

# **Visvesvaraya Technological University**

Belagavi



**A Mini Project Report**

**On**

**WIRELESS NOTICE BOARD**

*Submitted by*

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**In partial fulfilment for the award of the degree of**

**BACHELOR OF ENGINEERING**

**IN**

**ELECTRONICS & COMMUNICATION**



**NEW HORIZON**  
**COLLEGE OF ENGINEERING**

New Horizon Knowledge Park, Ring Road, Marathalli

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC

Accredited by NAAC with 'A' Grade, Accredited by NBA



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**BENGALURU-560103**

## **DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

### **CERTIFICATE**

Certified that the Mini project entitled “**WIRELESS NOTICE BOARD**” is carried out by Ms. POORNIMA R.M bearing USN: 1NH18EC086, Mr. MADALA BHANU PRAKASH bearing USN: 1NH18EC064, Ms. SNEHA N.S. bearing USN: 1NH18EC106 and Mr. VUTUKURI GOWTHAM bearing USN: 1NH18EC122, bonafide students of NHCE, Bengaluru in partial fulfilment for the award of Bachelor of Engineering in Electronics and Communication of the Visvesvaraya Technological University, Belagavi during the year 2020-21. It is certified that all corrections and suggestions indicated for Internal Assessment have been incorporated in the report deposited in the department library. The mini project report has been approved as it satisfies the academic requirements in respect of the mini project work prescribed for the said degree.

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## **ACKNOWLEDGEMENT**

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

We thank Dr. Mohan Manghnani, Chairman of New Horizon Educational Institution, for providing necessary infrastructure and creating good environment.

We also record here the constant encouragement and facilities extended to us by Dr. Manjunatha, Principal, NHCE and Dr. Sanjeev Sharma, head of the department of Electronics and Communication Engineering. We extend sincere gratitude to them.

We sincerely acknowledge the encouragement, timely help and guidance to us by our beloved guide Mr. Richard Lincoln Paulraj to complete the project within stipulated time successfully.

Finally, a note of thanks to the teaching and non-teaching staff of electronics and communication department for their co-operation extended to us, who helped us directly or indirectly in this successful completion of mini project.

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## **ABSTRACT**

This document deals with an innovation rather an interesting manner of initiating message to the people using a wireless electric display board which is synchronized using gsm technology.

This will help us in passing any message almost immediately without any delay just by sending a sms which is better and more reliable that old traditional way of passing message on notice board.

This proposed technology are used in many colleges, public places, malls.

So, using gsm module helps in sending message to display from any where.

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# **CHAPTER 1**

## **INTRODUCTION**

It presents an SMS based notice board incorporating the widely used GSM to facilitate the communication of displaying message on bulletin board via user's mobile. SIM 900 GSM modem with a SIM card is interfaced to the ports of the Arduino with the help of AT(attention) commands SIM-900 is duly interfaced through a level shifter IC MAX232 to the Arduino. The messaged is thus fetched into Arduino.

Communication devices such as the mobile phone handsets and related wireless innovations have become common. Many domains in the field of Communication and Embedded devices are being increasingly explored. The usage of the cell phones has been speedily increased now a days. Developments in the communication technologies have lead to the growth of dense networks. As a means of communication, notice boards are widely trending with it's applications ranging from schools, colleges, hospitals to major organizations.

Notice boards are effectively determining the global problem of deforestation by conveying the messages at large without the usage of paper. Such innovative measures will go a long way in adapting the damage to the environment. GSM technology aims in reducing the complexity for sending a message by incorporating SMS (Short Message Service) technology. This technology can be used in public areas such as in hospitals, schools, multiplexes and buildings to improve the security system and also to spread awareness in an emergency. The objective of this project is to analyse the various technologies of a SMS controlled wireless display board that can eventually replace the presently used paper based and programmable notice boards.

## CHAPTER 2

### LITERATURE REVIEW

With the event of cellular networks within the 1970's for increasing the shortage of frequencies in the radio telephone services which successively cause introduction of AMPS (Advanced mobile System) where the transmission was analog based.

We are using Atmega 328 to understand this project because using an Arduino simplifies the quantity of hardware and software development you would like to try to so as to urge a system running. The Arduino hardware platform already has the facility and reset circuitry setup also as circuitry to program and communicate with the microcontroller over USB. Additionally, the In / Out pins of the microcontroller are typically already fed bent sockets/headers for straightforward. On the software side, Arduino provides variety of libraries to form programming the microcontroller easier. More useful are things like having the ability to line In / Out pins to PWM at a particular duty cycle employing a single command or doing Serial communication. The best advantage has the hardware platform found out already, especially the very fact that it allows programming and serial communication over USB.

**Multiple units GSM controlled devices:** The human brain is always in search of data of interest to regulate systems of its choice. During this modern-age of electronic systems it's vital to be able to manage and acquire the maximum amount as information from all places. GSM network is widely used today for call/SMS or other communication related activities. Also, some places need urgent notices like in school, college, railway stations, airports, stock-market and this notice should be in real-time, so we would like a real-time bulletin board. This project is our experiment to offer a start to the age of real-time noticing.

## CHAPTER 3

### Existing System

- In this scenario to display any notice on the bulletin board we need type the message in PC and load into pen drive that we dump the knowledge on to the bulletin board.
- But this a time consuming and even much complicated process.
- If the person isn't available then it's harder to display the message. So, if we interface it with the GSM it becomes so easy.
- Even whenever the authorized person is out of station, he can convey the information just by sending the message from the persons mobile.

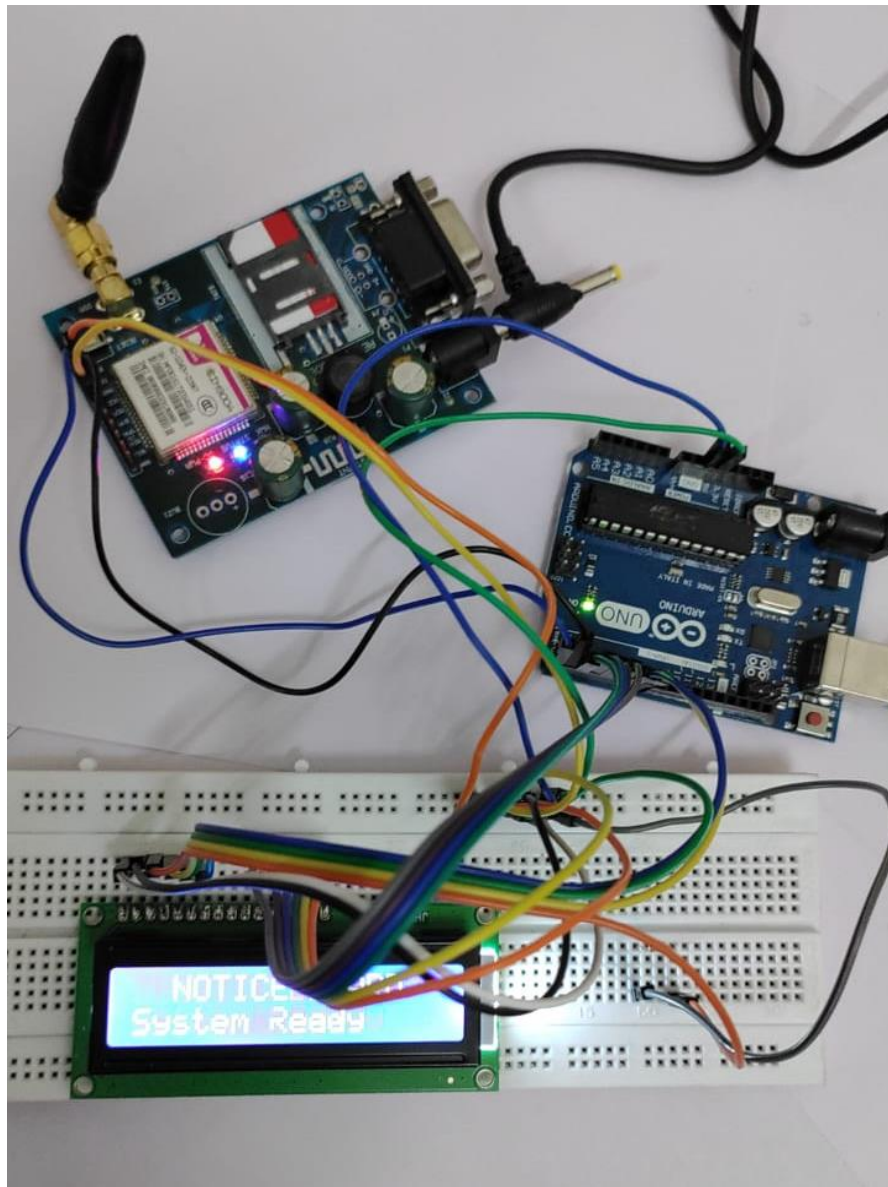


Fig. 3.1 - Existing System

## **Problem Statement & Objectives**

### **Problem Statement:**

- Notice board is primary thing in all institutions or organizations or public utility places like bus stations, railway stations and parks, etc.
- But sticking various notices day-to-day is a difficult process. so, this project deals with an advanced wireless notice board.

### **Objectives:**

- The main objective of this project is to display information on notice board using GSM technology.
- It's used to develop a wireless notice board that displays messages sent from the user's side.
- When a user sends a message, it is received by a SIM loaded GSM modem at the receiver unit.

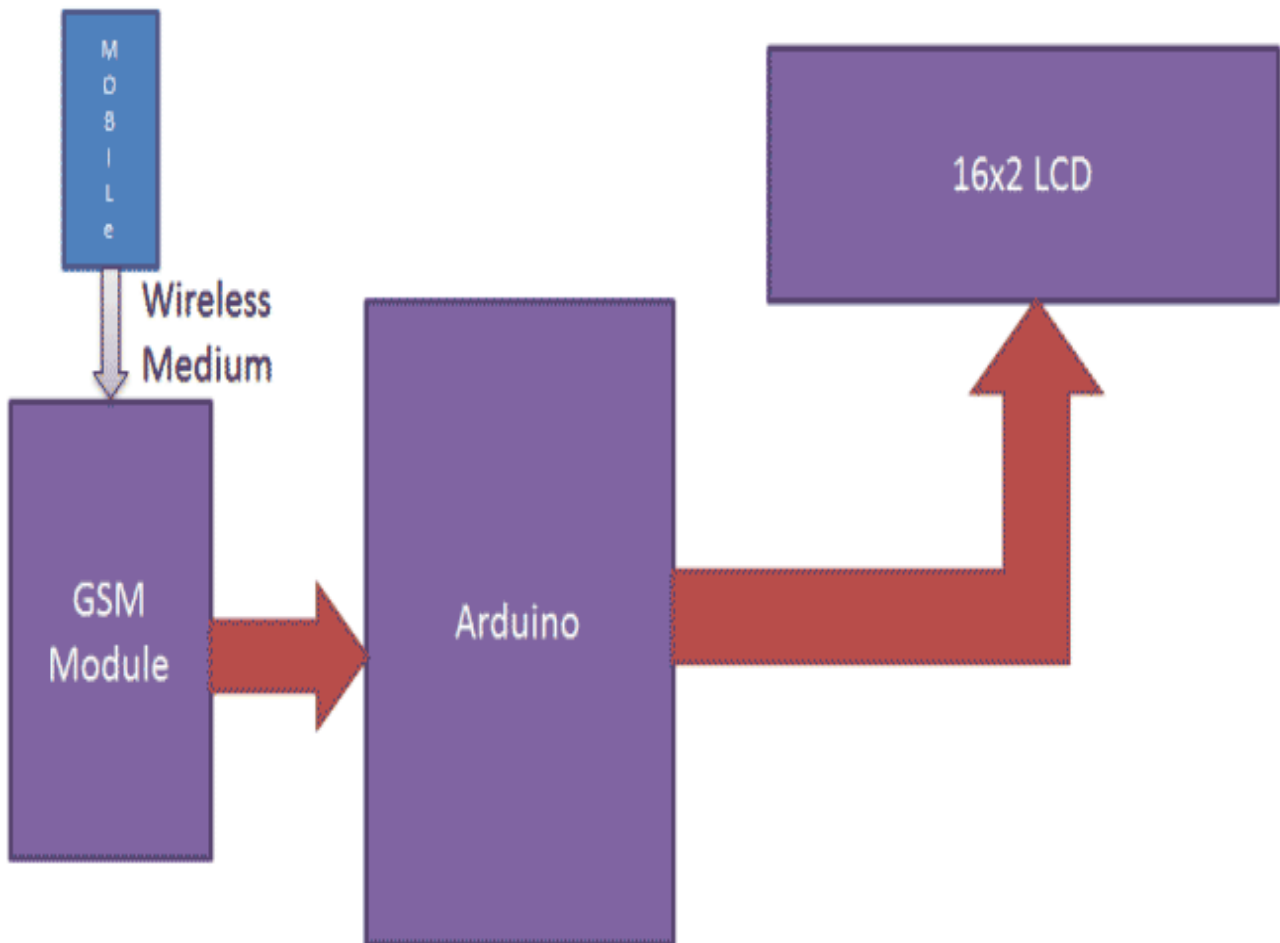
**Block diagram:**

Fig. 3.2 - Block Diagram

## CHAPTER 4

### PROPOSED METHODOLOGY

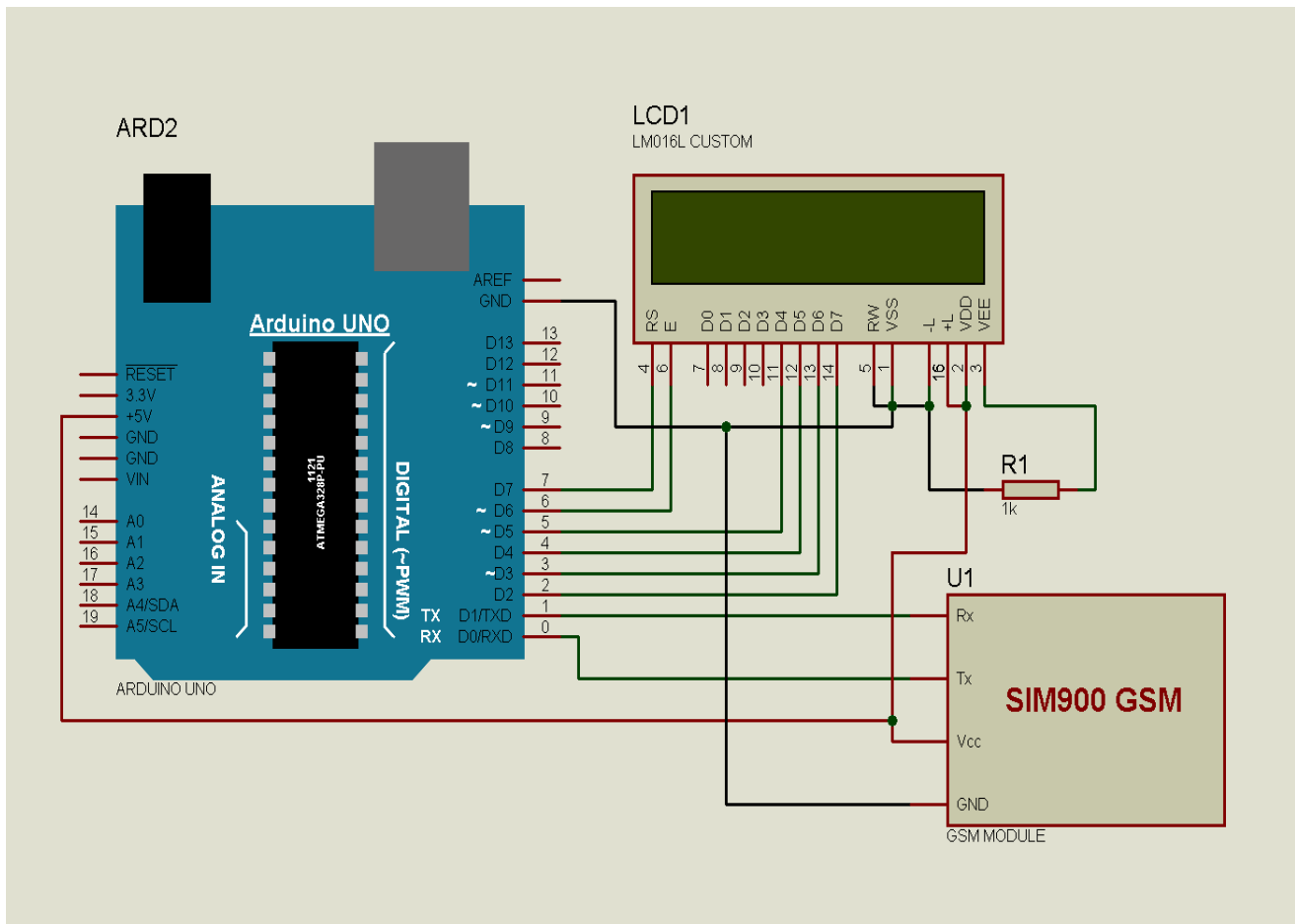


Fig. 4.1 - Circuit Diagram

Connections of the Wireless Notice Board using GSM and Arduino are very simple and shown in the figure 4.1. Here a liquid crystal display (LCD) is used for display the “Notice” or message, which is sent through the mobile phone as SMS. Data pins of LCD namely D7, D6, D5, D4, RS, EN are connected to Arduino digital pin number 2, 3, 4, 5, 7, 6. And pin Tx and Rx of GSM module is directly connected at Rx and Tx pin of Arduino respectively. And GSM module is powered by using a 12-volt adaptor.

**WORKING:**

- For this wireless bulletin board project 16×2 LCD acts as display device.
- GSM module acts as one communicating medium.
- Normal text message from our mobile will reach the GSM module through carrier.
- Once the message is reached GSM module will send it to the Arduino board through UART communication that's RX and TX.
- The code was written in such how once the message reached it'll display it within the LCD.
- GSM technology offers user the power to send a message from anywhere within the world and still it'll be display within the bulletin board.
- For the aim of prototyping, I even have chosen this small LCD module. However, you'll use any display module compatible with Arduino.

**Code Description:**

The code of the project is easily understandable; the new thing in this program is GSM initialization function GSM int(), which is explained in the last.

In the program, first of all we add library for liquid crystal display (LCD) and then we defines the data and control pins for liquid crystal display (LCD) and some variables.

```
#include <LiquidCrystal.h>
```

```
LiquidCrystal lcd(7,6,5,4,3,2);
```

```
int led=13;
```

```
int temp=0,i=0,x=0,k=0;
```

```
char str[100],msg[32];
```

After this, serial communication is initialized at 9600 bps and gives direction to used pin. And initialize GSM Module in setup loop.

```
void setup()
{
  lcd.begin(16,2);
  Serial.begin(9600);
  pinMode(led, OUTPUT);
  digitalWrite(led, HIGH);
  lcd.print("GSM Initilizing...");
  GSM_init();
  lcd.setCursor(0,0);
  lcd.print("Wireless Notice");
```

For receiving the data serially we use two functions, one is Serial.available which checks for any serial data is coming or not and other one is Serial.read which reads the data that comes serially.

```
void serialEvent()
{
  while(Serial.available())
  {
    char ch=(char)Serial.read();
    str[i++]=ch;
    if(ch == '*')
    {
      temp=1;
      lcd.clear();
```



```
lcd.print("Message Received");  
  
delay(1000);  
  
}  
  
}  
  
}
```

After receiving the data serially, we store it in a string and this string is checked for '#' and '\*', to find the starting and the ending of the Notice or message. Then finally Notice is displayed/printed on liquid crystal display (LCD) using lcd.print:

```
void loop()  
{  
  for(unsigned int t=0;t<60000;t++)  
  {  
    serialEvent();  
    if(temp==1)  
    {  
      x=0,k=0,temp=0;  
      while(x<i)  
      {  
        while(str[x]=='#')  
        {  
          x++;  
          while(str[x]!='*')  
          {
```

```
msg[k++]=str[x++];
```

Initialization function 'GSM\_init()' for GSM is important here, where firstly, GSM module is checked whether it is connected or not by sending 'AT' command to GSM module. If it response OK is received, means it is ready. System keeps checking for the module until it becomes ready or until it receives 'OK'. Then ECHO will be turned off by sending the ATE0 command, otherwise GSM module will make echo all the commands. Then finally Network availability is checked through the 'AT+CPIN?' command, if SIM card is inserted and PIN is present, it gives the response +CPIN: READY. This is also check repeatedly until the network is found.

```
void GSM_init()

{

lcd.clear();

lcd.print("Finding Module..");

boolean at_flag=1;

while(at_flag)

{

Serial.println("AT");

while(Serial.available()>0)

{

if(Serial.find("OK"))

at_flag=0;

}

delay(1000);

}
```

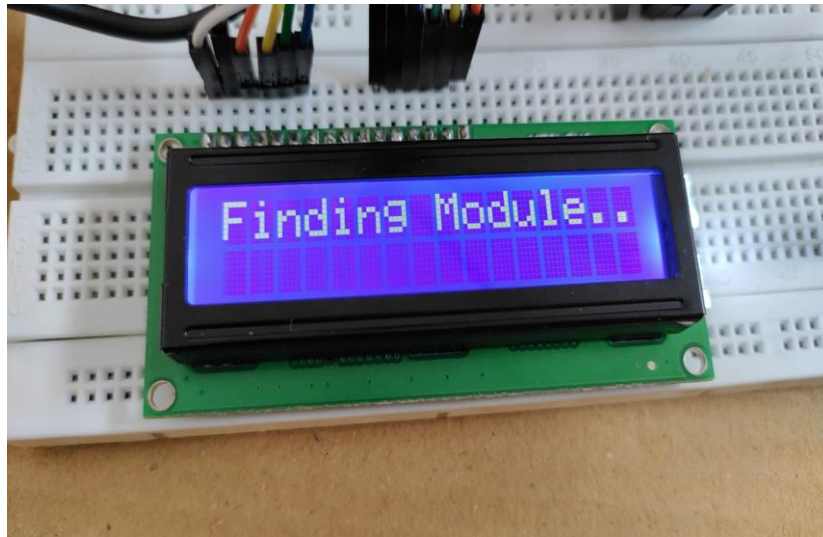


Fig. 4.2 - Initial Display Message

If network is not available:

The Arduino will be sending AT commands continuously until it gets a reply.

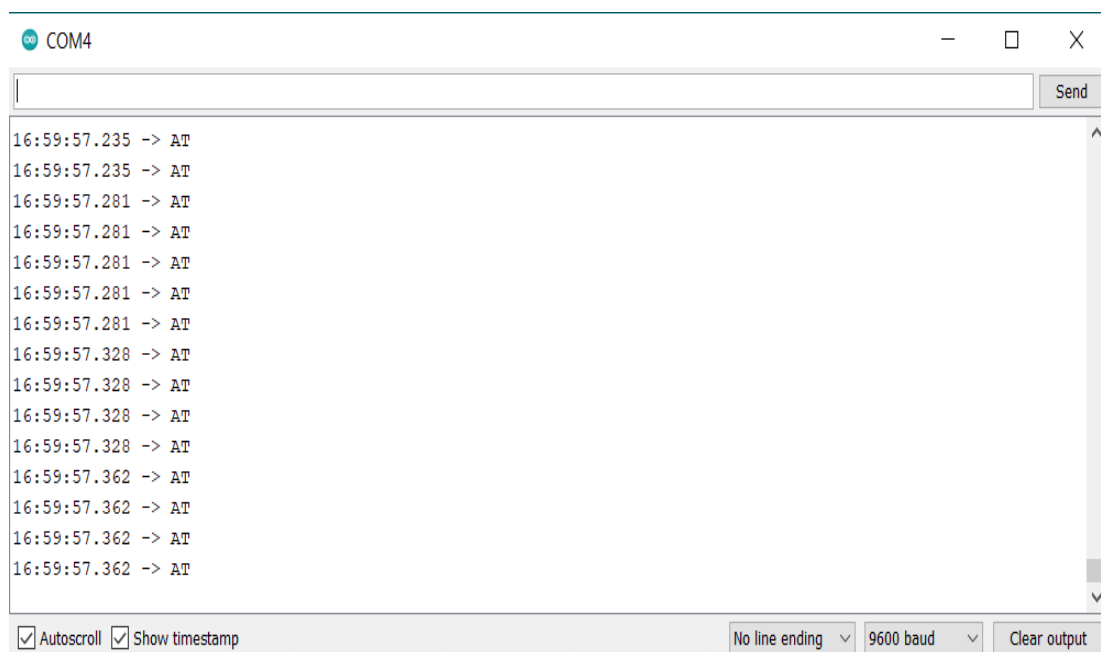


Fig. 4.3 - Serial monitor sends AT command

The liquid crystal display (LCD) will display the message Finding Network.....



Fig. 4.4 - GSM searching network

If network is available:

The Arduino when received a reply from GSM will proceed to the next step.



Fig. 4.5 - Serial monitor receives reply

It will proceed according to the program.



Fig. 4.6 - GSM found network

## **CHAPTER 5**

### **Hardware and Software Specifications**

#### **5.1 Hardware:**

- GSM Module SIM900
- Arduino
- LCD (16\*2)
- Power supply
- Sim Card
- Connecting wires
- Mobile Phone

#### **5.2 Software:**

- Arduino IDE software

### 5.1.1 GSM Modem:

A GSM modem is a wireless modem which works with a GSM wireless network. These extended AT commands are defined in the GSM standards. Extended AT commands give you the following options

- 1) Write, Read and Delete the messages.
- 2) Send the messages.
- 3) Strength of the Signal monitoring.
- 4) Monitoring status and battery charging.
- 5) Write, Read and search phone book entries.

It is utilized in many communication devices which are supported GSM (Global System for Mobile Communications) technology. It's wont to interact with GSM network employing a computer. GSM module only understands AT-commands, and may respond accordingly. The basic command is "AT", if the GSM respond OK then it's working good otherwise it respond with "ERROR". There are various AT commands like ATA for answering a call, ATD to dial a call, AT+CMGR to read the message, AT+CMGS to send the sms etc. AT-commands should be followed by printing operation i.e. \r (0D in hex), like "AT+CMGS\r". we will use the GSM module using these commands.

ATE0 For echo-off

AT+CNMI=2,2,0,0,0 <ENTER> Auto opened message Receiving. (No need to open message)

ATD<Mobile Number>; <ENTER> making a call (ATD+919610126059;\r\n)

AT+CMGF=1 <ENTER> Selecting Text mode

AT+CMGS="Mobile Number" <ENTER> Assigning recipient's mobile number

>>Now we can write our message

>>After writing message

Ctrl+Z send message command (26 in decimal).

ENTER=0x0d in HEX



Fig. 5.1 - GSM found network

### 5.1.2 Arduino:

Arduino is an open source business, project and user community for hardware and software that designs and develops single-board microcontrollers and microcontroller kits for digital computer construction. Its hardware products are licensed under the CC-BY-SA license, while the software is: licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), which allows anyone to develop and distribute Arduino boards and software.

Usable Arduino boards are from the official website or by registered distributors, commercially. A variety of microprocessors and controllers are utilized in Arduino board designs. The boards are fitted with digital and analog input/output (I/O) pin sets which will be attached to different expansion: boards ('shields') or breadboards (for prototyping) and other circuits. On some versions, the boards feature serial communications interfaces, including Universal Serial Bus (USB), which are often used to load programs from Computers for personal use. Using the programming languages C and C++, the microcontrollers can be programmed using a standard API that is also known as the Arduino language.

In addition to the use of conventional compiler toolchains, an integrated development environment (IDE) and command line tool (arduino-cli) built in Go are provided by the Arduino (project.-cli) built in go are provided by Arduino project. The Arduino project started in 2005 as a tool for students at: the Ivrea Institute of Interaction Design in Ivrea, Italy, with



the intention of providing a low-cost software. A quick and easy way for novices and professionals to build devices that use sensors and actuators to communicate with their environment. Simple robots, thermostats and motion detectors are typical examples of such devices intended for inexperienced hobbyists. The Arduino name comes from a bar in Ivrea, Italy, where some of the project's founders used to meet. The bar was named after Arduin of Ivrea, who from 1002 to 1014 was the Margrave of the March of Ivrea and therefore the King of Italy.

### **Microcontroller (Arduino 328 P):**

Microcontroller is based on a 32/16 bit ARM CPU. It provides large buffer size and high processing power. Various 32 bit timers, single or dual 10-bit ADC, 10-bit DAC, PWM channels and 45 fast GPIO lines level sensitive external interrupts pins.



Fig. 5.2 - Arduino

### 5.1.3 LCD Display:

In our project we are using LCD (16x2) display. The basic LCD requires 3 control lines as well as 4 or 8 I/O lines for the data bus. The user may select whether the LCD is to operate with a 4-bit data bus or an 8-bit data bus. :

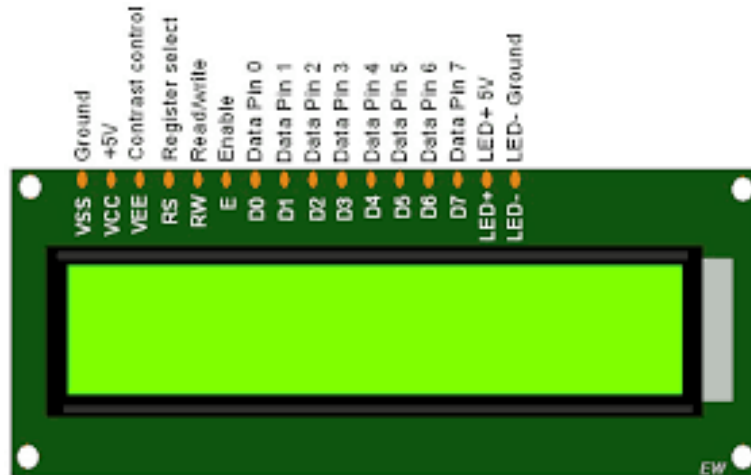


Fig. 5.3 - LCD display

### 5.1.4 Power Supply:

Power supply is an electrical power source to the whole system. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit.



Fig. 5.4 - Power supply

### 5.1.5 SIM card:

A SIM card, also referred to as a subscriber identity module, may be a open-end credit that stores identification information that pinpoints a smartphone to a selected mobile network. Data that the SIM cards contain include user identity, location and telephone number , network authorization data, personal security keys, contact lists and stored text messages. SIM cards allow a mobile phone user to use this data and therefore the features that accompany them.

Without a SIM card, some phones can not make calls, hook up with internet services like 4G LTE or send SMS messages. SIM cards can be removed and have anywhere from, 32KB to 128KB.



Fig. 5.5 - SIM

### 5.1.6 Connecting wires:

Connecting wires allows an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the connecting wires are made up of copper or aluminium.



Fig. 5.6 - Connecting wires

### 5.1.7 Mobile Phone:

A telephone with access to a cellular radio system so it can be used over a wide area, without a physical connection to a network.



Fig. 5.7 - Mobile phone

### 5.2.1 Arduino IDE:

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.

It contains a text editor for writing the code , a message area , a text console , a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and the hardware to upload the program, and communicate with them. Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical world.

The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License or the GNU General Public License, permitting the manufacture of Arduino boards and software distribution by anyone.



Fig. 5.8 - Logo of Arduino IDE software

## **CHAPTER 6**

### **Advantages, Disadvantages & Applications**

#### **Advantages :**

- No need of any complex wires to display the message on LCD as it is wireless.
- Consumes less power.
- Easy to operate.
- The circuit is portable.

#### **Disadvantages :**

- When there is a network problem GSM won't work.
- Display unit must have the network to receive the message wirelessly.
- As there is no password anyone can send the message to display.

#### **Applications :**

- Railway stations
- Advertisement in shopping malls
- Educational institute
- Organizations
- Managing traffic in metropolitan cities and other public utility places.

## CHAPTER 7

### Results and Discussion

- The message/notice sent from the mobile phone is received by the sim card which is inserted in GSM and Arduino to control the GSM using AT(attention) commands.
- Message/Notice received by the GSM from mobile will be displayed on LCD.

#### Output :

Output-1:

When we send NOTICE from a mobile device.

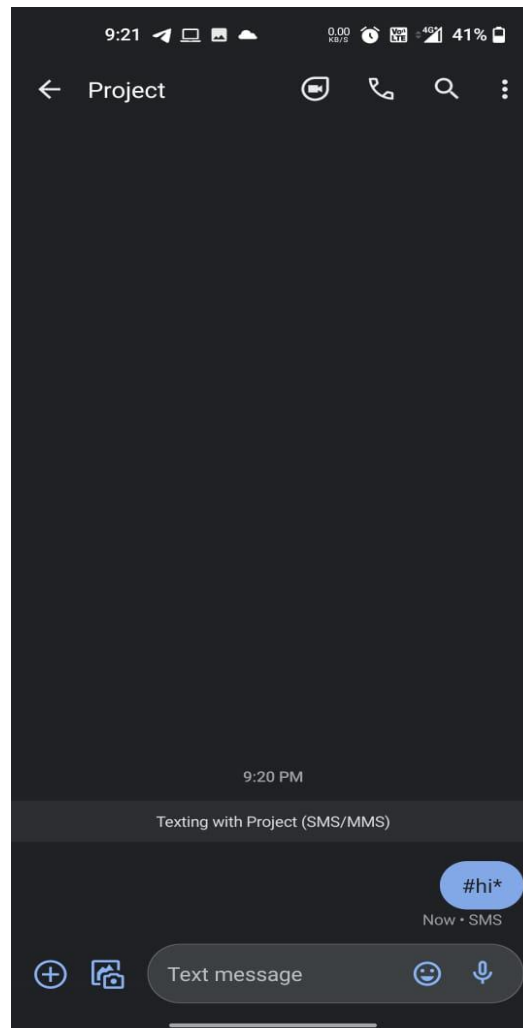


Fig. 7.1 - Message-1 sent from mobile phone

The NOTICE gets displayed on the screen.

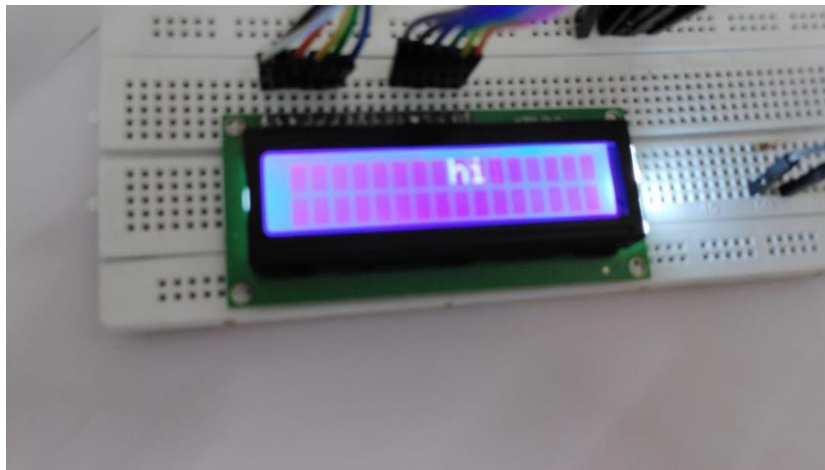


Fig. 7.2 - Message-1 displayed on LCD

And the same NOTICE can be observed in the serial monitor also.

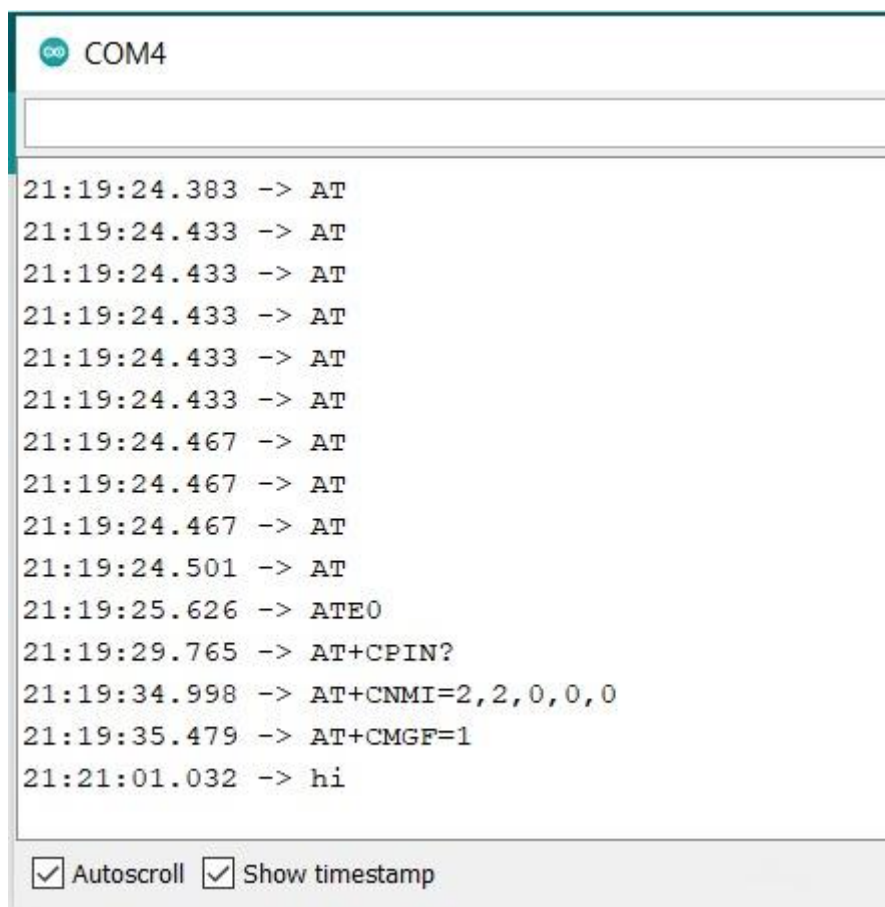


Fig. 7.3 - Message-1 can be seen on serial monitor



## Output-2:

When we send another NOTICE from a mobile device.

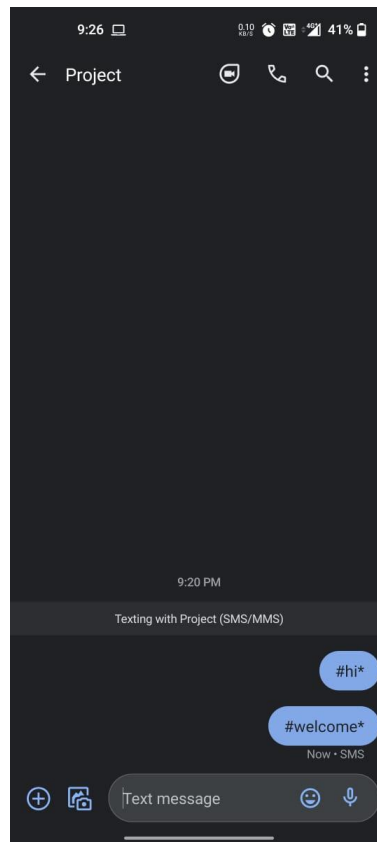


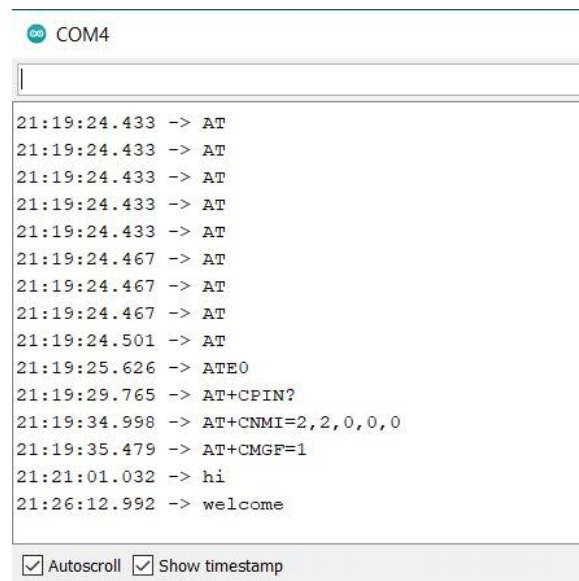
Fig. 7.4 - Message-2 sent from mobile phone

The NOTICE gets displayed on the screen.



Fig. 7.5 - Message-2 displayed on LCD

And the old and new NOTICE's can be observed in the serial monitor:



The screenshot shows a serial monitor window titled 'COM4'. It displays a series of AT command responses with timestamps. The responses are as follows:

```
21:19:24.433 -> AT
21:19:24.433 -> AT
21:19:24.433 -> AT
21:19:24.433 -> AT
21:19:24.433 -> AT
21:19:24.467 -> AT
21:19:24.467 -> AT
21:19:24.467 -> AT
21:19:24.501 -> AT
21:19:25.626 -> ATE0
21:19:29.765 -> AT+CPIN?
21:19:34.998 -> AT+CNMI=2,2,0,0,0
21:19:35.479 -> AT+CMGF=1
21:21:01.032 -> hi
21:26:12.992 -> welcome
```

At the bottom of the window, there are two checked checkboxes: 'Autoscroll' and 'Show timestamp'.

Fig. 7.6 - Message-2 can be seen on serial monitor

## **CHAPTER 8**

### **Future scope and Conclusion**

#### **Future Scope:**

- In recent years, the LCD has found wide spread use by replacing LEDs because of their declining prices, ability to display numbers, characters & graphics and the ease of programming.
- The model can be utilized to display temperature in case when there is no message to be display.
- The message can be first received display in standard language, the same message can be converted to another language and the message can be displayed.

**Conclusion:**

- The GSM display system that we have created has been in practical use in various companies like in construction and research area railways, colleges etc.
- This system can avoid paper work, reduce human efforts in different areas.
- After reviewing the possible solutions, we decided to use Arduino for this project.



Fig. 8.1 - Output

## REFERENCES

- [1] SMS Tutorial –How to use Microsoft HyperTerminal to send AT commands
- [2] Foram Kamdar, Anubhav Malhotra and Pritish Mahadik, Display Message on Notice Board using GSM, Advance in Electronic and Electric Engineering, ISSN 2231-1297, Volume 3, Number 7 (2013), pp. 827-832
- [3] A K Shawhney, “Electrical and Electronics Measurements and Instrumentation” by Dhanpat Roy & Sons, 4th Edition 2007.
- [4] Arduino Phone. Instructables.com (2013-07-17). Retrieved on 2013- 08-04.
- [5] “GSM Global System for Mobile Communications”. 4G Americans.  
Retrieved 2014-03-22

## APPENDIX

### Code:

```
#include <LiquidCrystal.h>

LiquidCrystal lcd(7,6,5,4,3,2);

int led=13;

int temp=0,i=0,x=0,k=0;

char str[100],msg[32];

void setup()

{

  lcd.begin(16,2);

  Serial.begin(9600);

  pinMode(led, OUTPUT);

  digitalWrite(led, HIGH);

  lcd.print("GSM Initilizing...");

  GSM_init();

  lcd.setCursor(0,0);

  lcd.print("Wireless Notice");

  lcd.setCursor(0,1);

  lcd.print("  Board  ");

  delay(2000);

  lcd.clear();

  lcd.print(" NOTICE BOARD ");
```

```
delay(1000);

lcd.setCursor(0,1);

lcd.print("System Ready");

Serial.println("AT+CNMI=2,2,0,0,0");

delay(500);

Serial.println("AT+CMGF=1");

delay(1000);

digitalWrite(led, LOW);

}

void loop()

{

for(unsigned int t=0;t<60000;t++)

{

serialEvent();

if(temp==1)

{

x=0,k=0,temp=0;

while(x<i)

{

while(str[x]!='#')

{

x++;
```

```
while(str[x]!='*')  
  
{  
  
msg[k++]=str[x++];  
  
}  
  
}  
  
x++;  
  
}  
  
msg[k]='\0';  
  
lcd.clear();  
  
Serial.println(msg);  
  
lcd.print(msg);  
  
delay(1000);  
  
temp=0;  
  
i=0;  
  
x=0;  
  
k=0;  
  
}  
  
}  
  
lcd.scrollDisplayLeft();  
  
}  
  
void serialEvent()  
  
{
```



```
while(Serial.available())

{

char ch=(char)Serial.read();

str[i++]=ch;

if(ch == '*')

{

temp=1;

lcd.clear();

lcd.print("Message Received");

delay(500);

}

}

}

void GSM_init()

{

lcd.clear();

lcd.print("Finding Module..");

boolean at_flag=1;

while(at_flag)

{

Serial.println("AT");

while(Serial.available()>0)
```

```
{  
  
if(Serial.find("OK"))  
  
at_flag=0;  
  
}  
  
delay(10);  
  
}  
  
lcd.clear();  
  
lcd.print("Module Connected..");  
  
delay(1000);  
  
lcd.clear();  
  
lcd.print(" ECE Dept ");  
  
boolean echo_flag=1;  
  
while(echo_flag)  
  
{  
  
Serial.println("ATE0");  
  
while(Serial.available()>0)  
  
{  
  
if(Serial.find("OK"))  
  
echo_flag=0;  
  
}  
  
delay(2000);  
  
}
```

```
lcd.clear();

lcd.print("SYSTEM WAKING UP");

delay(2000);

lcd.clear();

lcd.print("Finding Network..");

boolean net_flag=1;

while(net_flag)

{

Serial.println("AT+CPIN?");

while(Serial.available()>0)

{

if(Serial.find("+CPIN: READY"))

net_flag=0;

}

delay(1000);

}

lcd.clear();

lcd.print("Network Found..");

delay(1000);

lcd.clear();

}
```