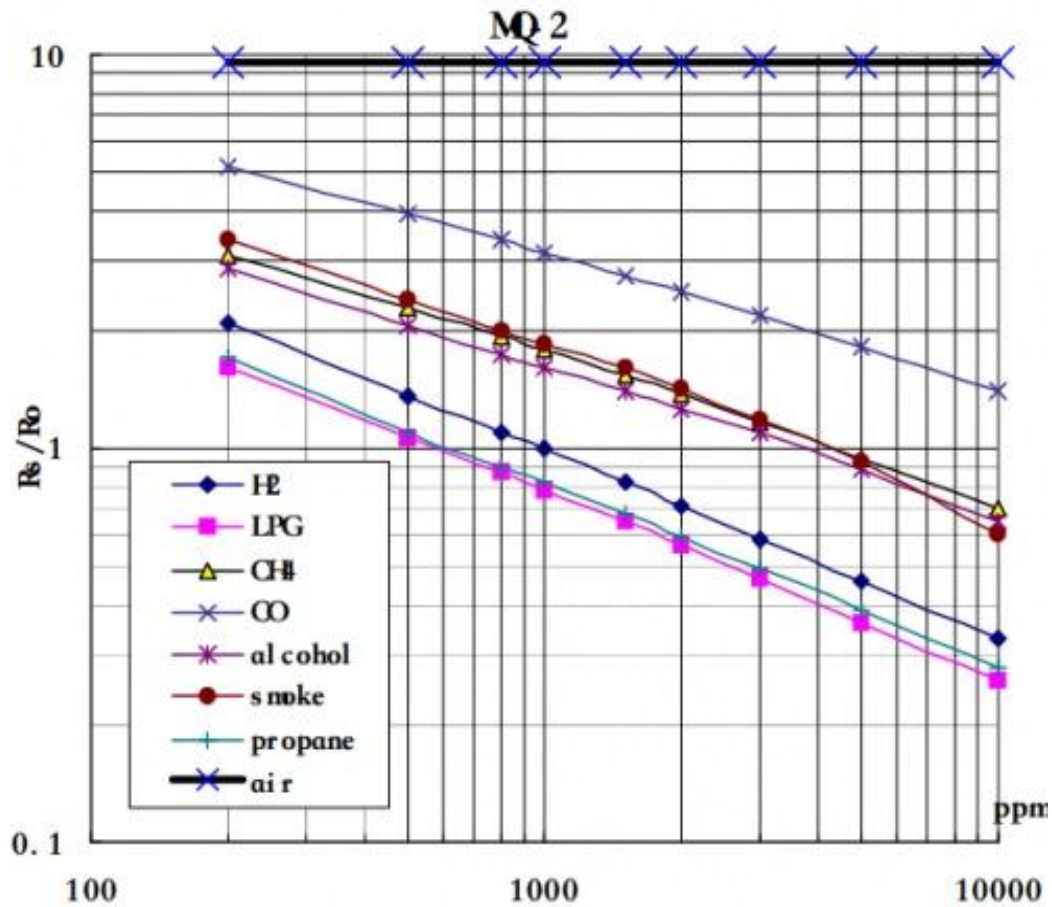
FIQ.3.6: TYPICAL SENSITIVITY CHARACTERISTICS

As indicates by the show figure, we can see that the minimum attention we can check is 100ppm and the maximum is 1000ppm, we can get a concentration of gasoline between 0.01% & 0.1%. However, we cannot offer a formula because the relation between ratio and concentration is nonlinear.

3.3 TEMPERATURE SENSOR

FIG .3.7:TEMPERATURE SENSOR

A temperature sensor is a gadget, typically a resistance temperature detectors or a thermocouple, that gathers the information about temperature from a specific source and changes over the information into reasonable structure for a gadget or a Spector. temperature sensors are utilized in numerous applications like HV and AC framework natural controls, medicaldevices, food processing unit, substance taking care of car in the engine checking and controlling framework, and so forth.

The most widely recognized sort of temperature sensor is a thermometer, which is utilized to quantify temperature of solids, fluids and gases. It is likewise a typical kind of temperature sensor for the most part utilized for non-logical purposes since it isn't so exact.he LM35 is a coordinated circuit sensor that can be utilized to gauge temperature with an electrical yield corresponding to the Celsius (Centigrade) temperature. Temperature is straightforwardly estimated by the AN0 stick of microcontroller IC.

The estimation of temperature from the sensor is determined from the given condition 1. On the off chance that the temperature worth is not exactly the worth preset is EEPROM0, at that point it is expected as should be expected temperature. Again the temperature is more noteworthy than the estimation of EEPROM0 then it is ready temperature and for the temperature that is more prominent than the incentive in EEPROM1 the status is peril temperature.

Advantage of temperature sensor, remote temperature ranges between -55 to +150 degree Celsius, low self-warming at 0:08 degree Celsius, working at a voltage at 4 to 330v, the circuit is not complicated.

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3.4 IR SENSOR MODULE

FIG.3.8: IR SENSOR MODULE

An infrared sensor circuit is one of the popular sensor module in an electronic device. This sensor is analogous to human visionary senses, which can be used to detect obstacles.an IR Sensor can measure the heat of an object as well as detects the motion.

The sensor has a three pin header which connects to the microcontroller board or Arduino Nano.

3.4.1PIN CONFIGARATION

PIN NUMBER	DESCRIPTION
VCC	POWER SUPPLY INPUT
OUT	ACTIVE HIGH OUTPUT
GND	POWER SUPPLY GROUND

3.4.2APPLICATIONS

1. Obstacle detection.
2. Industry safety device.
3. Wheel encoder.

3.5 DESCRIPTION OF CONTROL UNIT
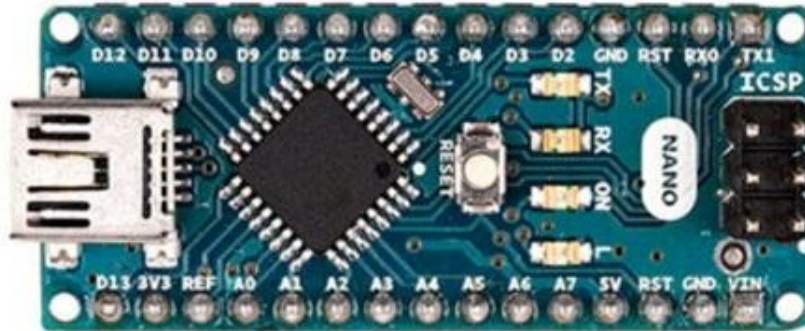
FIG.3.10: ARDUINO NANO MICROCONTROLLER BOARD

In the controller unit, we are utilizing Arduino equipment board (with AVR microcontroller). With the assistance of Arduino1.6.8 programming plate structure we can without much of a stretch program AVR IC, as our necessity. Arduino is an open-source gadgets prototyping stage dependent on adaptable, simple to-utilize equipment and programming. It's planned for craftsmen, fashioners, specialists, and anybody keen on making intuitive items or situations. The microcontroller on the board is customized utilizing the Arduino programming language and the Arduino advancement conditions.

The Arduino Uno is a microcontroller board dependent on the ATmega328. It has 14 digital input and output pins (of which 6 can be utilized as PWM outputs), 6 analog inputs, a USB connection, a power jack, a 16 MHz Ceramic Resonator, an ICSP Header. It contains everything expected to help the Microcontroller; Simply partner it to a PC with a USB connection or power it with an AC-to-DC connector or battery to start.

3.5.1 SPECIFICATION OF ARDUINO NANO

MICROCONTROLLR	ATmega328
OPERATING VOLTAGE	5V
DIGITAL INPUT/OUTPUT PINS	14(6 PWM OUTPUT PINS)
ANALOG INPUT PINS	6
INPUT VOLTAGE (RECOMMENDED)	7 TO 12V
OUTPUT VOLTAGE(LIMITS)	6 TO 20V
DC CURRENT PER I/O PIN	40 MA
DC CURRENT FOR 3.3V PIN	50MA
SRAM	2KB
EEPROM	1KB
FLASH MEMORY	32KB
CLOCK SPEED	16MHZ

3.5.2 BLOCK DIAGRAM OF MICROCONTROLLER

3.5.3 PIN DIAGRAM OF MICROCONTROLLER.

A commonplace case of Arduino board is Arduino Uno. It comprises of ATmega328 a 28 stick microcontroller.

Atmega328

Pin	Left		Right	Pin
1	(PCINT14/$\overline{RESET}$) PC6		PC5 (ADC5/SCL/PCINT13)	28
2	(PCINT16/RXD) PD0		PC4 (ADC4/SDA/PCINT12)	27
3	(PCINT17/TXD) PD1		PC3 (ADC3/PCINT11)	26
4	(PCINT18/INT0) PD2		PC2 (ADC2/PCINT10)	25
5	(PCINT19/OC2B/INT1) PD3		PC1 (ADC1/PCINT9)	24
6	(PCINT20/XCK/T0) PD4		PC0 (ADC0/PCINT8)	23
7	VCC		GND	22
8	GND		AREF	21
9	(PCINT6/XTAL1/TOSC1) PB6		AVCC	20
10	(PCINT7/XTAL2/TOSC2) PB7		PB5 (SCK/PCINT5)	19
11	(PCINT21/OC0B/T1) PD5		PB4 (MISO/PCINT4)	18
12	(PCINT22/OC0A/AIN0) PD6		PB3 (MOSI/OC2A/PCINT3)	17
13	(PCINT23/AIN1) PD7		PB2 ($\overline{SS}$/OC1B/PCINT2)	16
14	(PCINT0/CLKO/ICP1) PB0		PB1 (OC1A/PCINT1)	15

3.5.4 PIN DESCRIPTIONS

The table beneath gives a portrayal for every one of the pins, along with their function -

PIN NUMBER	DESCRIPTION	FUNCTIONS
1	PC6	RESET
2	PD0	DIGITAL PIN(RX)
3	PD1	DIGITAL PIN(TX)
4	PD2	DIGITAL PIN
5	PD3	DIGITAL PIN(PWM)
6	PD4	DIGITAL PIN
7	VCC	POSITIVE VOLTAGE
8	GND	GROUND
9	XTAL1	CRYSTAL OSCILLATOR
10	XTAL2	CRYSTAL OSCILLATOR
11	PD5	DIGITAL PIN(PWM)
12	PD6	DIGITAL PIN (PWM)
13	PD7	DIGITAL PIN
14	PB0	DIGITAL PIN
15	PB1	DIGITAL PIN(PWM)
16	PB2	DIGITAL PIN(PWM)
17	PB3	DIGITAL PIN(PWM)

18	PB4	DIGITAL PIN
19	PB5	DIGITAL PIN
20	AVCC	POSITIVE VOLTAGE FOR ADC (POWER)
21	AREF	REFERANCE VOLTAGE
22	GND	GROUND
23	PC0	ANALOG VOLTAGE
24	PC1	ANALOG VOLTAGE
25	PC2	ANALOG VOLTAGE
26	PC3	ANALOG VOLTAGE
27	PC4	ANALOG VOLAGE
28	PC5	ANALOG VOLTAGE

- **VCC:** Digital supply voltage.
- **GND:** Ground
- **PORT B (PB0-PB7)**

PORT B is an 8 pieces' bidirectional input/output port with inward pull-ups.

processor pins 14 to17 bring PB0 to PB5 out.

- PB0 to PB5 are also interrupts 0 to 5 respectively.
- PB1 can likewise be utilized as a PWM yield
- PB2 can likewise be or SPI Bus Master slave select or PWM yield.
- PB3 can likewise be or SPI Bus Master Out/Slave in(MOSI).
- PB4 can likewise be SPI Bus Master in/Slave Out (MISO).
- PB5 can likewise be SPI Bus Master Clock Input (SCK).
- PB6 and PB7 are brought out on Processor pins 9 and 10 for the gem clock oscillator.

> **PORT C (PC0-PC6)**

PORT C is a 7 pieces' bidirectional input/output port with interior pull-up resistors.

processor pins 23 to28 bring PC0 to PC5 out.

> ➢ PC0 – PC5 are likewise interferes with 8-13 individually.
> ➢ PC0 – PC5 can likewise be utilized as A/D inputs.
> ➢ PC4 AND PC5 can likewise be utilized as SDA and SCL for I2C.
> ➢ PC6 is brought out on processor stick 1 as reset.

> **PORT D(D0-D7)**

> PORT D is an 8 pieces' bidirectional input/output port with inner pull-ups.
> processor pins 2 to 6 and 11 to 13 bring all pins out.
> ➢ PD0 can likewise be USART Input (RXD).
> ➢ PD1 can likewise be USART Output (TXD).
> ➢ PD3 can likewise be utilized as a PWM yield.
> ➢ PD5 can likewise be utilized as a PWM yield.
> ➢ PD6 can likewise be utilized as a PWM yield.

> **PC6/REET**

In the event that the RSTDISBL Fuse is customized, PC6 is utilized as an I/O strict. The electrical qualities of PC6 vary from those of different pins of PORT C.in event that the RSTDISBL fuse is modified, PC6 is utilized as a reset info. A low level on this stick for longer than the base beat leant will produce a Reset, regardless of whether the clock is not running. Shorter heartbeats are not ensuring to produce a Reset.

> **AVCC**

AVCC is the supply voltage pin for the A/D converter, PE and PC.

> **AREF**

AREF is the Analog Reference pin for the A/D Converter.

3.5.5 POWER OF ARDUINO NANO:

The Arduino Nano can be powered by the USB connection with an outer power supply. The power source is chosen consequently. Outer power can come either from an AC to DC adapter or battery. The board can work on external supply of 6 to 20 volts. In the occasion that Utilizing more than 12V, the voltage controller may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as per the following: VIN ,5V,3V3, GND.

- ➢ **VIN:** the input voltage to the Arduino board when it is utilized an external power supply. You can supply voltage through this pin.
- ➢ **5v:** This pinoutputs a controlled 5V from the controller on the board. The board can be provided with control jack (7 to 12v), the VIN pin of the board (7 to 112v), the USB connector (5v). supply voltage via 5V or 3.3V PINS sidesteps the controller, and can harm your board. We do not advise it.
- ➢ **3V3:** 3.3-volt supply created by the on board controller. Maximum current draw is 50 mA.
- ➢ **GND:** Ground Pins.
- ➢ SIM800L is smaller than usual down cell module which takes for GPRS transmission, sending and getting SMS and making and tolerating voice calls.

3.6 GSM MODULE (SIM8OOL)

SIM800L is smaller than usual down cellular module which takings for GPRS transmission, sending and getting SMS and making and tolerant voice calls. Low cost and quad band frequency support make this module perfect solution for any project that require long range connectivity. After connecting power module boost up, searches for cellular network and logging automatically. On board LED displays connection fast.

3.6.1 SIM800L OVERVIEW

SIM800L is a quad band GSM/GPRS Module, that work on frequencies GSM850MHZ, DCS1800MHZ, PCS1900MHZ and EGSM900MHZ.SIM800L features GPRS multi opening class twelve or class ten and supports the GPRS/GSM coding schemes CS-1, CS-2, CS-3 and CS-4.
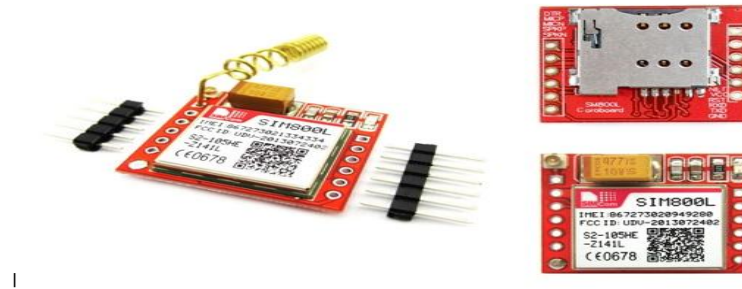
FIG.3.13: SIM800L OVERVIEW

SIM800L can meet almost all the space requirements in utilized applications, such as PDA, smart phone and other telephone devices.

SIM800L has 88 pin plugs of LGA packaging, and affords all hardware interfaces between the module and clients boards.

    1.Support 5*5*2keypads

    2.One full modem serial port, user can configure two serialports.

    3.One USB, the USB interfaces can debug, downloadsoftware.

    4.Audio channel which includes 2 microphone input; a receiver O/P and a speakerO/P.

    5.Programmable general purpose input andoutput.

    6.A SIM cardinterface.

    7. Support FM.

    8. Support onePWM.

3.6.2 GSM ARCHITECTURE
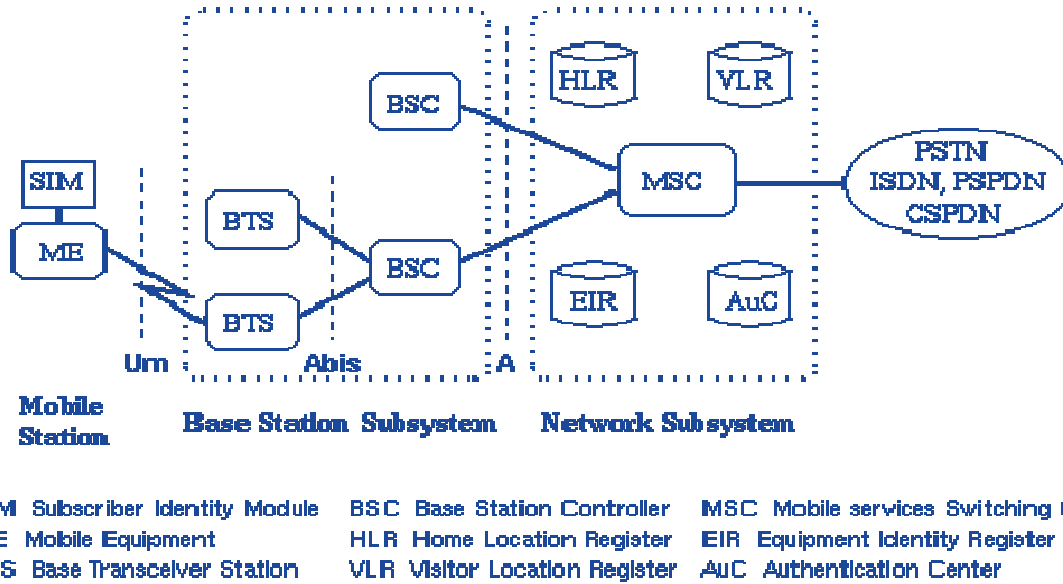
FIG.3.14: GSM ARCHITECTURE

3.6.3NETWORK STRUCTURE:

The network behind the GSM system realized by customer is large and complicated in order to provide all of the services which are obligatory.it is separated into a number of pieces and these are individually covered in separate articles.

1. The base station subsystem.
2. The network and switching subsystem.
3. The GPRS core network.

All of the elements in the system combine to produce many GSM services such as SMS and voice calls.
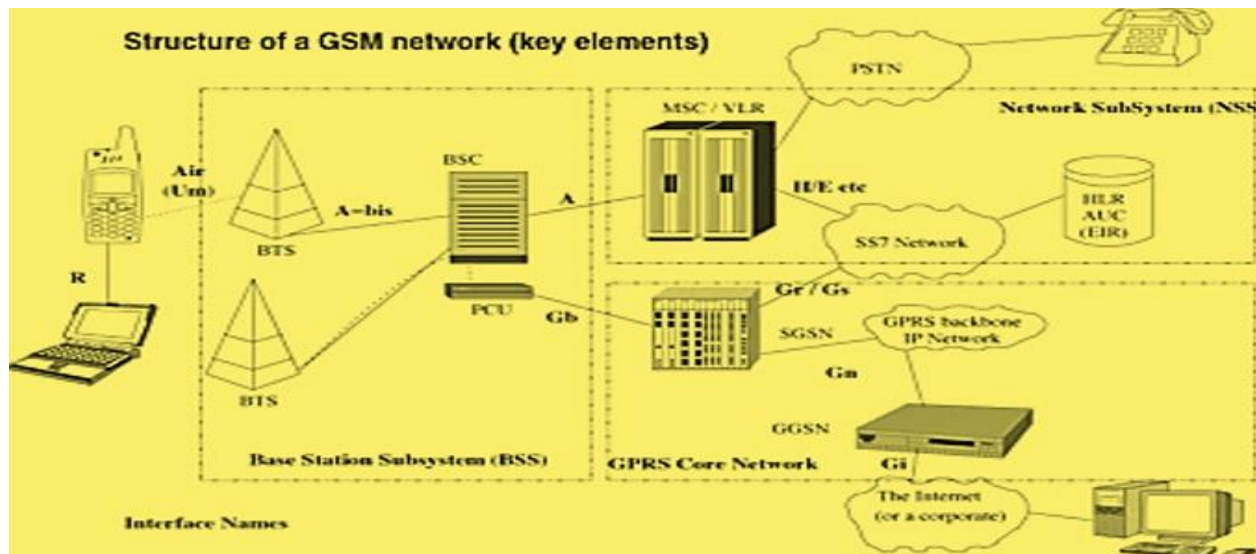
FIG.3.15: THE STRUCTURE OF A GSM NETWORK

3.6.4 FEATURES OF GSM MODULE (SIM800L)

1. **Power Supply:** 3.4V TO 4.4V.
2. **Power Saving:** Typically, powerconsumptions in sleep mode is 0.7ma.
3. **Data GPRS:**

   - Coding Scheme: CS-1, CS-2, CS-3 AND CS-4.
   - GPRS data uplink transfer: max 85.6kbps.
   - GPRS data downlink transfer:max 85.6kbps.

   - Support Packet Broadcast Control Channel.
   - Integrate the TCP/IP protocol.
   - CDS transmission rates: 2.4, 4.8,.9.6, 14.4kbps.

4. **Frequency Bands:**quad-band: GSM850, PCS1900, SIM800L, EGSMM900, DCS1800 can search the four frequency bands automatically. The frequency band can also be set by AT command "AT+CBAND".

5. **CDS:** Support CSD Transmission.

6. **Temperature Range:**
   - Normal Operation: -40 degree Celsius to +85 degree Celsius.
   - Storage Temperature: - 405degree Celsius to +90 degree Celsius.

7. **USSD:** Unstructured Supplementary Service Data Support.

8. **SMS:**
   - MT, MO, CB, PDU and Text mode.
   - SMS Storage: SIM card.

9. **External Antenna**: Antenna pad.

10. **SIM Interface:** support SIM card: 1,8V .3V.

11. **Audio Features**
   Speech Codec Modes:
   - Half Rate.
   - Full Rate.
   - Adapting multi rate.
   - Enhanced full rate.

12. **Real Time Clock:** Support RTC.

13. **Serial port and debug port:**

Serial port:

- Can be used for at commands.
- 1200bps to 115200bps.
- Full modem interface with status and control lines, unbalanced etc.
- Upgrading firmware.

Debug Port:

- Can be utilized for debugging and upgrading firmware.
- USB_DM and USB_DP.

14. **Timing Functions:** Utilized AT command set.

15. **Firmware Upgrade:** Main serial port or USB port.

16. **Physical characteristics:**

- Weight: 1.35g.
- Size: 15.8 *17.8*2.4mm.

3.6.5 CODING SCHEMES AND MAXIMUM NET DATA RATES OVER AIR INTERFACE

CODING SCHEME	1 TIMESLOT	2 TIMESLOT	4 TIMESLOT
CS-1	9.05KBPS	18.2KBPS	36.1KBPS
CS-2	13.4KBPS	26.8KBPS	53.6KBPS
CS-3	15.7KBPS	31.1KBPS	62.5KBPS
CS-4	20.4KBPS	42.8KBPS	85.6KBPS

3.6.6 FUNCTIONAL DIAGRAM (SIM800L)

The following figure shows a Functional Diagram: - GSM Baseband, GSMRF, Antenna Interface, Other Interface.
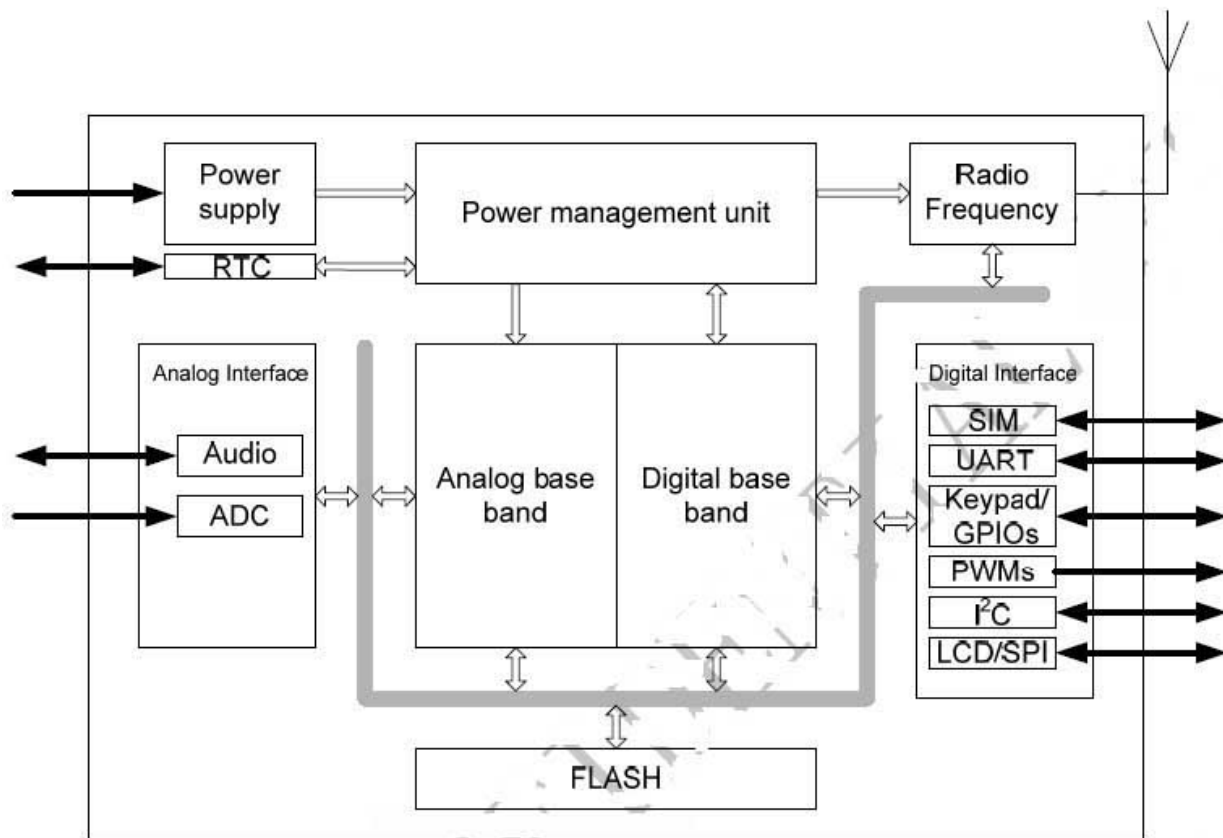
FIG.3.16: FUNCTIONAL DIAGRAM

3.6.7 SIM800L PIN OUT DIAGRAM
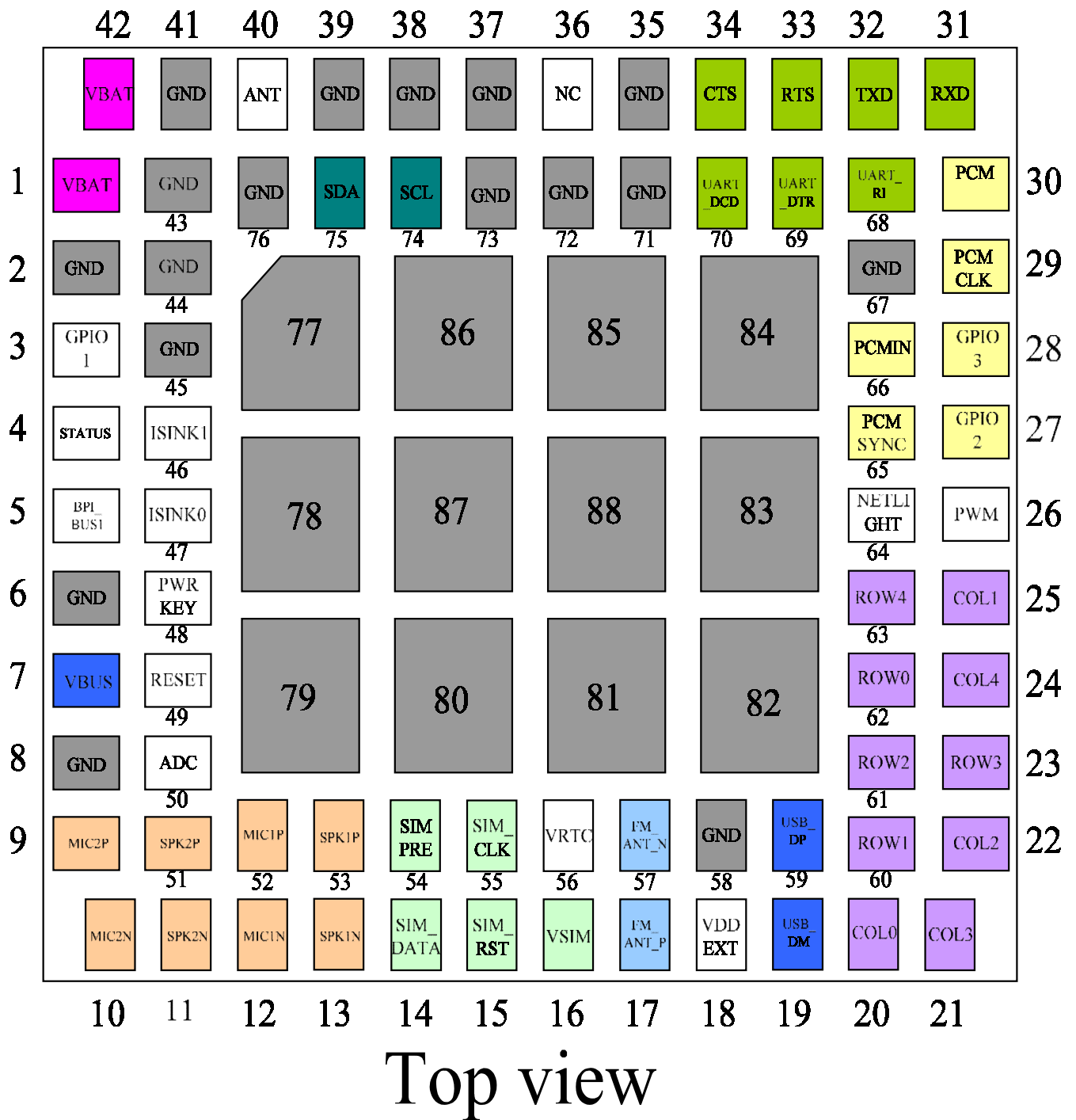
FIG.3.17:SIM800L PIN OUT DIAGRAM (TOP View)

3.6.8 PIN DESCRIPTION (SIM800L):

PIN NAME	PIN NUMBER	I/O	DESCRIPTION	COMMENT
Power Supply				
VBAT	1 , 42	I	Power supply	
VRTC	56	I/O	Power supply for RTC.	It is recommended to connect with a battery.
VEXT	18	O	2.8V Power output	If these pins are unused, keep open.
GND	2 , 43 ,44 ,45 etc.	O	GROUND	GNDN for VBAT recommend to use 2,43 ,44,45 pin
Power on /down module				
PWRKE Y	48	I	PWRKEY ought to be pulled low at least one second and before released to control on/ down the module.	Internally pulled up to VBAT
Audio Interfaces				
MIC1P	52	I	Differential audio input.	

MIC1N	12	I	Differential audio input.	
SPK1P	53	O	Differential audio output.	
SPK1N	13	O	Differential audio output.	
MIC2P	9	I	Differential audio input	
MIC2N	10	I	Differential audio input	
SPK2P	51	O	Differential audio output	If these pins are unused ,keep open.
SPK2N	11	O	Differential audio output	
Keypads Interface				
COL4	24	I		
COL3	21	I		
COL2	22	I		
COL1	25	I		
COL0	20	I		
ROW4	63	O	Supports up to 50 buttons (5* 5*2)	If these pins are unused, keep open
ROW3	23	O		
ROW2	61	O		
ROW1	60	O		
ROW0	62	O		

GPIO				
GPIO1	3	I/O	Programmable general purpose input and output	
GPIO2	27	I/O		
GPIO3	28	I/O		
NETLIGHT	64	O	Network status	
STATUS	4	O	Power on status	
Serial port				
UART-DTR	69	I	Data terminal relay	If these pins are unused, keep open
UART-RI	68	O	Ring indicator	
UART-DCD	70	O	Data carrier detect	
CTS	34	O	Request to send	
RTS	33	I	Clear to send	
TXD	32	O	Transmit data	
RXD	31	I	Receiver data	
ADC				
ADC	50	I	10 bit general analog to digital converter	If these pins are unused, keep open
PWM				
PWM	26	O	Pulse wide	If these pins are

			modulation	unused, keep open
Debug Interface				
VBUS	7	I	Debug and download	If these pins are unused, keep open
USB_DP	59	I/O		
USB_DM	19	I/O		
I2C				
SDA	75	I/O	I2C Serial bus data	Need external pulled up
SCL	74	O	I2C Serial bus clock	
SIM Card Interface				
VSIM	16			
SIM_DATA	14		Voltage supply for SIM card .support1.8Vor 3V SIM Card	
SIM_CLK	55		SIM data I/O	
SIM_RST	15		SIM reset	All signals of SIM Interface should be protected against EZD with

				a TVS diode array
SIMPER	54	I	SIM card detection	Reservation function

3.6.9 APPLICATIONS OF GSM MODULE (SIM800L)

1. SMS Based Remote Control & Alert.
2. Sensor Monitoring.
3. Security Applications.
4. GPRS Mode Remote Data Logging.

3.6.10 POWER ON SIM800L

Client can control on SIM800L by pulling down by PWRKEY pin for at least one second release. This pin is already pulled up to VBAT in the module internal, so external pull up isn't needed. Reference circuit is show as below.

3.7 DESCRIPTION OF BUZZER

FIG.3.9: BUZZER AS AN ALARM

In our system we are use a simple buzzer. Alarm gives audible response when gas (smoke, LPG, iso-butane, propane) is sensed. A Buzzer is an audio signaling gadget, which might be Mechanical, Electromechanical, or Piezoelectric. normal uses of buzzer include alarm devices, clocks and confirmation of user input, for example, a mouse click. The buzzer has two pins miniature, compact PCB mount buzzer in AC and DC type, ideal for use with microcontrollers and control system. Low current consumption and loud sound output.

The Smoke Sensor is very important component in the BTS room security system. When gas leak (smoke, LPG, propane etc.) occurs in the BTS room to active sound alarm.

3.8 DESCRIPTION OF DISPLAY

FIG .3.1: LIQUID CRYSTAL DISPLAY

Display is interfaced with controller. In this project 16*2 LCD (Liquid Crystal Display) is used, 16*2 mean that, 16 columns and 2 rows.LCD (Liquid Crystal Display) screen is an electronic display module and locate a wide scope of utilizations. A 16*2 LCD show is very essential module and is normally utilized in different gadgets and circuits. These modules are supported in excess of seven part and other multi piece LED's. The reasons being: LCDs are prudent;

37

effectively programmable; have no impediment of showing exceptional and even custom characters, movements, etc. LCD can show 16 characters for each line and there are 2 such lines. In this LCD individually character is shown in 5x7 pixel lattice. LCD has two registers, specifically, Command and Data. The order register stores the direction guidelines given to the LCD. A direction is a guidance given to LCD to do a predefined assignment like introducing it, clearing its screen, setting the cursor position, controlling show and so forth. The information register stocks the data to be shown on the LCD. The data is the ASCII estimate of the character to be shown on the LCD.
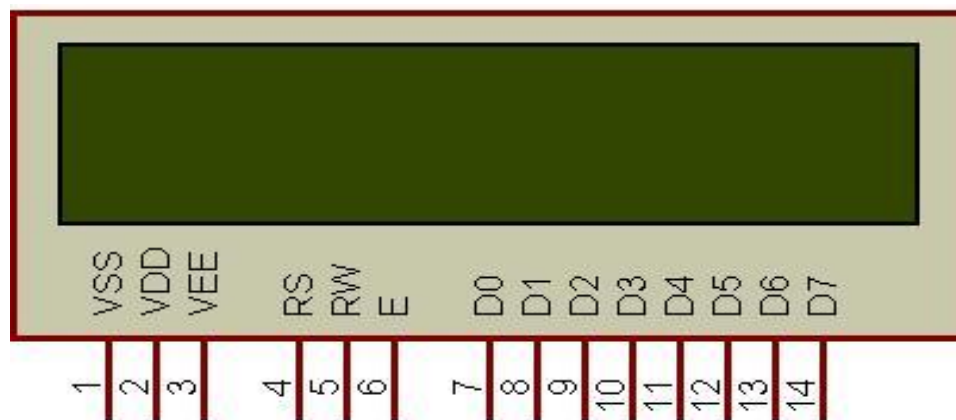
3.8.1 PIN DIAGRAM

FIG.3.2: PIN DIAGRAM OF LCD

PIN DESCRIPTION:

- GND(GROUND)
- VCC(CONTRAST VOLTAGE)
- E(CLOCK)
- R/W (READ/WRITE)
- R/S (RESISTER SELECT)

- D0 (DATA0)
- D1 (DATA1)
- D2 (DATA2)
- D3 (DATA3)
- D4 DATA4)
- D5 (DATA5)
- D6 (DATA6)
- D7 (DATA7)

3.8.2 ADVANTAGE OF LCD'S
- LCD's devours less measure of intensity contrasted with CRT and LED.
- LCD's is of low cost.
- Excellent contrast.
- LCD's are lighter and thinner when compared to LED and cathode ray tube.

3.8.3 DISADVANTAGE OF LCD, S
- Require extra light sources.
- Speed is low.
- Low dependability.
- Range of temperature is limited for activity.
- Liquid crystal display need an AC drive.

3.9 LIGHT EMITTING DIODES(LED'S)

A Light emitting diode is a semiconductor light source that emits visible light when an electric current pass. Light emitting diodes are the most broadly utilized semiconductor diodes among all the various kinds of semiconductor diodes accessible today.

A light emitting diode is an optical semiconductor device. As Such, a light emitting diode converts electrical energy into light energy.
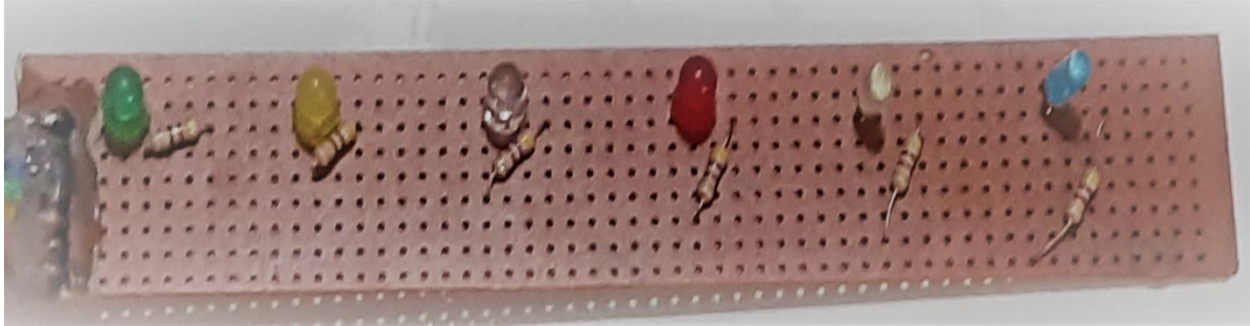

FIG.3.3: LIGHT EMITTING DIODE
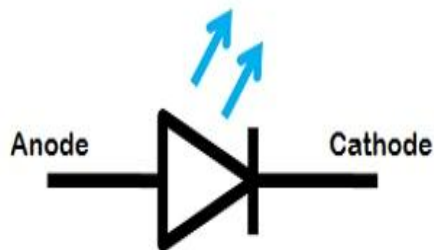
3.9.1 LIGHT EMITTING DIODE (LED) SYMBOL

FIG.3.4: LED SYMBOL

The symbol of light emitting diode (LED) is similar to the normal p-n junction diode. Liquide crystal display are different colors. The most widely recognized color of LED's are yellow, orange, red and green. The schematic image is same for all shades of liquid crystal display (LED). Subsequently, it is not possible to identify the shades of liquid crystal display.

3.9.2 APPLICATIONS OF LED

The different uses of LEDs are as per the following

1. Calculators.
2. Picture Telephone.

3. Burglar cautions frameworks.

4. Traffic signals

5. Multieters

6. Digital PC's

7. Digital Watches

8. Automotive Heat Watches.

9. Microprocessors.

10. Aviation Lighting.

11. Camera Flashes.

3.9.3 ADVANTAGE OF LED

1. Smaller size.

2. LED' s is light in weight.

3. LED's have longer lifetime.

4. LED's can transmit various shades of light.

5. LED's works exceptionally quick.

6. LED's are exceptionally modest and promptly accessible.

3.9.4 DISADVANTAGE OF LED

1. Luminous proficiency of LED's low.

2. LED's need more capacity to work than ordinary p-n junction diode.

3.9.5 LED's FUTURE

LED's have progressed significantly and right now they are generally utilized in numerous applications. In future, I accept research will proceed for high force LED's, despite the fact that

warmth dispersal is an issue display by observing its symbol.
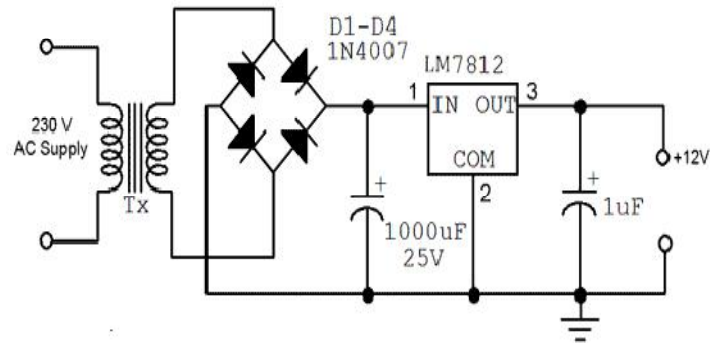
3.10 POWER SUPPLY

FIG.3.18: AC-DC POWER SUPPLY AND CIRCUIT

A power supply is an electronic device that provisions electrical energy to an electrical load. The main functions of a power supply are to convert one of electrical energy to another. Therefore, power supplies are sometimes referred to as electrical power converts.

Some power supplies are discrete, independent devices, while others are incorporated with bigger devices along with their loads. Examples of the latter include power supplies found in personal computers and consumer electronic device. The source of this power can come from different source like the principal AC voltage, a battery or even from a renewable power source like solar panel wind turbine or fuel cell to name just a few. The most common source of power is usually the primary AC.

3.11 TRANSFORMER

A transformer is astatic device, with no moving part, whichtransformer electrical power from one circuit to another with charges in voltage and current and changingfrequency. There are two sorts of transformer characterized by their capacity: step up transformer & step down transformer.

- Step up transformer is a gadget which changes over the low primary voltage to a high secondary voltage. That is, it steps up the input voltage.
- A step down transformer then again, steps down the input voltage i.e. the secondary voltage is fewer than the primary voltage.
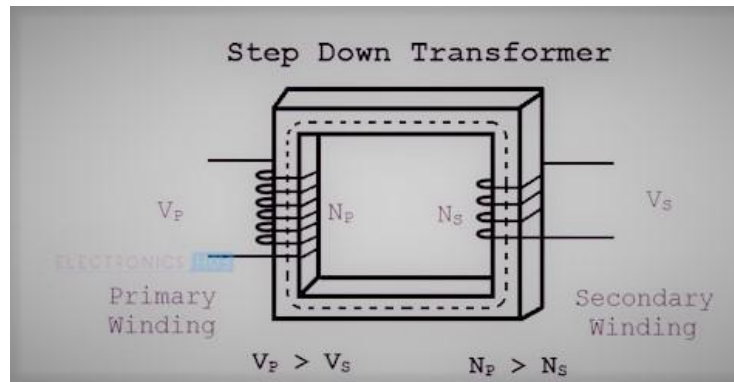
3.11.1 STEP DOWN TRANSFORMER

FIG.3.19: STEP DOWN TRANSFORMER

A step down transformer is as sort of transformer, which converts a high voltage at the primary side to a low voltage at the secondary side.

If we speak in terms of the coil winding's, the primary winding of a step down transformer has more turns than the secondary winding.

3.11.2 EXAMPLE OF STEP DOWN TRANSFORMER

For Example, consider the following situation. The no of turns in the primary winding of a transformer is 3000 & that in the secondary winding is 150, if the alternating voltage t the primary of the transformer is 240 volts, then the voltage at the secondary of the transformer can be calculated using the following equations.

Up/Vs=Np/Ns

Here, VP is voltage at primary winding of the transformer =240V

VSis the voltage at the secondary winding of the transformer =?

NP is the primary winding turns=3000

Ns is the secondary winding turns = 150

Using the above equation, VS=(Vp*Ns)/Np=240 *150/3000=12V

Hence the voltage t the secondary windings of the transformer is 12v, which is less than that at the primary.

3.11.3 USED OF STEP DOWN TRANSFORMER

1. All the path transformers which we see nearby our households are step down transformer. They take a 11KV alternating voltage at the primary and exchange it to 230V for distributing it to our homes.
2. Before the wide use of switching power supplies, practically all low voltage divider connectors usage steps down transformer.

3.12 RELAY

A relay is an electromagnetic switch that is utilized to turn on and turn off a circuit by a low power signal, or where a few circuits must be controlled by one signal.The main process of a relay comes in place where just a low power signal can be utilized to control a circuit.Such relays are called conductors.
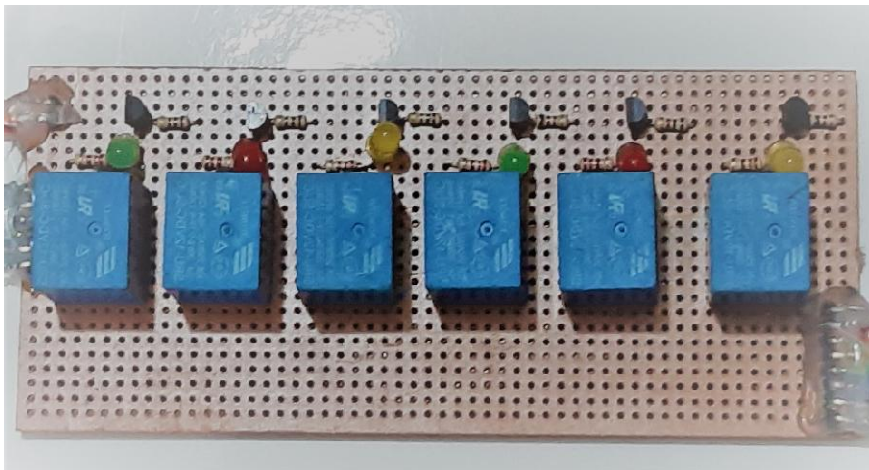

FIG.3.20: RELAY

3.12.1 RELAY APPLICATIONS

1. A relay circuit is utilized to realize logic functions. They play a very significant role in providing security critical logic.

2. Relays are utilized to control high voltage circuits with help of low voltage signals. Correspondingly, they are utilized to control high current signal with the assistance of low current signal.

3. Relays are utilized to realize logical function They are utilized to time the delay open and delay close of contacts.

4. They are also utilized as defensive relays.
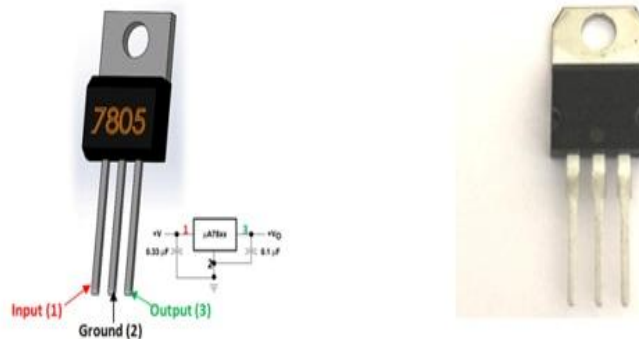
3.13 7805 VOLTAGE REGULATOR IC

FIG.3.21:7805 VOLTGE REGULATOR IC

All voltage source can't ready to give fixed output due to vacillations in the circuit. For getting constant and steady output, the voltage controllers are executed. The integrated circuits which are utilized for the regulation of voltage are termed as voltage regulator IC. We can discuss IC 7805.

The voltage controller IC7805 is really a member of the 78xx series of voltage regulator IC. It is a fixed linear voltage controller. The xx present in 78xx represents the value of the fixed output voltage that the specific IC gives. For 7805 IC, it is +5v DC controlled power supply. This

controller IC additionally includes an arrangement for a warmth sink. The input voltage to this voltage controller can be up to 35v, and this IC can give a constant 5v for any value of input less than or equal to35v which is as far as possible.

3.13.1 PIN CONFIGURATION

PIN NUMBER	PIN NAME	DESCRIPTION
1	INPUT(V+)	UNREGULATED INPUT VOLTAGE
2	GROUND (GND)	CONNECTED TO GROUND
3	OUTPUT (V0)	OUTPUT REGULATED +5V

3.13.2 7805 VOLAGE REGULATOR FEATURES

1. 5V Positive Voltage Regulator.
2. Operating current is 5ma.
3. Maximum input voltage is 7V.
4. Minimum input voltage is 25V.
5. Junction temperature minimum 125 degrees Celsius.
6. Internal current overload and short circuit current limiting protection is available.

3.13.3 APPLICATIONS OF VOLTAGE REGULATOR 7805 IC

1. Constant +5V output regulator to power microcontroller and sensors in most of the projects.
2. Regulated dual supply.

3. Current Regulator.

4. Fixed output regulator.

5. Adjustable output regulator.

6. Building circuits for phone charger, portable CD Player, UPS power supply circuits etc.

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3.14 CONCLUSION

Some main Component & some tools are used in this system to makes it. This system is used to design and implementation of monitoring and survellance of BTS room. Our all component is very simple & available in our country market.

CHAPTER 4

HARDWRE IMPLEMENTATION

4.1 INTRODUCTION

This is one of the most important chapters of this report. In this chapter we will show our completed project's outlook that meansConnection layout & operation representation of our project. We will discuss aboutHardware implementation of our system.

4.2 CONNECTION LAYOUT OF OUR SYSTEM

After the circuits had been devised and tested on Breadboard. Then we were soldering with lead. The circuit diagram shown in section is implementing on this board.

4.3 SYSTEM OPERATION

We Experiment four type of fault in the BTS room Security system. Example: Gas Leak, Door Open Fault, Battery Protection Fault, Temperature Fault. We will discuss all types of fault.

When the concentration of Gas (smoke, LPG, LNG, Propane, Tobacco) in the air exceeds the certain level then activate the Buzzer and send the message to the consumer by using GSM module. The GSM module is used to send SMS when Gas leakage. Any number of mobile numbers can be included to which SMS must be sent about the above mentioned details. This wireless module is used to alert the consumer even when they are away from BTS room. An audio-visual alarm provided to immediately alert the people at BTS room in abnormal condition, and status message commands to show LCD module.
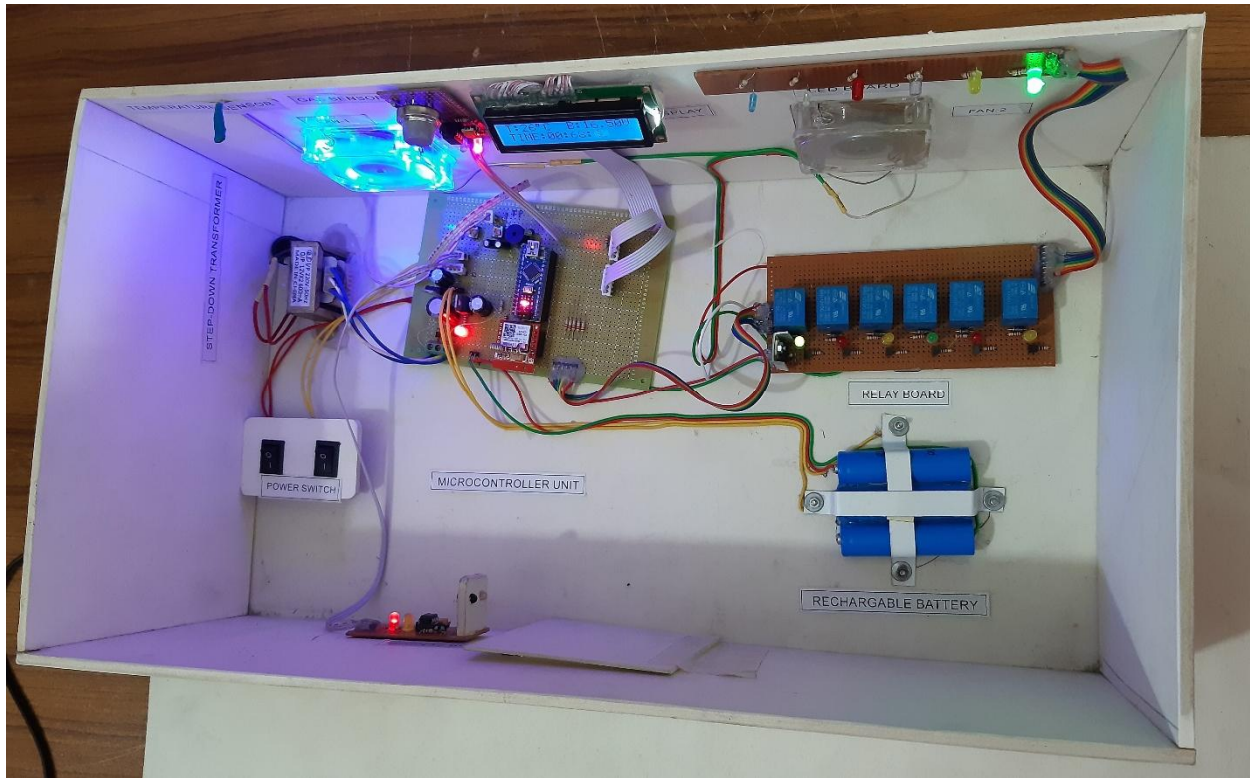
FIG: OUTLOOK OF OUR SYSTEM

For controlling the temperature in BTS room we use two ventilation fan. When the temperature of BTS room will normal then one ventilation fan will rotate.

But when the temperature wills 42 degrees above then temperature sensor sends output signal to Microcontroller, then activate the Buzzer and send the message to the consumer by using GSM module. The GSM module is used to send SMS when gas leakages. Any number of mobile numbers can be included to which SMS must be sent about the above mentioned details. This wireless module is used to alert the consumer even when they are away from BTS room. An audio-visual alarm provided to immediately alert the people at BTS room in abnormal condition, and status message commands to show LCD module.

There are various kind of expensive device in the BTS room. So all the illegal human intrusion will forbid at BTS room. If any illegal peoples enter the BTS room, to active sound alarm, SMS alert, and status message commands to LCD module.

For that reasons to protect battery we used two wire connections in BTS room. If any one touch the battery, then battery protection sensor sends output signal to Microcontroller, then activate the Buzzer and send the message to the consumer by using GSM module. The GSM module is used to send short messages when gas leakages. Any number of mobile numbers can be included to which SMS must be sent about the above mentioned details. This wireless module is used to alert the consumer even when they are away from BTS room. An audio-visual alarm provided to immediately alert the people at BTS room in abnormal condition, and status message commands to show LCD module.

4.4 COST ANALYSIS

In this section we will show cost of our project that means cost sheet representation of our project.

4.4.1 COST SHEET

SL NO	COMPONENT NAME	QUANTITY	PRICE
1.	LCD DISPLAY	1	300
2.	TEMOPERATURE SENSOR	1	20
3.	ARDUINO NANO	1	350
4.	12V STEP DOWN TRANSFORMER	1	100
5.	12 VOLT RELAY	6	150
6.	SMOKE SENSOR	1	150
7.	IR MODULE	1	150
8.	BC 547 TRANSISTOR	6	20
9.	LED	7	10
10.	POWER SWITCH	1	30
11.	7805 REGULATOR	1	30
12.	RESISTOR- 1K	4	10
13.	RESISTOR – 2.2K	1	10
14.	DC FAN	2	200
15.	RECHAGRABLE BATTERY	1	200
16.	GSM DOMULE	1	500
17.	TIP 122	1	30
TOTAL PRICE:			**2260TK**

COMPARISON:

Our all components are available in market. We get all components are very reasonable price. But design and implementation of monitoring and survellance of BTS room are very high price in our local market. Because It is not directly commercial made in our country. We get this product by import. Now

The design and implementation of monitoring and survellance of BTS room are at prices 12000 - 15000 TK. So,our making this project more cost efficient.

4.5 CONCLUSION

Tostructure, Hardware execution is the fundamental motivation behind ourproject. Our project work is as of now finished. The developed circuit is pleasantly working.

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CHAPTER 5

SOFTWARE ANALYSIS

5.1 INTRODUCTION

In this part the chapter utilized and the language in which the program code is characterized is referenced and the program code dumping apparatuses are clarified. The chapter additionally reports the advancement of the program for the application.

5.2 DESCRIPTION OF OUR SOFTWARE

The open-source Arduino condition makes it simple to compose code and upload it to the I/O board. It runs on Windows, Linux, MAC OS X. The environment is written in Java and dependent on Processing, avr-gcc, and other open source programming. The screen shot of Arduino 1.8.5 is demonstrated as follows…

FIG: SOFTWARE PLATFROM

It is additionally fit for compiling and uploading programs to the board with a solitary snap. There is normally no compelling reason to alter make documents or run programs on a command line interface. Although construction on command line is possible if required with the third party tools such as Ino.

The Arduino IDE accompanies a C/C++ library called "Wiring" (from the task of a similar name), which makes numerous basic input/output activities a lot simpler. Arduino projects are written in C/C++, despite the fact that clients just need characterize two capacities to make a runnable program:

1. setup () – a functions run once toward the beginning of a program that can introduce settings

2. loop () – a function called more than once until the board powers off

5.2.a THE COMPLIED WINDOW OF OUR CODE IS SHOWER BELOW.

FIG: BTS ROOM SECURITY SYSTEM COADING PART-1

```
/////////////////////
cnt++;
if(cnt > 10)
{SEC++;cnt=0;}
if(SEC > 59)
{SEC=0;MIN++;}
/////////////////////
}
////////////////////////////////////////////////////////////////////////
////////////////////////////////////////////////////////////////////////
void DISPLAY1()
{
    lcd.setCursor(0,0);
    lcd.print("T:");
    lcd.setCursor(2,0);
    lcd.print(tp);
    lcd.setCursor(5,0);
    lcd.print((char)223);
    lcd.setCursor(6,0);
    lcd.println(" C        ");

    lcd.setCursor(0,1);
    lcd.println("TIME:00:");
    lcd.setCursor(9,1);
    lcd.print(MIN);
    lcd.setCursor(11,1);
    lcd.println(":");
    lcd.setCursor(12,1);
    lcd.print(SEC);
    lcd.println("    ");

    //delay(100);
    //lcd.clear();
}
////////////////////////////////////////////////////////////////////////
void SENSOR()
{
    BV = analogRead(BVP);
    tp = analogRead(tP);
    tp = (tp / 10);
    GAS=analogRead(GP);
    DA = analogRead(DP);
    BA = analogRead(BPP);

    delay(1);
}
////////////////////////////////////////////////////////////////////////
void CONTROL()
{
    if(SEC > 29)
    {digitalWrite(FAN1, HIGH);digitalWrite(FAN2, LOW);}
    else
    {digitalWrite(FAN2, HIGH);digitalWrite(FAN1, LOW);}
```

Invalid library found in D:\SOFT\installed arduino\Arduino\libraries\Arduino-master: D:\SOFT\installed arduino\Arduino\libraries\Arduino-master

FIG: BTS ROOM SECURITY SYSTEM COADING PART-2


```
void CONTROL()
{
    if(SEC > 29)
    {digitalWrite(FAN1, HIGH);digitalWrite(FAN2, LOW);}
    else
    {digitalWrite(FAN2, HIGH);digitalWrite(FAN1, LOW);}

    if(tp > 42)
    {
        almstp=1;
        SendMessage1();
        alarm();
    }
    if(GAS > 200)
    {
        almstp=2;
        SendMessage2();
        alarm();
    }
    if(DA > 200)
    {
        almstp=3;
        SendMessage3();
        alarm();
    }
    if(BA > 200)
    {
        almstp=4;
        SendMessage4();
        alarm();
    }
}
////////////////////////////////////////////////////////////////////////
void serialEvent()
{
    while(Serial.available())
    {
        if(Serial.find("$A."))
        {
            digitalWrite(BUZ, HIGH);
            delay(10);
            digitalWrite(BUZ, LOW);
            while (Serial.available())
            {
                char inChar=Serial.read();
                str[i++]=inChar;
                if(inChar=='>')
                {
                    temp=1;
                    return;
                }
            }
        }
    }
```

Invalid library found in D:\SOFT\installed arduino\Arduino\libraries\Arduino-master: D:\SOFT\installed arduino\Arduino\libraries\Arduino-master

FIG: BTS ROOM SECURITY SYSTEM COADING PART-3

```
c-main-bts | Arduino 1.8.5
File Edit Sketch Tools Help

c-main-bts

void check()
{
  if(!(strncmp(str,"alm on",5)))
  {
    digitalWrite(BUZ, HIGH);
    lcd.setCursor(13,1);
    lcd.print("EMERGENCY ALARM! ");
    delay(2000);
  }

}
//////////////////////////////////////////////////////////
void alarm()
{
  int alm=0;
  for(alm=0;alm < 6;alm++)
  {
    SENSOR();

    digitalWrite(BUZ, HIGH);
    lcd.setCursor(0,1);
    lcd.print("               ");
    delay(300);
    digitalWrite(BUZ, LOW);

    lcd.setCursor(0,0);
    lcd.print("T:");
    lcd.setCursor(2,0);
    lcd.print(tp);
    lcd.setCursor(5,0);
    lcd.print((char)223);
    lcd.setCursor(6,0);
    lcd.println(" C          ");

    if(almstp==1)
    {
      lcd.setCursor(0,1);
      lcd.print("FIRE DETECTED  ");
      digitalWrite(TAP, HIGH);
    }
    if(almstp==2)
    {
      lcd.setCursor(0,1);
      lcd.print(" GAS DETECTED ");
      digitalWrite(DAP, HIGH);
    }
    if(almstp==3)
    {
      lcd.setCursor(0,1);
      lcd.print("  DOOR OPEN !  ");
      digitalWrite(GAP, HIGH);
    }
    if(almstp==4)

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```

FIG: BTS ROOM SECURITY SYSTEM COADING PART-4


```
c-main-bts | Arduino 1.8.5
File Edit Sketch Tools Help

c-main-bts

    }
    if(almstp==4)
    {
      lcd.setCursor(0,1);
      lcd.print(" BATTERY FAULT  ");
      digitalWrite(BAP, HIGH);
    }
    /////////////////////////////////
    delay(300);
  }
  almstp=0;
  digitalWrite(DAP, LOW);
  digitalWrite(TAP, LOW);
  digitalWrite(GAP, LOW);
  digitalWrite(BAP, LOW);
  digitalWrite(GAP, LOW);
}

//////////////////////////////////////////////////////////
void SendMessage()                     // fan on
{
  Serial.println("AT+CMGF=1");
  delay(100);
  Serial.println("AT+CMGS=\"+8801992751283\"\r");
  delay(100);
  Serial.println("system ready...");
  delay(100);
  Serial.println((char)26);
  delay(2000);
}

void SendMessage1()                    // FIRE DETECTED
{
  Serial.println("AT+CMGF=1");
  delay(100);
  Serial.println("AT+CMGS=\"+8801992751283\"\r");
  delay(100);
  Serial.println("FIRE DETECTED");
  delay(100);
  Serial.println((char)26);
  delay(2000);
}
void SendMessage2()                    // GAS GETECTED
{
  Serial.println("AT+CMGF=1");
  delay(100);
  Serial.println("AT+CMGS=\"+8801992751283\"\r");
  delay(100);
  Serial.println("GAS DETECTED");
  delay(100);
  Serial.println((char)26);
  delay(2000);
}

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```

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FIG: BTS ROOM SECURITY SYSTEM COADING PART-5


```
Serial.println("AT+CMGF=1");
delay(100);
Serial.println("AT+CMGS=\"+8801992751283\"\r");
delay(100);
Serial.println("system ready...");
delay(100);
Serial.println((char)26);
delay(2000);
}

void SendMessage1()                    // FIRE DETECTED
{
Serial.println("AT+CMGF=1");
delay(100);
Serial.println("AT+CMGS=\"+8801992751283\"\r");
delay(100);
Serial.println("FIRE DETECTED");
delay(100);
Serial.println((char)26);
delay(2000);
}
void SendMessage2()                    // GAS GETECTED
{
Serial.println("AT+CMGF=1");
delay(100);
Serial.println("AT+CMGS=\"+8801992751283\"\r");
delay(100);
Serial.println("GAS DETECTED");
delay(100);
Serial.println((char)26);
delay(2000);
}
void SendMessage3()                    // THIEF DETECTED
{
Serial.println("AT+CMGF=1");
delay(100);
Serial.println("AT+CMGS=\"+8801992751283\"\r");
delay(100);
Serial.println("   DOOR OPEN !  ");
delay(100);
Serial.println((char)26);
delay(2000);
}
void SendMessage4()                    // EMERGENCY
{
Serial.println("AT+CMGF=1");
delay(100);
Serial.println("AT+CMGS=\"+8801992751283\"\r");
delay(100);
Serial.println(" BATTERY FAULT / THIEF DETECTED !");
delay(100);
Serial.println((char)26);
delay(2000);
}
```

```
Invalid library found in D:\SOFT\installed arduino\Arduino\libraries\Arduino-master: D:\SOFT\installed arduino\Arduino\libraries\Arduino-master
```

FIG: BTS ROOM SECURITY SYSTEM COADING PART-6

5.3 ARDUINO PROGRAM

The very important advantage through Arduino is the programs can be directly loaded the device without needful any hardware programmer to burn the program.
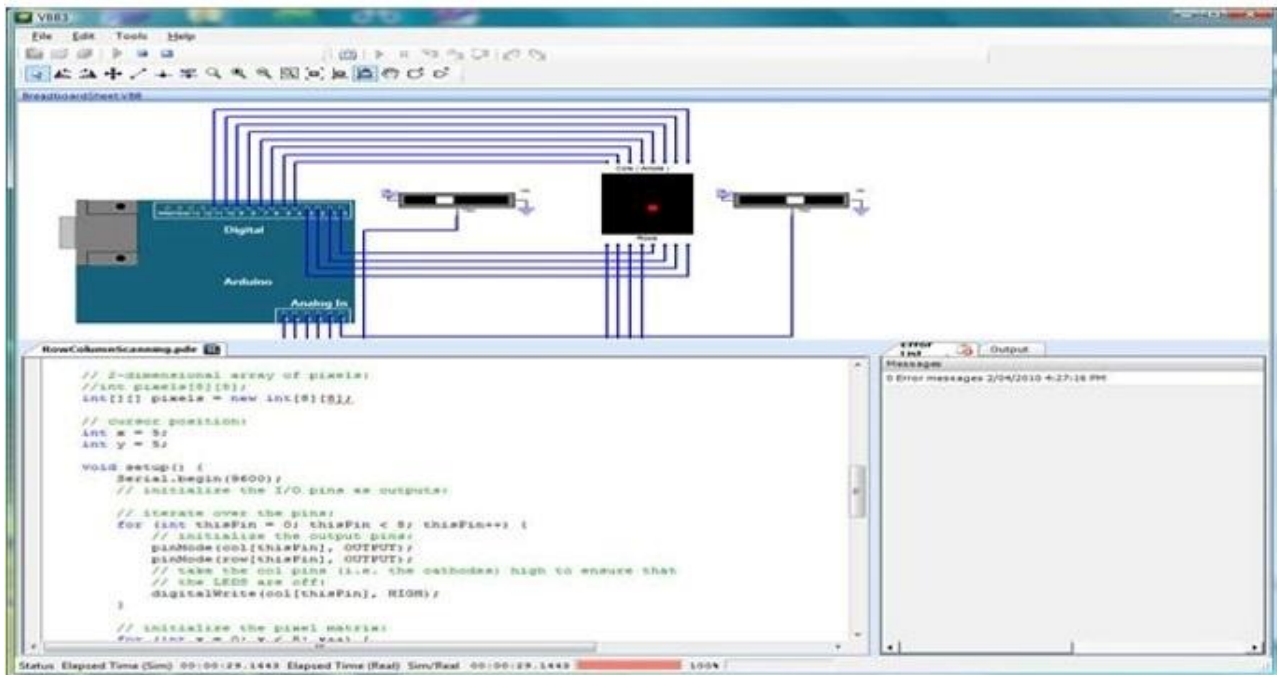
FIG.5.2: PROGRM AN ARDUINO

All we have to do is to download the Arduino software and text the code. The Arduino tool window contains of the toolbar with the buttons line confirm, upload, new, open, save, serial monitor.it also contains of a text editor to write the code, a message area which displays the response like show the error, the text console which displays the output and a sequence of Manus like the File, Edit, Tools.

5.4 SEVEN REASONS WHY ARDUINO IS BEING DESIRED THESE DAYS

1. It is cheap.
2. It comes with an open source hardware characteristic which permits users to develop their personal kit the use of already on hand one as a reference source.
3. The Arduino software is like with all types of operating system like windows, Macintosh, and Linux etc.

4. It additional comes with open source software characteristic which enables skilled software developers to use the Arduino cade to merge with the present programming language libraries and can be prolonged and modified.
5. It is easy to use for beginners.
6. We can advance an Arduino based totally venture which can be totally stand by myself or initiatives.
7. It comes with a handy provision of connecting with the CPU of the PC the use of serial communication over USB as it carrier constructed in electricity and reset circuity.

5.5 CONCLUSION

The framework programming created in Embedded C, C++ language which has the capacity of getting the information from sensor and transmitting the information, and sends the message to the client telephone when the security issue of BTS room surpasses certain level and enact Buzzer to caution the individuals at home and show the message on LCD show. In view of its low power utilization, simple use, dependability it is utilized in different fields.

Software analysis is a very important part of our system. A Software analysis makes sure good design. A proper Software analysis and its burn into Arduino Uno the project to a smooth end.

CHAPTER 6

RESULT AND DISCURSSION

6.1INTRODUCTION

The target of this work is to develop a security system for BTS room efficiently and accurately. From the results of the presentation study, we can say that the developed system works accurately and can provide economic benefits. One target of the system is to watch the condition of a BTS room and take some decision automatically. The LCD used in this system can display the ADC data at different ecological conditions and activate the Buzzer and send the message to the consumer by using GSM module. It also displays the applied modes by the controller. The other target of the system is to provide economic benefit to its users. Inexpensive and available instruments are used to design the system. And it is also playing an important role to save some electricity for a country. So, it is affordable for developing country like Bangladesh. The efficiency of the system is reasonable. The overall show of the system is satisfactory and successful.
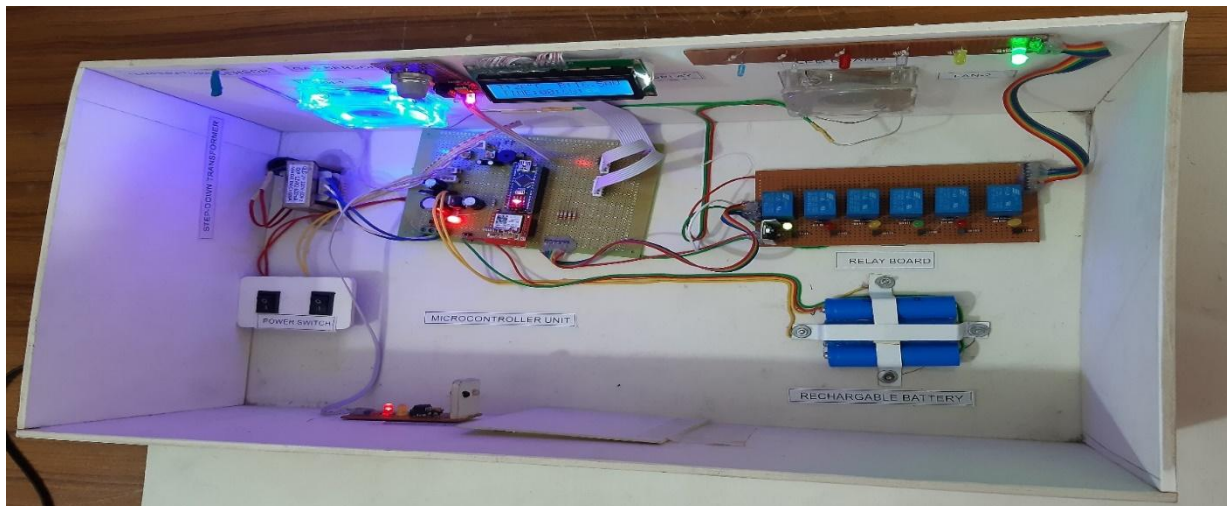
6.2 SETUP OUR SYSTEM

FIG.6.1: SETUP OF OUR SYSTEM

DETECTION SYSTEM:

In the detection system of BTS room,Smoke Leak/Temperature High/ Battery Theft/Door Open. This sensor sends a signal to the microcontroller when Smoke Leak/Temperature High/ battery Theft/Door Open. An alert message is sent through the GSM to the user and a buzzer alarm is activated in the BTS room. This alarm produces huge sound which drops down the attention of user in current leak/fire accidents. These alert messages will be displayed on LCD.

6.3 TESTING OF OUR PROJECT

After developing the circuit on the board, then complete are designing the full system. We can be seen that output

DISPLAT TEST

We are using 16*2 LCD display in this project. This following figure 00 shows thestatus massage commands to LCD module.

FIG.6.2: DISPLAY OUTPUT OF OUR SYSTEM

BUZZER TEST:

We are using simple electromechanical Buzzer in this System. This Buzzer sound is very loud& clearly. When the security problem of BTS room, then sensor detect the problem & send a digital output to control unit. At this time the Microcontroller (Arduino Nano) will read MQ2 output & to activate sound alarm. That time people will be take action fast.

SMS TEST

The figure shows four types of Detection System. Example: Gas/smoke Detected, Door Open Detected, Fire Detected and Battery Fault /Thief Detected.

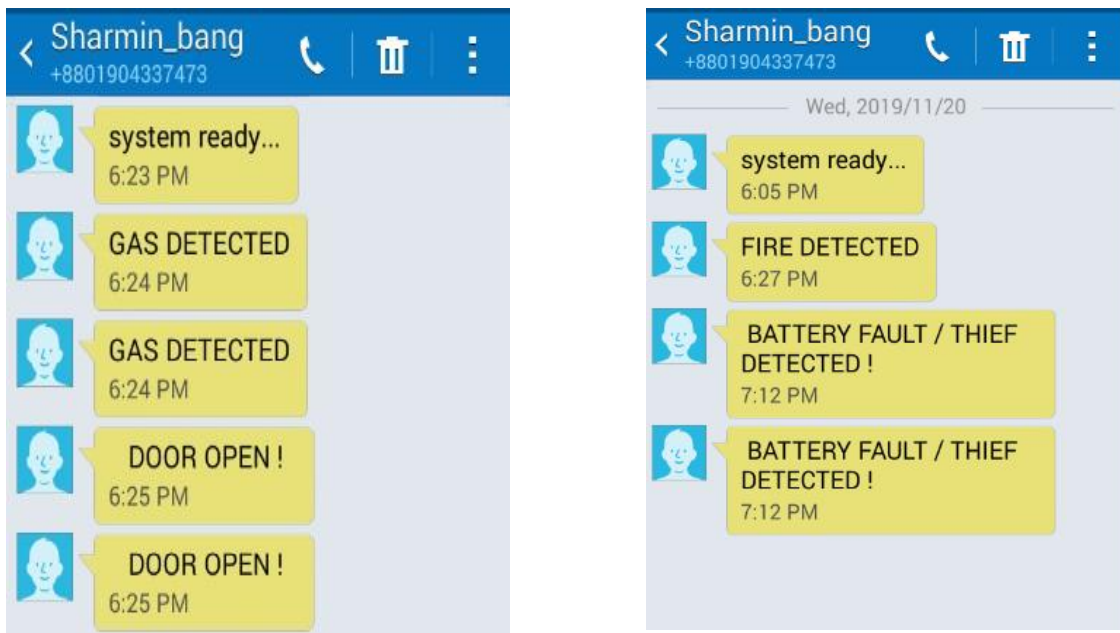This following figure shows the receiving SMS from GSM Module (SIM800L)

FIG.6.3:SMS RECEIVING

6.4 RESULT

Monitoring and detection in the system of BTS room, Smoke Leak/Temperature High/ Battery Theft/Door Open. we can protect the BTS room by using BTS security system. Security system is an active process if any problems occur in the BTS room, then send a SMS to the customer using GSM modem and activate the Buzzer to alert the user at in abnormal condition and to take the necessary action and display the message on LCD display.

Our system is completed a successful operation& testing. It can be seen that output clearly. So, we said that our BTS room security system was effective fast response most secure and easy to construct.

6.4 DISCUSSION

Cellular communications become the essential mode of communication in present century. With the development of this phase of communication the globalization system is also in its height of speed. The improvement of cellular communication is mainly depending on the improvement and stability of BTS (Base Transceiver Station) room.So for the purpose of the development of cellular communication a large totaled of BTS room are installed throughout the world. To ensure suitable support from BTS rooms there must be a security system to avoid any needless vulnerability.therefore, multiple alarm system is designed to protected the BTS rooms from any undesired circumstances. This system is planned with a Microcontroller as a main controller and some sensors are interfaced with it afford high temperature alarm, smoke alarm, door alarm and battery protection alarm. All these alarms are interfaced with the alarm box in the BTS room which provides the present status directly to network management center of a global system for mobile communication network (GSM).

6.4 ADVANTAGES

1. Easy to monitoring.

2. High reliability

3. Digital output.

4. Reduce battery lose.

5. Easy to get alarm on phone.

6.5 DISADVANTAGES

1. Very hard to develop this program.

2. Sometime never got SMS due to network error.

6.6 CONCLUSION

We tested our system & it's worked properly. As beginning of the code section we use unit testing. When we made our modules we test it by unit testing. After complete development process of our full system, we test it by integration testing system. In every test section we found some problems and we solve those problems as soon as possible. After completing all process including testing we are assuring that now design and implementation of monitoring and survellance of BTS room System is much more enriched & a strong system and it's ready for commercial use.

CHAPTER 7

CONCLUSION

7.1 CONCLUSIONS

This project is microcontroller based project. BTS room security system is used to detect, illegal human instruction, fire and many other incidents can occur. The target of this work is to develop a security system for BTS room cost efficiency and accurately. From the results of presentation study, we can say that the developed system works appropriately and provide financial benefits. Cheap and available equipment's are used to design the system. The overall performance of the system is satisfactory and successful.

We have finally succeeded in making the "design and implementation of monitoring and survellence of BTS room in cellular network" satisfactorily and successful. Moreinformation is gained and other experiences are faced lot of information's are collected ultimately. we haveconcluded with a great wish for achieving our aim. Wehave planned to fulfil my technicalrequirements. The knowledge we have achieved with this project really would follow till the end of our carrier.

7.2 APPLICATIONS

There is huge application in our country.

For examples:

1. Grameenphone company BTS room.
2. Airtel company BTS room.
3. Banglalink company BTS room.
4. And many other network companies like this.

7.3 FUTURE WORK

In future we can improve some feature in our projects such as

1. Adding 360-degree Night Vision Home Security IP Camera.
2. And many other update technologies.

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