

## WIRELESS ELECTRONIC NOTICE BOARD USING GSM MODULE

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### Abstract:

Notice Board is primary thing in any institution / organization or public utility places like bus stations, railway stations and parks, but sticking various notices day-to-day is a difficult process. A separate person is required to take care of this notices display. This project deals about an advanced hi-tech wireless notice board. The main objective of the project is to develop a wireless notice board that displays notices when a message is sent from the users mobile. While the user sends the message from the mobile, it is received and retrieved by the GSM modem at the display unit. It is then sent to the Arduino Uno that further displays the notice sent from the user on to the electronic notice board which is equipped with a 16X2 LCD display.

### Introduction:

The project mainly focuses on transmission of textual data through air interface by the use of GSM through serial communication. The data will be displayed on LCD only after entering unique pass key before and after the message. Actually, what happens in sending SMS through phone has become very popular and if we can use this SMS to control devices and in displaying data, then it will be great use of it. It is possible to receive or decode the SMS globally by using GSM MODEM from any part of the world. So, we can control and display data on LCD board from a large distance. In this project, Arduino UNO is used for controlling the whole process, GSM module (SIM900) to receive the SMS/message sent from mobile phone and LCD to display the message. We can send some message or notice like “#welcome brother\*”, “#We Welcomes You\*” through the SMS. Here we have used a prefix in the message string that is ‘#’. This prefix is used to identify the starting of the message or notice. And ‘\*’ is used as suffix to indicate the end of the message or notice. When we send SMS from mobile phone to GSM module then GSM receives that SMS and sends it to Arduino. Now Arduino read this SMS and extract main notice message from the received string and stores in another string. And then sends the extracted message to 16x2 LCD by using appropriate commands. Here we not only send the data but send the data with pass code also. Which enables us to prevent the unauthorized use of LCD display board and only the person who have pass code can have access to LCD board. The main components of the kit include ARDUINO UNO, GSM MODEM. These components are integrated with the LCD DISPLAY BOARD and thus incorporate the wireless features. The GSM modem receives the SMS. The AT commands are serially transferred to the modem, in return the modem transmits the stored message through the COM port. The microcontroller validates the SMS and then displays the message in the LCD display board.M

### Methodology:

#### 16\*2 LCD:

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

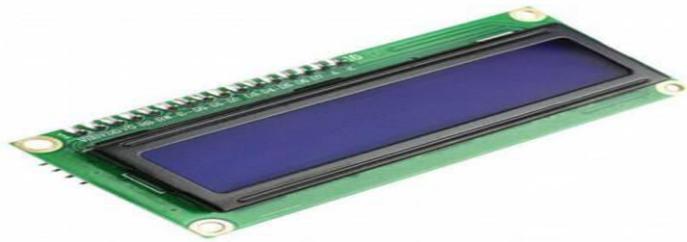


Fig.1 Liquid Crystal Display

#### GSM SIM900:

GSM module acts as a communicating medium. It is used to interact with GSM network using a computer. GSM module only understands **AT commands** , and can respond accordingly. This module could make all actions that our normal mobile phone could do, like making/receiving a call, sending/receiving a SMS, connecting to internet using GPRS etc.

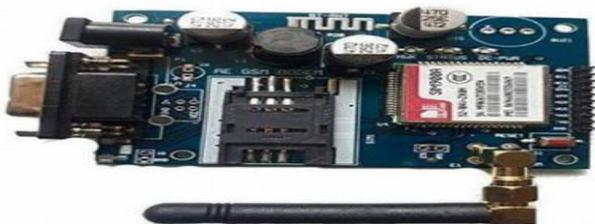


Fig.2 GSM Module

### ARDUINO UNO:

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes pre-programmed with a bootloader that allows uploading new code to it without the use of an external hardware programmer.

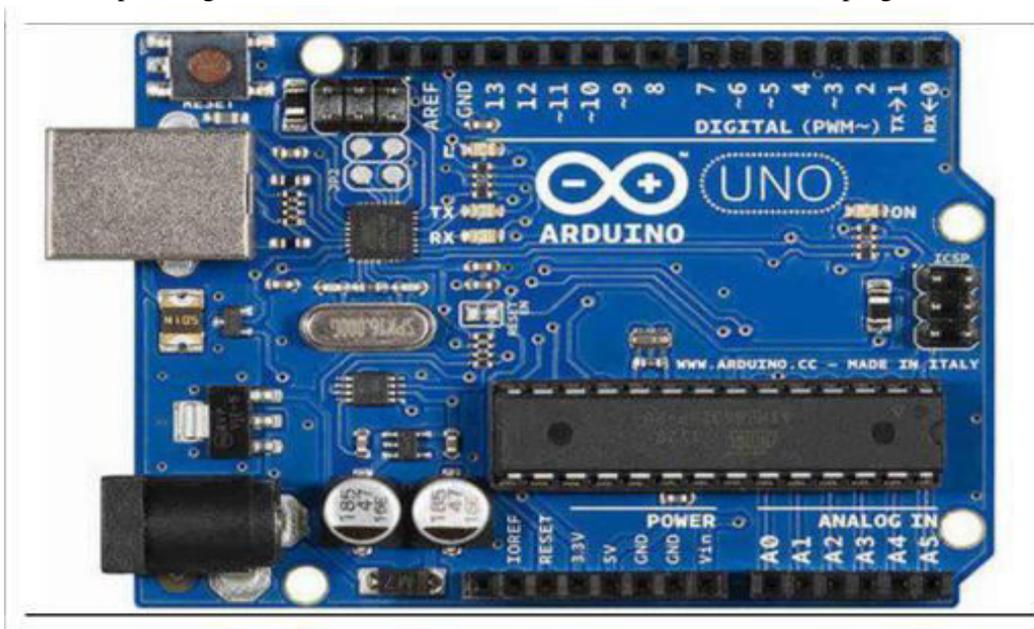
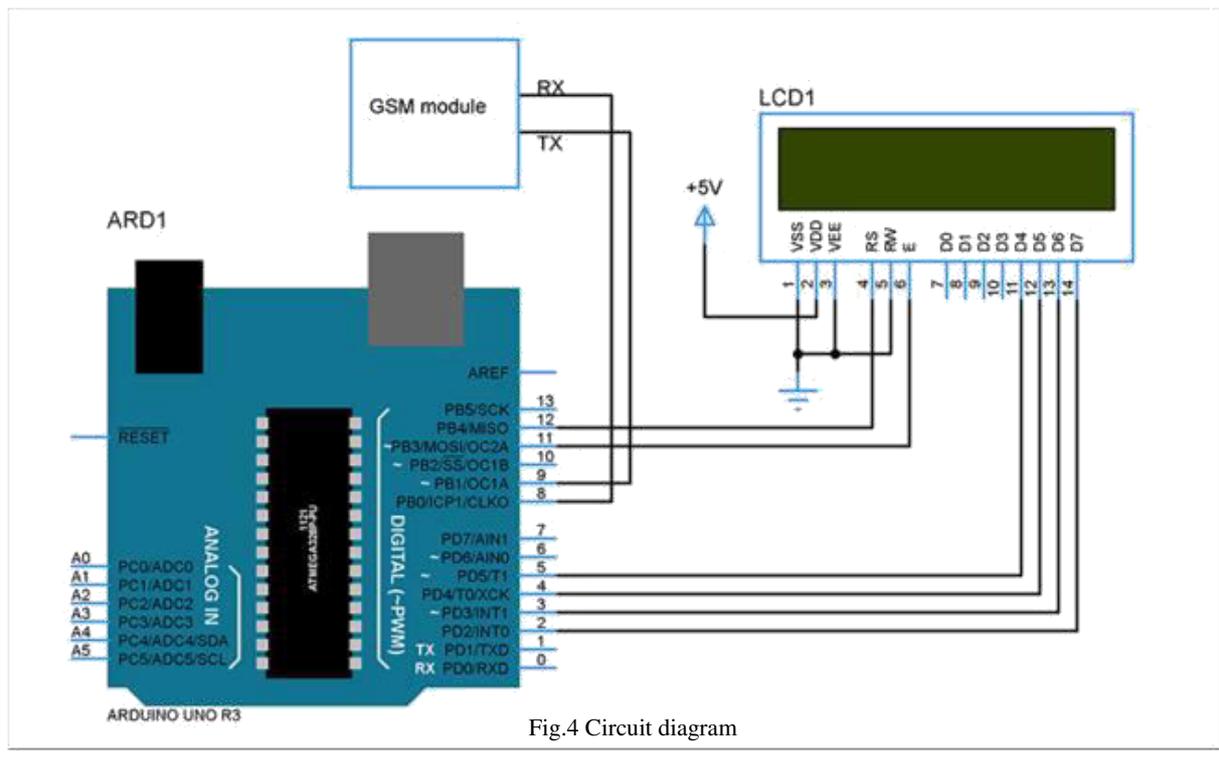


Fig.3 Arduino UNO

### Working:

For this wireless notice board, 16x2 LCD acts as display device. GSM module acts as a communicating medium. It is used to interact with GSM network using a computer. GSM module only understands AT commands, and can respond accordingly. We can send some message or notice like “#Welcome\*” through the SMS. Here we have used a prefix in the message string that is ‘#’. This prefix is used to identify the starting of the message. And ‘\*’ is used as suffix to indicate the end of the message. From our mobile, the message will reach the GSM module through the carrier. Once the message is reached GSM module will send it to the Arduino board through UART communication that is RX and TX. The code is written in such a way, Arduino read this SMS and extract main notice message from the received string and stores in another string. And then sends the extracted message to 16x2 LCD by using appropriate commands. GSM technology offers user the facility to send message from anywhere in the world and still it will be displayed in the notice board.

CIRCUIT DIAGRAM:



Mode of Operation:

For this wireless notice board project 16x2 LCD acts as display device  
 GSM module acts as a communicating medium.

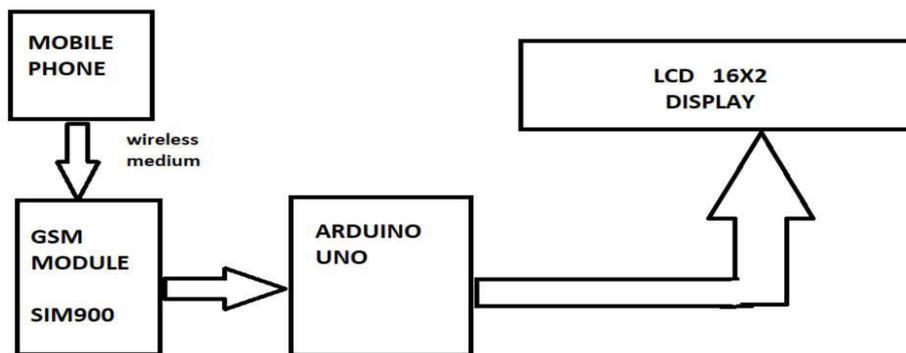


Fig.5 Block diagram showing mode of operation

GSM module is checked whether it is connected or not by sending 'AT' command to GSM module. If response OK is received, means it is ready. System keeps checking for the module until it becomes ready or until 'OK' is received.

Then ECHO is turned off by sending the ATE0 command, otherwise GSM module will echo all the commands.

Then finally Network availability is checked through the ‘AT+CPIN?’ command, if inserted card is SIM card and PIN is present, it gives the response +CPIN: READY.

This is also check repeatedly until the network is found.

Then Normal text message from our mobile will reach the GSM module through the carrier

Once the message is reached GSM module will send it to the Arduino board through UART communication that is RX and TX

The code where written in such a way once the message reached it will display it in the LCD.

### Result:

On uploading code on to the Arduino, it will check for network connection. Arduino will sends AT command continuously until GSM module responds OK. It send ATE0 command to disable the Echo. It sends AT+CPIN? Command to know the SIM status. The AT+CNMI=2,2,0,0,0 command is to handle the newly received SMS. The AT+CMGF=1 is sent to select the operating Text mode of the message. When GSM receives the SMS it will display it on the LCD.

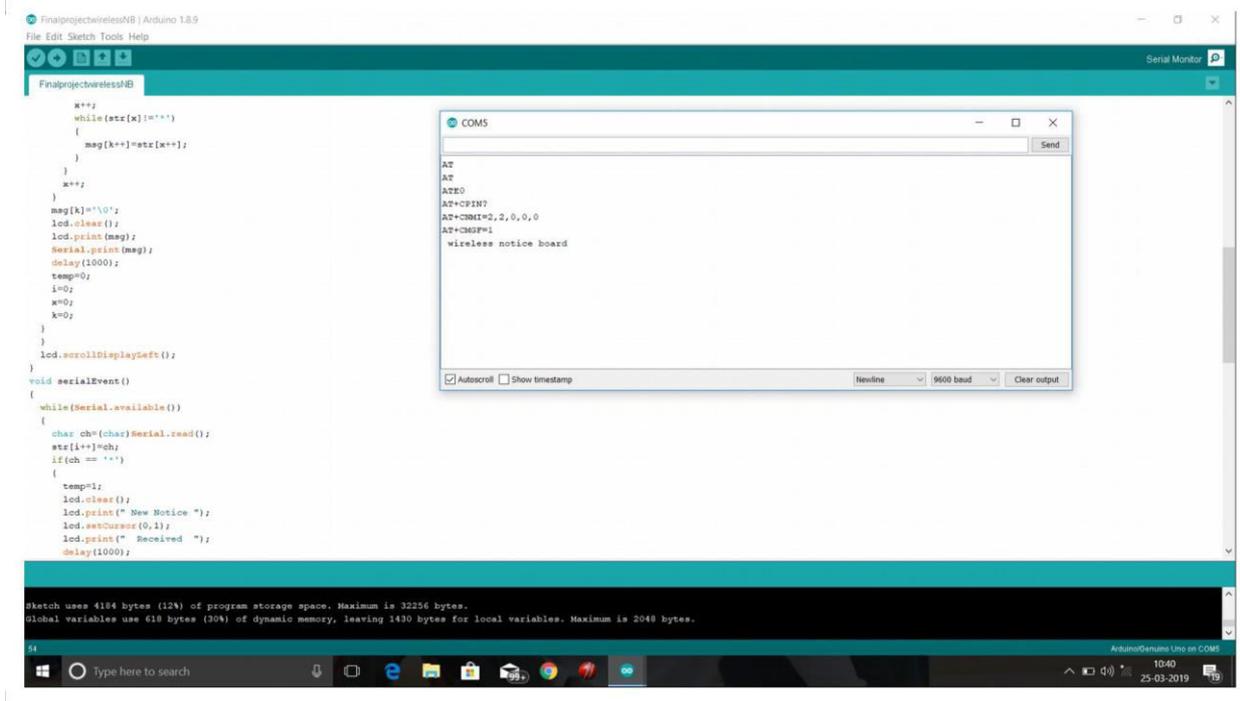


Fig.6 Output

When GSM receives the SMS it will display it on the LCD.



Fig.7 Displaying the result

### Advantages:

The electronic notice board is wireless and no need of wires for displaying the information on the LCD display.

GSM technology offers user the facility to send message from anywhere in the world and still it will be display in the notice board.

It is very easy to operate and consumes less power The circuit of the wireless notice board is portable.

### Applications:

The applications of wireless notice board mainly include public places like bus stands, railway stations, airports, shopping malls and parks to display the information wirelessly

This project is also used in organizations, schools and colleges.

### Future scope:

Significant improvement would be to accommodate multiple receiver MODEMS at different positions in the geographical area carrying duplicate SIM cards.

Multilingual display can be added variation in displaying the notice.

We can able to store messages for long time by using sd memory card.

Use of LED matrix display.

Notification system for new notice.

### References:

- [1] SMS And MMS Interworking in Mobile Networks Arnaud Henry-Labordère, Artech House mobile communications, 2004 - Technology & Engineering

- [2] GSM telecommunication standards, June 2000 Second edition, European Telecommunications Standards Institute.
- [3] O'Reilly's Arduino: A Technical Reference.