GSM BASED EMERGENCY ALERT SYSTEM & HOME APPLAINCE CONTROL

**A Project and Thesis that submitted in partial fulfillment of the requirements for the Degree of
Bachelor of Science in Electrical and Electronic Engineering**

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Certification

This is to certify that this project and thesis entitled "**GSM BASED EMERGENCY ALERT SYSTEM & HOME APPLIANCE CONTROL**" is done by the following students under my direct supervision and this work has been carried out by them in the laboratories of the Department of Electrical and Electronic Engineering under the Faculty of Engineering of Daffodil International University in partial fulfillment of the requirements for the degree of Bachelor of Science in Electrical and Electronic Engineering. The presentation of the work was held on 30 January 2019.

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The project and thesis entitled **" GSM BASED EMERGENCY ALERT SYSTEM & HOME APPLIANCE CONTROL,"** submitted by **Md Rakibuzzaman & Tauhidul Islam**, ID No: 162-33-309 & 162-33-302, Session: Fall 2019 has been accepted as satisfactory in partial fulfillment of the requirements for the degree of **Bachelor of Science in Electrical and Electronic Engineering** on 25 October 2019.

<div style="text-align:center">

BOARD OF EXAMINERS

</div>

_____

Name: External member
Designation:

_____

Name: Internal Member
Designation:

This book is dedicated to my father,

with love,

actually, father box doesn't read any engineering book, and so if someone doesn't tell him about this, he will never know.

SUBSTANCES

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List of Abbreviations

BTS	Base transceiver station
IC	Integrated circuit
GSM	Global System for Mobile Communication
LCD	Liquid Crystal Diode
SIM	Subscriber Identity Module
NC	Normally Closed
MS	Group Velocity Dispersion
LED	Light Emitting Diodes
LDR	Light dependent register

List of Symbols

λ	Wavelength
λ_B	Bragg wavelength
n_{eff}	Effective index
z	Position along the grating
n	Mode index
f	Fundamental Frequency
ω	Angular frequency
M	Modulation Index
T	Fundamental Time Period

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ABSTRACT

Every project have a fixed goal, the main goal of this project is to switching control of home appliance like (light, fan, door, etc.) and also switch ON the buzzer when we are in danger. The whole system is design with GSM, Arduino. The main motive of this project is that it can provide not only facile but also speedily. In this project GSM was send for executed an instruction from user's cell phone that can hold in addition work like OFF/On the desire home appliance or buzzer. MPLAB assembly language interface on the GSM .GSM used for wirelessly control light, active-deactivate emergency buzzer via SMS. Message signal transmitted and it received by GSM modem. GSM passed an instructed SMS to Arduino. The Arduino / The Arduino grasp the taken instruction and change the status of the set up system where the Arduino was coded .After completely finishing this process Arduino send an instruction to the GSM modem and goes back to the desire cell phone through via SMS.

Chapter 1

Introduction

1.1 Introduction:

Nowadays mobile phone is called mother of communication. It is as important as our daily meal due to its versatile feature. In present time of digital innovation, Home appliance control and emergency alarm system both design in a project is a revolution of communication engineer. It is the system where apparatuses can control wirelessly. The innovation works by permitting correspondence between a recipient in the house and cell phone somewhere else.

1.2 Objective:

A cell phone is a progressive innovation of the century. It was fundamentally intended for making and getting calls and instant messages, however it has turned into the entire world after the smartphone comes into the image. In this venture we are building a home mechanization framework and emergency buzzer framework, where one can control the home machines, utilizing the basic GSM-based cellphone, just by sending SMS through his cellphone. In this task, no smartphone is required, only the old GSM telephone will work to turn ON and OFF any.

Using a smaller controller, any electrical or electronic device like light, buzzer can be controlled wirelessly. It is the system where wireless control by means of short message service utilizing the GSM.

.

1.3 Scope:

√ the project "GSM BASED EMERGENCY ALERT & LIGHT CONTROL" is intended to automate the certain function of home appliances and emergency alert. The main Scope of this project is that we can control light and alarm from anywhere in the world where GSM network is available.

√ with the recent expansion of communication networks, emergency alert control and home appliance control can be further enhanced with new dimension of capabilities.

√The device is much helpful in controlling home and safety. It decreases the wastage of our important time and safety.

√GSM is globally accepted standard for digital cellular communication.

√A helpful future add on feature could be the addition of GSM technology along with it for the better automatic functioning.

√Can be used by everyone with just the knowledge of text SMS.

1.4 Methodology:

1. Prepare our tools and parts.

2. Insert a SIM card to the GSM shield.

3. Communicate with Arduino by hardware serial.

4. Upload the program.

5. Plug relay + GSM shields to the Arduino.

6. Control the relay shield by manually.

7. Have a test for the manual control.

8. Control the light via SMS.

9. Connect the lamp to the relay shield.

10. Control the light via SMS.

1.5 Project outline:

This project is organized as follows:
Chapter 1 Introduces GSM & Arduino based home appliance control & emergency buzzer control.
Chapter 2 Reviews the literature
Chapter 3 Analyzes and simulates the theoretical works
Chapter 4 describes the hardware development parts.
Chapter 5 presents the results and its discussions
Chapter 6 conclusion with some recommendations

CHAPTER 2

LITERATURE REVIEWS

GSM based emergency alert and home appliance control can be described as introduction of technology with in the own safety and home environment to provide convenience, security to its occupants.

There are many other projects done on GSM based emergency alert and home appliance control in different countries. They are all different from each other in design, features, devices, element and algorithm. In the respective areas of components availability and they were designed according to specific needs. Most of them are very cheap and also some of them are very expensive. The hardware and software is both availability is necessary work. After a long time searching on internet and thesis book, we have found a lot of articles. When we searching for security purpose articles, we also found some garage project for security and most of them are mainly done by western countries. Most of them are done only for security purpose using Arduino or raspberry Pi.

The security issues for home appliance control and emergency alert projects there are few projects on fingerprints recognition module and also biometric method for next generation E-passport. Face recognition module and biometric method are costly so we used normal SMS method for controlling and it's really very cheap. It can use also used by every type of person specially kids, women, etc. A group of Malaysia proposed a web based indoor air quality system Using GSM and Arduino. The system contains of gas sensor, temperature and particle dust sensor also (WSN) wireless sensor network. There a desktop computer acts as the base station.

There are some emergency alert and home appliance system that use ZigBee or Bluetooth for wireless connection.

In Bangladesh, we faced a problem by using GPS.

CHAPTER 3

HARDWARE DEVELOPMENT

3.1 Introduction:

To begin with the project, let's get the idea of all the components that we used for the project. It is very important to know all the information about both hardware and software specifications. The components we are using are as follows:
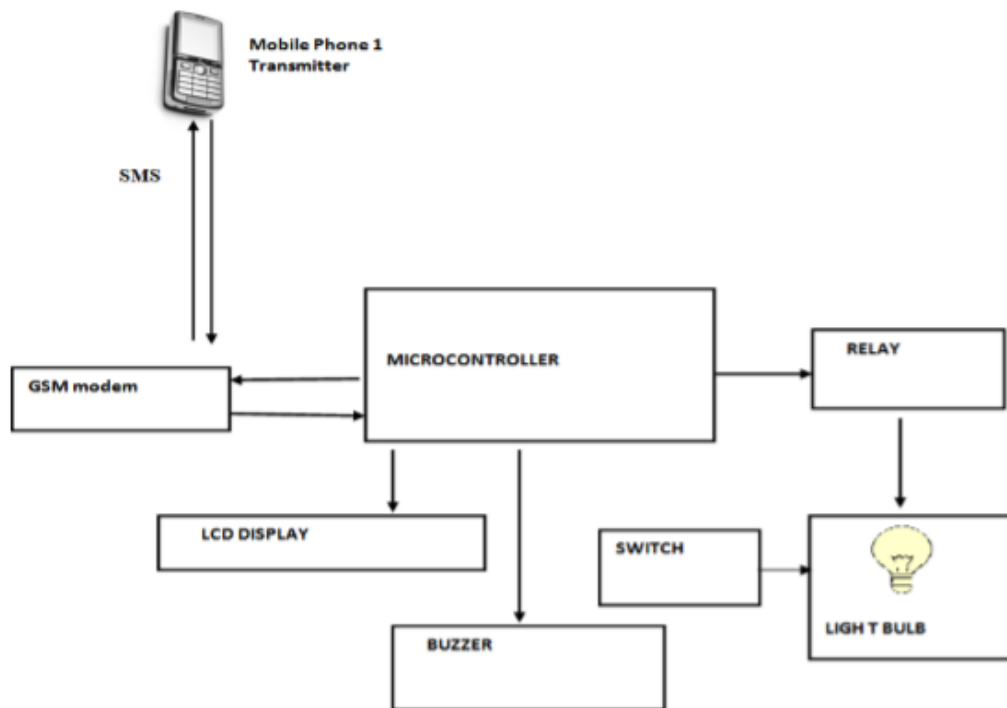

Figure 1: Block diagram of design

3.2 Hardware Used:

1. Arduino Uno
2. GSM shield
3. Relay module
4. LCD display
5. Breadboard

6. Adaptor
7. Buck converter
8. Switch & Socket
9. Rectifier

3.3 Software used:

1. Arduino IDE.

2. Mobile phone messaging application.

GSM TECHNOLOGY:

3.4 ABOUT GSM:

The Global system for mobile communication (GSM) is a worldwide granted standard for digital cellular communication. The name of standardization of GSM in 1982 to create a general European mobile telephone standard that would have some specifications for a pan-European mobile cellular radio system operating at 900 MHz
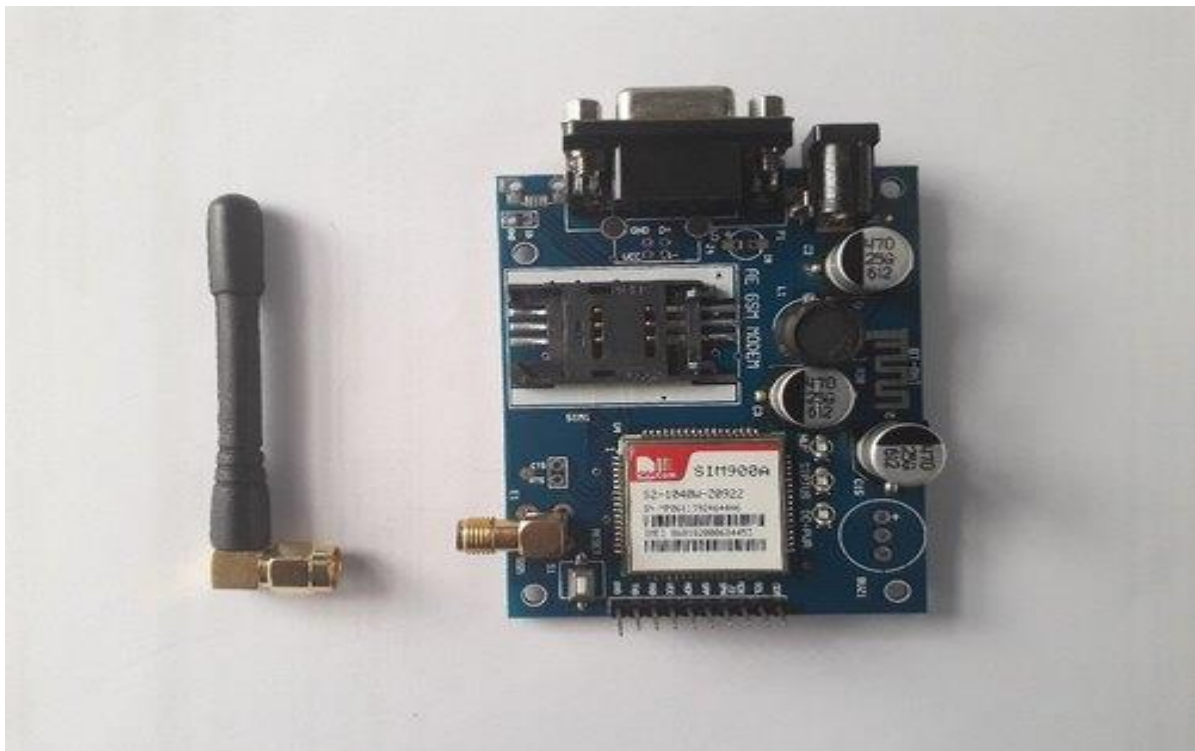

Figure 3.4. : GSM Module

3.5 How GSM Works?

Global System for Mobile communication is a short form of GSM. Today it is used by more than 800 million end-users and spread across more than 190 countries which work around 70% of digital wireless works. In a GSM, the geographical area is divided into hexagonal cells and whose side that depends upon the power of transmitter and load on transmitter. In the center of the cell, there is a base station containing a transceiver and an antenna.
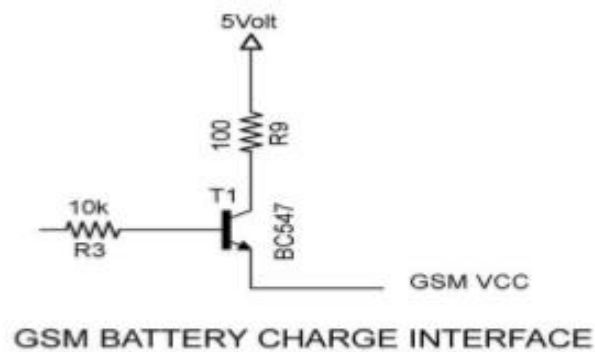

GSM BATTERY CHARGE INTERFACE

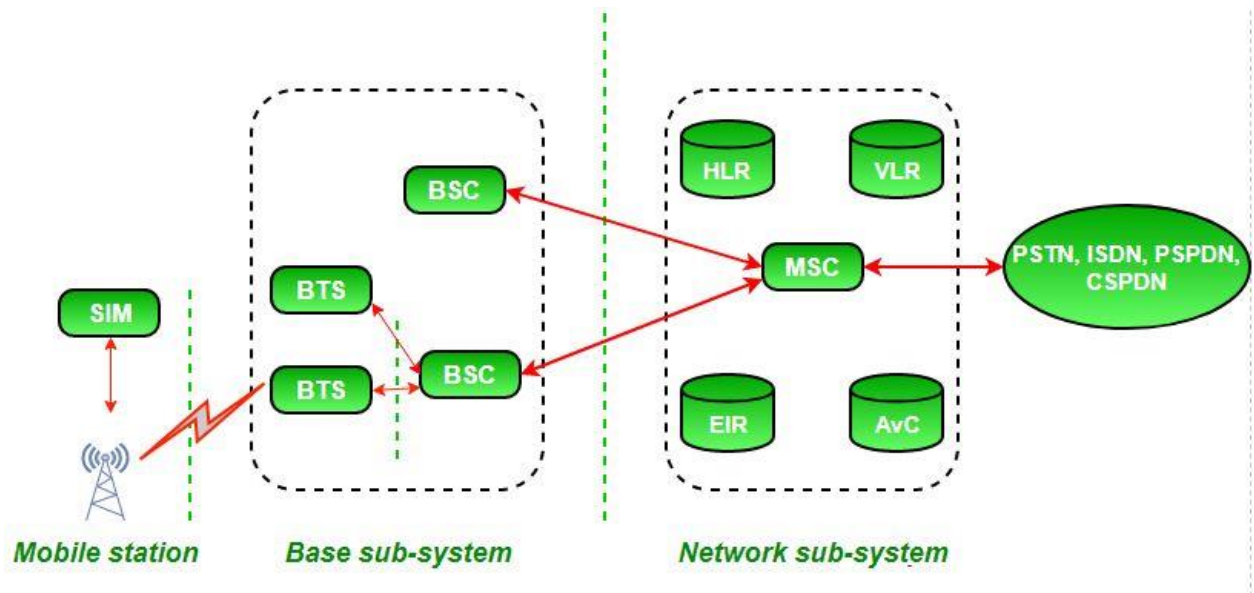**Figure 7: GSM Battery Charging Interface**

3.6 Architecture:

Fig: Image of GSM Architecture

3.7 Function of the components:

*Mobile station (MS)

* Base transceiver system (BTS)

*Base station controller (BSC)

 *Home location register (HLR)

*Visitor location register (VLR)

3.8 Relay:

In this system a relay is an electrical switch that close and opens under the control of Arduino Uno.
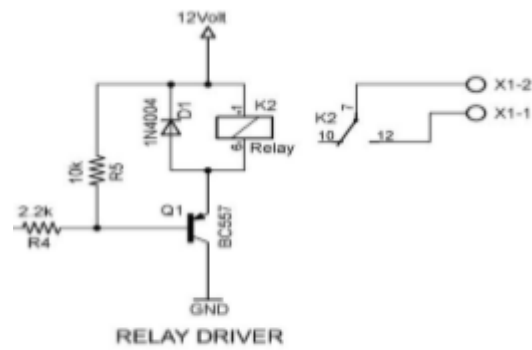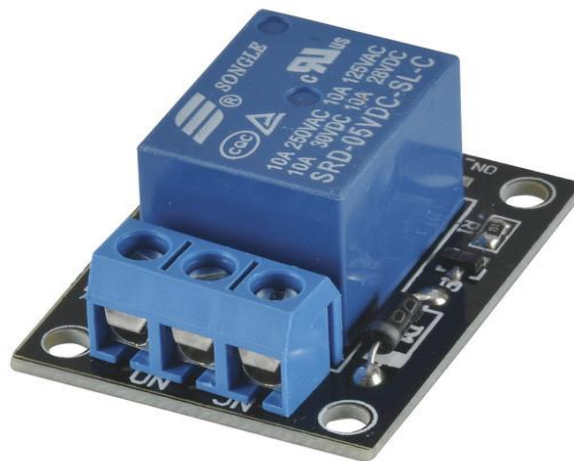

Figure 3: Relay driver

Fig3.1.3: Arduino Compatible Relay Board for 5V
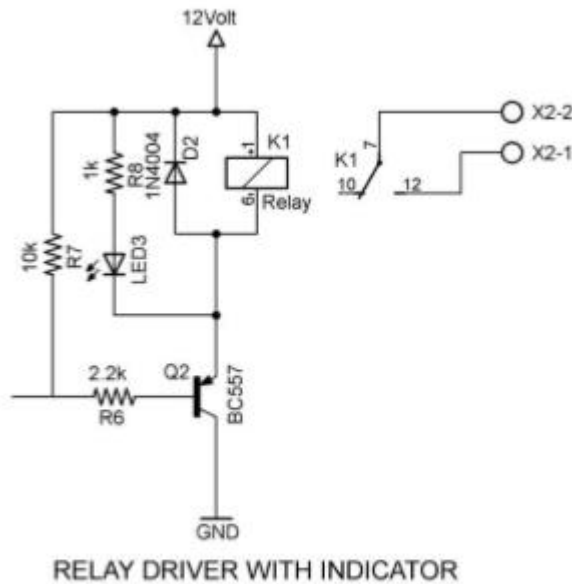
RELAY DRIVER WITH INDICATOR

Figure 4: Relay driver with indicator

3.9 Rectifier:

A semiconductor device that widely used and this rectifier is two lead semiconductor that allows current to pass one direction. The P-N Junction Diode is consists by joining both N-type and P-type semiconductor materials. Rectifier diodes are an indispensable part of power supplies where they are utilized to change over AC voltage to DC voltage.
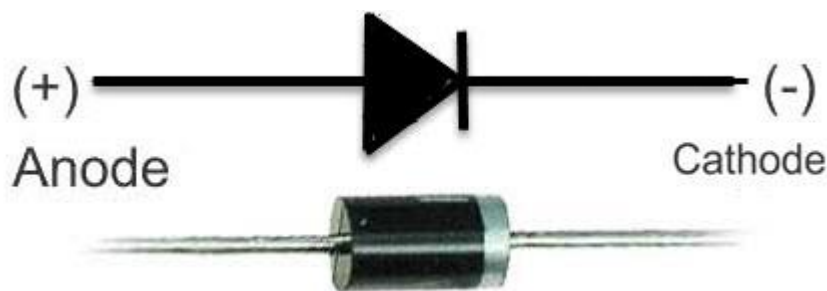

Fig 3.1.4: Symbol of Rectifier Diode

3.10 Centre Taped Rectifier:

A center-tapped rectifier is a kind of full-wave rectifier that utilizations two diodes associated with the auxiliary of a center-tapped transformer, as shown in Figure below. To a center-tapped secondary the input voltage is coupled through the transformer.
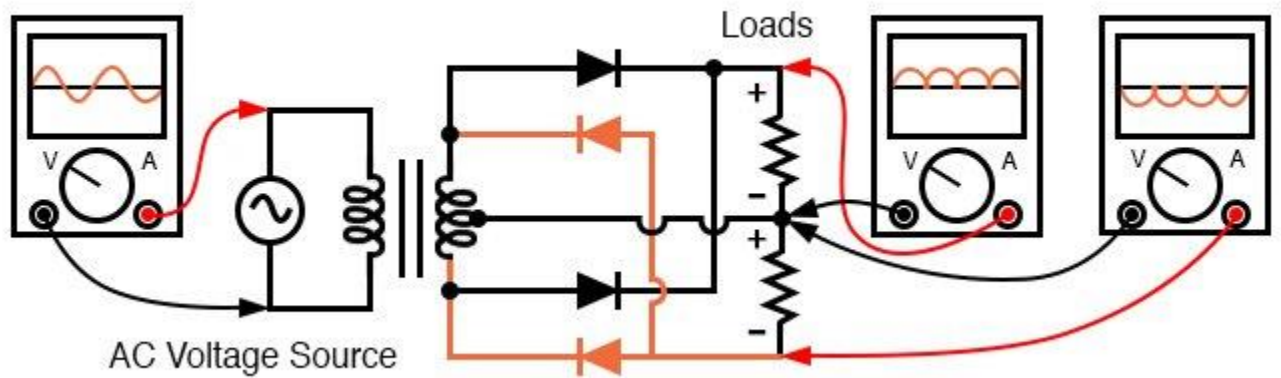
Fig 3.1.5: Dual Polarity Center Tapped Rectifier

3.11 Buck Converter:

A buck converter (step-down converter) is a DC-to-DC control converter that steps down voltage (while stepping up current) from its info (supply) to its output (load).

Fig 3.1.6: Step Down Buck Converter

3.12 Voltage Regulator IC 7805:

When a IC maintains the output voltage at a constant value is known as a voltage regulator. In this system we used IC 7805.

LM7805 PINOUT DIAGRAM
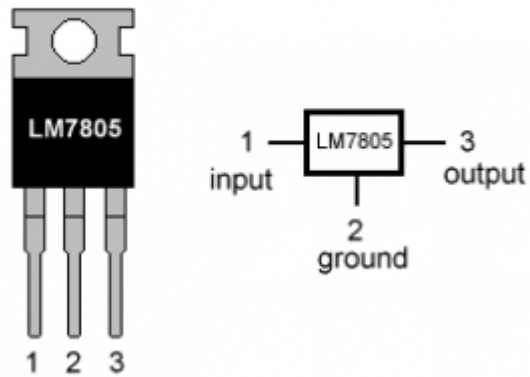
Fig3.1.7: LM7805 PINOUT DIAGRAM

3.13 Rating of 7805 IC:

1. 7V-35V for input voltage range
2. 1A for current rating and
3. Maximum voltage=5.2V, Minimum voltage=4.8V

CHAPTER 4

ANALYSIS AND SIMULATION

4.1 Introduction:

After connecting and programming all the components with the given block diagram, we run the experiment. Then we have conducted all given components according to our proposed system. We have chosen a place inside the house where the alarm sound can everyone can listen.
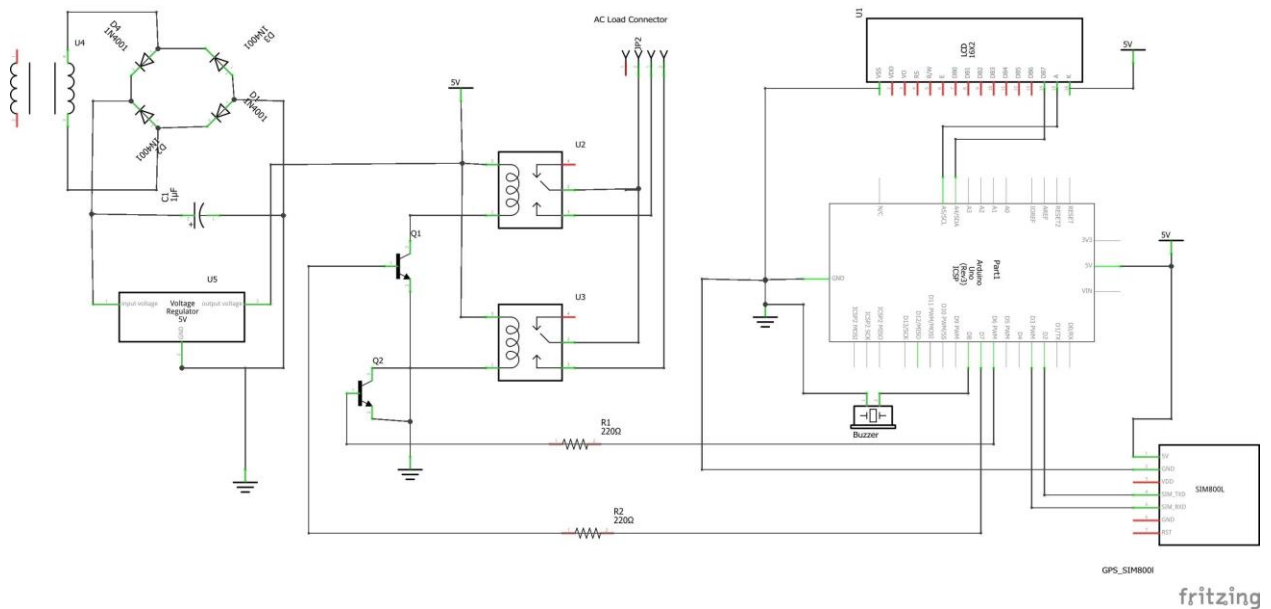
Fig: Block diagram of the design

4.2 System Description:

This system consists two parts and this is hardware and software. Where the hardware part consists of an embedded system like Arduino Uno, SIM 900 of GSM modem. Mainly the GSM modem provides the communication between homeowner and the system that means of SMS. The message command to be executed. Once the GSM modem receives the message from the command sent will be extracted and executed by the GSM module.

Fig: Block diagram for GSM based mobile control light and buzzer

4.3 Working principle:

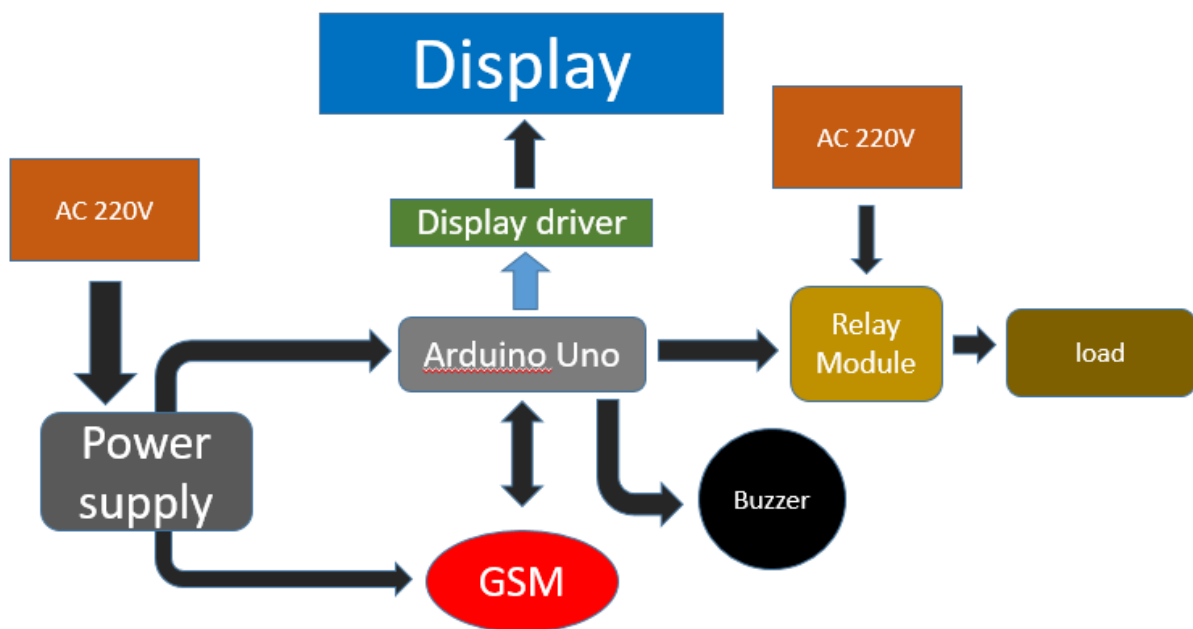In this project, Arduino is utilized for controlling the entire procedure. Here we have utilized GSM wireless correspondence for controlling home machines and an emergency buzzer control. We send a few directions like light 1 ON or OFF, etc. for controlling home apertures and an emergency buzzer. In the wake of accepting given direction by Arduino through GSM, Arduino sends a sign to transfer, to turn ON or OFF the home machines utilizing a hand off driver. Here we have utilized a prefix in the direction string that is Light. This prefix is utilized to distinguish that the primary order is coming along side it and toward the finish of the string demonstrates that the message has been finished.

At the point when we send SMSS to the GSM module by mobile, at that point GSM gets that SMS and sends it to Arduino. Presently Arduino peruses this SMSS and concentrates the principle order from the got string and stores in a variable. After this Arduino contrasts this string and a predefined string. On the event that the match happened, at the point Arduino sends a sign to transfer by means of hands off driver for killing ON and the home machine s. What's more, the relative outcome additionally prints on

X2 LCD by utilizing suitable direction.

4.4 Results of appliance and emergency buzzer control:

Appliance	SMS intrusion sent by user	System response
Light 1	Load 1	Light 1 simulated ON
Light 2	Load 2	Light 2 simulated On
Buzzer	Load 3	Alarming

Program:

```
#include <SoftwareSerial.h>
SoftwareSerial my Serial (2, 3);
#include <LiquidCrystal_I2C.h>
#include <Wire.h>
LiquidCrystal_I2C Lcd (0x27, 16, 2);

String incomingData;

Int Load1 = 6;
Int Load2 = 7;
int Buzzer = 8;

unsigned int flag1 = 0,  flag2 = 0,  flag3 = 0, flag5 = 0;

void setup()
{
 pinMode(Load1, OUTPUT);
 pinMode(Load2, OUTPUT);
 pinMode(Buzzer, OUTPUT);
 lcd.begin(16,2);
 lcd.init();
 lcd.backlight();
 lcd.clear();
 lcd.setCursor(0,0);
 lcd.print("A GSM Based");
 delay(2000);
 lcd.clear();
 lcd.setCursor(0,0);
 lcd.print ("Danger Alert ");
 lcd.setCursor (3,1);
 lcd.print(" System ");
 delay(3000);
 lcd.clear();
 lcd.setCursor(0,0);
 lcd.print("Circuit Design");
 lcd.setCursor(6,1);
 lcd.print("By");
 delay(4000);
 lcd.clear();
 lcd.setCursor(0,0);
 lcd.print("Tauhidul Islam");
 lcd.setCursor(0,1);
 lcd.print("Hashme Vhai");
 delay(6000);
 Serial.begin(9600);
 mySerial.begin(9600);
 mySerial.println("AT+CMGF=1\r\n");  //Set SMS Text Mode
```

```
  delay(100);
  mySerial.println("AT+CNMI=2,2,0,0,0\r");  //procedure, how receiving of new messages
from the network
  delay(100);
  lcd.clear();
}

void loop()
{
  if(flag1 == 0)
  {
   start();
   flag1 = 1;
  }
  receive_message();
  delay(100);
  on_off();
  delay(100);
  Display();
}

void start()
{
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("System Ready");
  lcd.setCursor(0,1);
  lcd.print("Message send");
  number();
  mySerial.write("System Ready");
  delay(100);
  mySerial.write((char)26);
  delay(3000);
  lcd.clear();
}

void receive_message()
{
  if (mySerial.available() >= 0)
  {
   incomingData = mySerial.readString(); // Get the data from the serial port.
   Serial.print(incomingData);
   delay(100);
  }
}


void on_off()
{
  if(incomingData.indexOf("BON") > 0)
```

```
  {
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Message receive");
delay(1000);
   flag5 = 1;
   digitalWrite(Buzzer, HIGH);
   lcd.clear();
   lcd.setCursor(0,0);
   lcd.print("Message send");
   number();
   mySerial.write("Buzzer is ON");
   delay(100);
   mySerial.write((char)26);
   delay(3000);
  lcd.clear();
   }

  if(incomingData.indexOf("L1ON") > 0)
  {
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Message receive");
delay(1000);
   flag2 = 1;
   digitalWrite(Load1, HIGH);
   lcd.clear();
   lcd.setCursor(0,0);
   lcd.print("Message send");
   number();
   mySerial.write("Load1 is ON");
   delay(100);
   mySerial.write((char)26);
   delay(3000);
  lcd.clear();
   }

  if(incomingData.indexOf("L2ON") > 0)
  {
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Message receive");
delay(1000);
   flag3 = 1;
   digitalWrite(Load2, HIGH);
   lcd.clear();
   lcd.setCursor(0,0);
   lcd.print("Message send");
   number();
   mySerial.write("Load2 is ON");
```

```
    delay(100);
    mySerial.write((char)26);
    delay(3000);
   lcd.clear();
   }

 if(incomingData.indexOf("BOFF") > 0)
  {
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Message receive");
delay(1000);
   flag5 = 0;
   digitalWrite(Buzzer, LOW);
   lcd.clear();
   lcd.setCursor(0,0);
   lcd.print("Message send");
   number();
   mySerial.write("Buzzer is Off");
   delay(100);
   mySerial.write((char)26);
   delay(3000);
  lcd.clear();
  }

  if(incomingData.indexOf("L1OFF") > 0)
  {
lcd.clear();
lcd.setCursor(0,0);
lcd.print("Message receive");
delay(1000);
   flag2 = 0;
   digitalWrite(Load1, LOW);
   lcd.clear();
   lcd.setCursor(0,0);
   lcd.print("Message send");
   number();
   mySerial.write("Load1 is Off");
   delay(100);
   mySerial.write((char)26);
   delay(3000);
  lcd.clear();
  }

if(incomingData.indexOf("L2OFF") > 0)
  {
 lcd.clear();
 lcd.setCursor(0,0);
 lcd.print("Message receive");
 delay(1000);
```

```
    flag3 = 0;
    digitalWrite(Load2, LOW);
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("Message send");
    number();
    mySerial.write("Load2 is Off");
    delay(100);
    mySerial.write((char)26);
    delay(3000);
   lcd.clear();
    }

   if(incomingData.indexOf("ALLON") > 0)
    {
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Message receive");
  delay(1000);
    flag2 = 1;
    digitalWrite(Load1, HIGH);
    flag3 = 1;
    digitalWrite(Load2, HIGH);
    flag5 = 1;
    digitalWrite(Buzzer, HIGH);
    lcd.clear();
    lcd.setCursor(0,0);
    lcd.print("Message send");
    number();
    mySerial.write("All Load is ON now");
    delay(100);
    mySerial.write((char)26);
    delay(3000);
   lcd.clear();
    }

if(incomingData.indexOf("ALLOFF") > 0)
    {
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Message receive");
  delay(1000);
    flag2 = 0;
    digitalWrite(Load1, LOW);
    flag3 = 0;
    digitalWrite(Load2, LOW);
    flag5 = 1;
    digitalWrite(Buzzer, LOW);
    lcd.clear();
    lcd.setCursor(0,0);
```

```
       lcd.print("Message send");
       number();
       mySerial.write ("All Load is OFF now");
       Delay (100);
       mySerial.write ((char)26);
       delay (3000);
      lcd.clear ();
       }


if(incomingData.indexOf("CHECK") > 0)
 {
  lcd.clear();
  lcd.setCursor(0,0);
  lcd.print("Message receive");
  delay(1000);
  lcd.clear();
     lcd.setCursor(0,0);
     lcd.print("Message send");
     number();
   if((flag2 == 0) && (flag3 == 0))
     {mySerial.write("All Load is OFF now");}
   if((flag2 == 0) && (flag3 == 1))
     {mySerial.write("Load1 OFF & Load2 ON");}
   if((flag2 == 1) && (flag3 == 0))
     {mySerial.write("Load1 ON & Load2 OFF");}
   if((flag2 == 1) && (flag3 == 1))
     {mySerial.write("All Load is ON now");}
     delay(100);
     mySerial.write((char)26);
     delay(3000);
    lcd.clear();
     }
     }

void number()
{
 mySerial.write("AT+CMGS=\"+8801961861563\"\r\n");
 delay(100);
}

void Display()
{
 if((flag2 == 0) && (flag3 == 0))
     {
     lcd.setCursor(0,0);
     lcd.print("Load1 is OFF    ");
     lcd.setCursor(0,1);
     lcd.print("Load2 is OFF    ");
     }
```

```
if((flag2 == 0) && (flag3 == 1))
  {
  lcd.setCursor(0,0);
  lcd.print("Load1 is OFF    ");
  lcd.setCursor(0,1);
  lcd.print("Load2 is ON     ");
  }
if((flag2 == 1) && (flag3 == 0))
  {
  lcd.setCursor(0,0);
  lcd.print("Load1 is ON     ");
  lcd.setCursor(0,1);
  lcd.print("Load2 is OFF    ");
  }
 if((flag2 == 1) && (flag3 == 1))
  {
  lcd.setCursor(0,0);
  lcd.print("Load1 is ON     ");
  lcd.setCursor(0,1);
  lcd.print("Load2 is ON     ");
  }
}
```

CHAPTER 5

CONCLUSIONS

5.1 Discussion

Practically all logical and most recent advancements have both great and terrible sides. That doesn't mean we ought to maintain a strategic distance from innovation. This kind of work moves us to improve the situation for our nation. Keen Technology is a gift for our nation. We should attempt to keep away from the terrible results and use it for our improvement. The switching of security lighting system utilizing GSM was talked about and the point of the work which is the structure and usage of a GSM based security lighting framework controller has been finished. This framework would make it simpler for man to control security lighting framework from a separation. For places where GSM inclusion isn't accessible, there is requirement for the establishment of GSM base handset stations, since the framework activity is generally reliant on accessibility of effective correspondence inclusion.

5.2 Limitations

There are a few restrictions watched all through our task. Since our venture is GPS based location control, our home apparatuses are completely controlled through SMS get to. As we control the entire framework through SMS, we have to affirm fast of SMS. Something else, the framework postpone will happen as Ethernet shield won't fill in as a system supplier to the circuit.

In spite of the fact that it needs less hardware however its expense isn't in insignificant range. To get office, clients need to cost for this. The expense of introducing a home computerization framework can be partially costly. Be that as it may, it relies upon the mechanical assembly. The more advanced the framework is the more costly it will be.

This constant server base framework is restricted to just a single individual which means just a single individual can work the framework at once.

In the event that there is any break due to bursting of links or the strands then the all-out framework will be smashed. In this way, this won't be the situation of radio sign or different sign. There will be a trouble of accepting sign.

On the off chance that the individual doesn't deal with the hardware securely or utilize the careful key to do the activities, human mistake can happen. Human blames additionally direct to the annihilations of the gadget. At that point there will be framework impacts.

Home mechanization has various downsides. For having home robotized framework, individuals will be lazier. That at last may wind up with making extraordinary damage in human social and expert life.

In particularly remarkable cases, the unfaltering nature of the home mechanized devices changes (diminishes). It depends for the most part on the advancement used and the movements being done.

5.3 Future Scope

As we have referenced before this theory is definitely not a total undertaking. This is only an essential structure of another total framework. We have done all the essential necessities of a run of the simple house and own safety. The assignments that we have done are by all account not the only undertakings the parts can do. There are a great deal of different degrees for this task.

More machines can be included this framework with an incredible transfer module.

√ the project "GSM BASED EMERGENCY ALERT & LIGHT CONTROL" is intended to automate the certain function of home appliances and emergency alert. The main Scope of this project is that we can control light and alarm from anywhere in the world where GSM network is available.

√ with the recent expansion of communication networks, emergency alert control and home appliance control can be further enhanced with new dimension of capabilities.

√The device is much helpful in controlling home and own safety. It decreases the wastage of our important time and safety.

√GSM is globally accepted standard for digital cellular communication.

√A helpful future add on feature could be the addition of GSM technology along with it for the better automatic functioning.

Reference:

A Car Test for the Estimation of GPS/INS Alignment Errors SANYO Hong, Man Hung Lee, Senior Member , IEEE, Sun Hong Kwon, and Ho Hwan Chun IEEETRANSACTIONS ON INTELLIGENTTRANSPORTATION SYSTEMS, VOL. 5, NO. 03, SEPTEMBER 2004

A. Srivastava, B. Divide, and D. Porsha, "GSM based home security system", International Journal of Emerging Trends in Electronic and Computer Science (IJETECS), Vol.2, Issue.4, pp. 171-176, April 2013.

Shih-Chung Chen, Chung-Min Wu, Yeou-Jiunn Chen, Jung-Ting Chin, Yu-Yin Chen, "Smart home control for the people with severe disabilities", Applied System Innovation (ICASI) 2017 International Conference on, pp. 503-506, 2017.

Ma Shabo, Zhang Guoyu, Sun Xing angst. Design of the system of wireless alarming based on GSM module [J]. Then the Journal of the Changchun University of the Science and Technology.

APPENDIX A

Derivation:

The given transistor parameters are
Transistor (npn BC547)
Forward beta (β) = 290,

I_{CMAX} = 100mA,

Transistor's renowned equations

$$I_E = I_C + I_B \qquad (1)$$

$$I_C = \beta I_B \qquad (2)$$

From circuit analysis I_C = 30mA

$$30 \ mA = 290 \ * \ I_B$$

$$I_B = \frac{30 \ * \ 10^{-3}}{290}$$

$$I_B = 0.000103448$$

$$I_B \cong 103.45 \ \mu A$$

From the base emitter loop,

$$V_B - I_B R_B - V_{BE} = 0 \qquad (3)$$

$$I_B R_B = V_B - V_{BE}$$

$$R_B = \frac{V_B - V_{BE}}{I_B}$$

$$R_B = \frac{5 - 0.7}{103.45 \ * \ 10^{-6}}$$

$$R_B = 45432.5761$$

$$R_B \cong 45 \ K\Omega$$

$$R_B \cong 43 \ K\Omega$$

Using a smaller value of resistor that will yield a wider range of base current without endangering the transistor is ok but not exceeding the current limit of the base which is 500uAmps for 5mAmps of collector current and higher for higher values of the collector as well.

$$\therefore R_B \cong 10 \ K\Omega$$
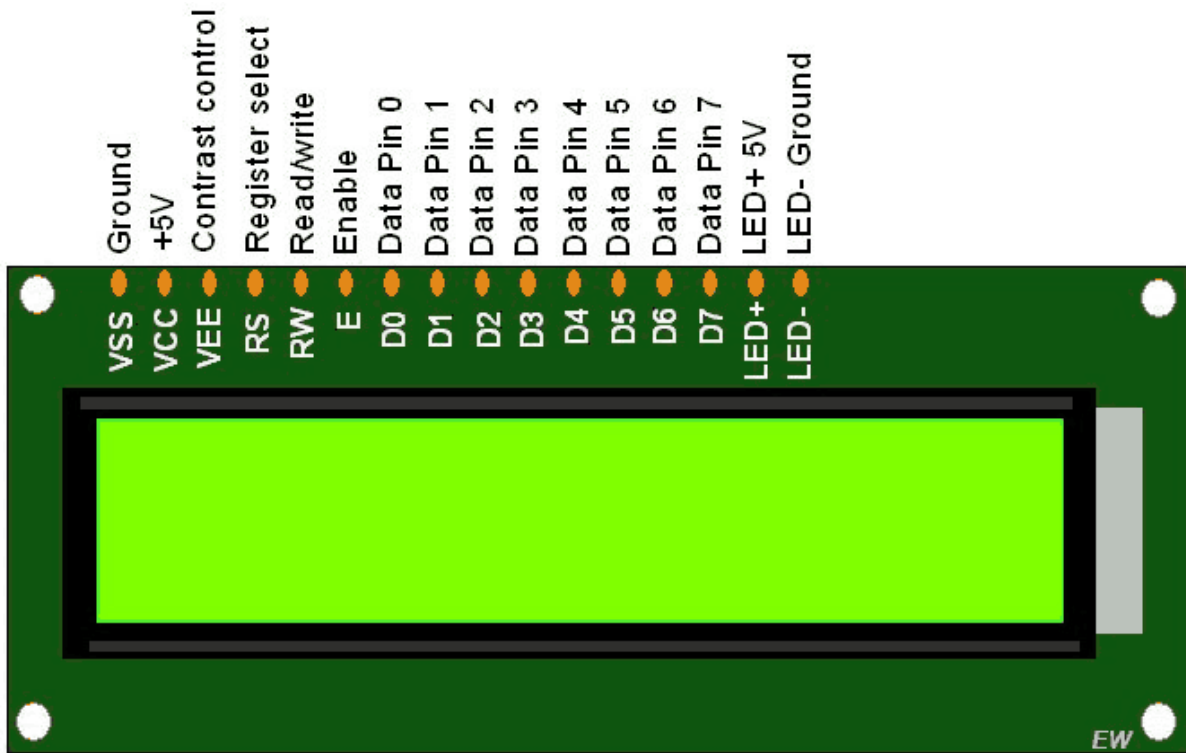
Command for this system:

AT+CSCA: Set the SMS center address. Mobile-originated messages are transmitted through this service center.

AT+CMGS: Send short message to the SMS center

AT+CMGR: Read one message from the SIM card storage

AT+CMGD: Delete a message from the SIM card storage

AT+CMGF: Select format for incoming and outgoing messages: zero for PDU mode, one for Text mode

AT+CSMP: Set additional parameters for Text mode messages

Appendix B

Pin configuration:
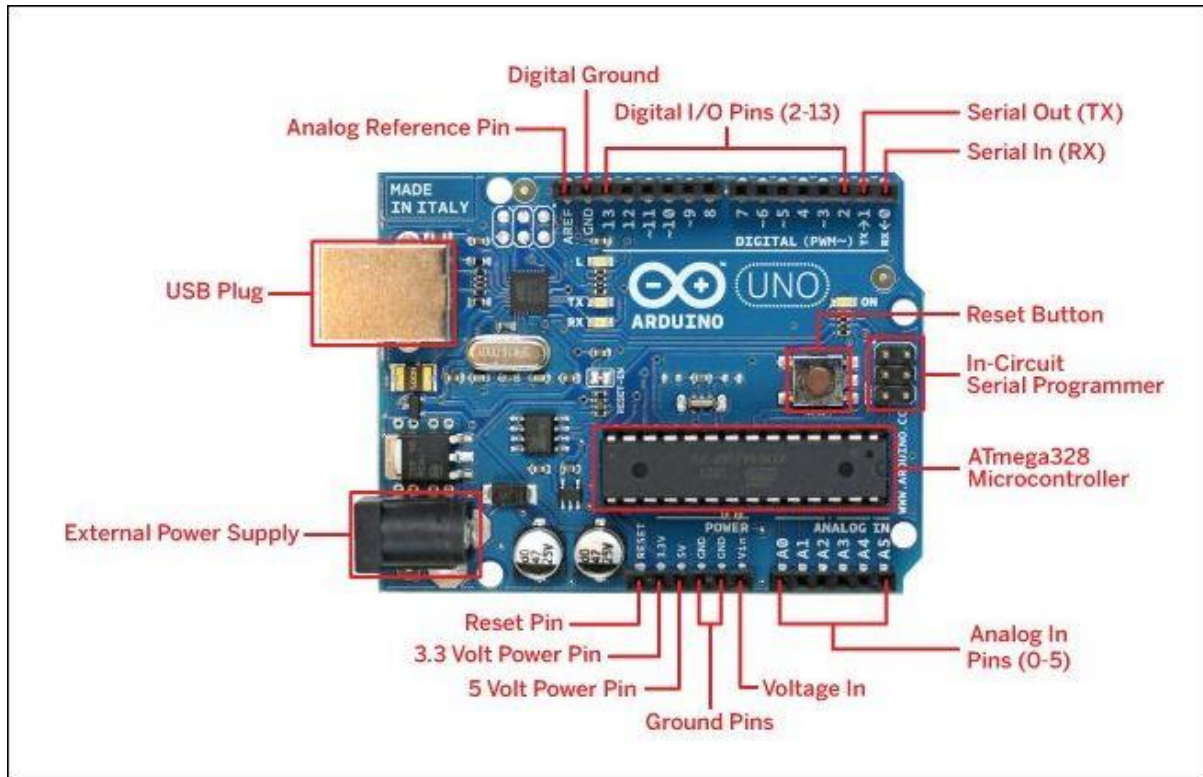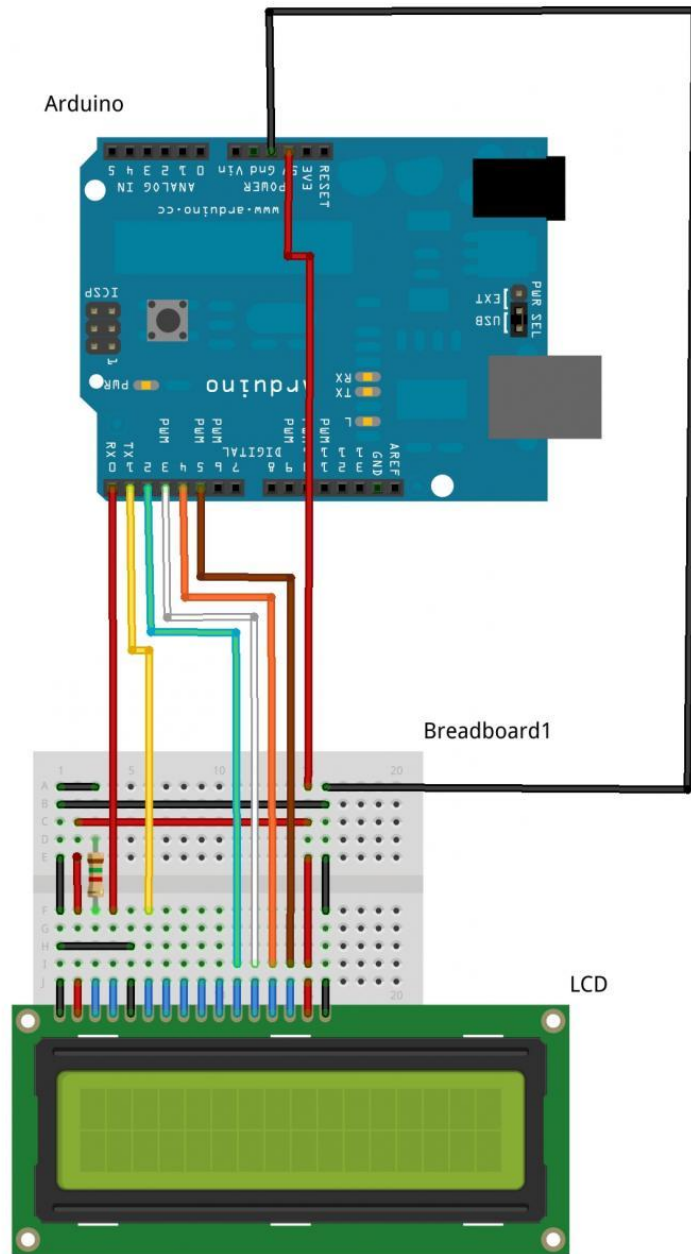

Arduino Uno Pin Diagram

16x2 LCD Display

LCD	Arduino		LCD	Arduino
1 GND	GND		9 DB2	Not connected
2 VDD	5V		10 DB3	Not connected
3 Contrast	Resistor to GND		11 DB4	PIN 2
4 RS	PIN 0		12 DB5	PIN 3
5 R/W	GND		13 DB6	PIN 4
6 Enable	PIN 1		14 DB7	PIN 5
7 DB0	Not connected		15 Back LED+	Resistor to 5V
8 DB1	Not connected		16 Back LED-	GND

LCD TABLE PIN

Arduino

Breadboard1

LCD

LCD to Arduino interfacing circuit

Appendix C

Some snapshot: