

# Wireless Notice Board Using Arduino & GSM

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*Abstract: Notice Board is a primary thing in any institution/organization or public utility places. Sticking various notices day-to-day is a difficult process. A separate person is required to take care of this notices display. This is the model for displaying notices in colleges on electronic notice board by sending messages in form of SMS through mobile; it is a wireless transmission system which has very less errors and maintenance. The hardware board contains microcontroller ATmega328p at the heart of the system. A SIM800 GSM modem with a SIM card is interfaced to the ports of the microcontroller with the help of AT commands. When the user sends a SMS via a registered number from his mobile phone, it is received by SIM800 GSM modem at the receiver's end. The message is thus fetched into the microcontroller. It is further displayed on an electronic notice board which equipped with LCD display. This project is our experiment on real time noticing.*

**Keywords:** Microcontroller ATmega328p, GSM Sim800 Modem, Arduino IDE , Lcd display

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## I. INTRODUCTION

Now-a-days advertisement is going digital. The big shops and the shopping centers use digital displays now. We want to control everything and without moving an inch. This remote control of appliances is possible through Embedded Systems. The use of "Embedded System in Communication" has given rise to many interesting applications that ensures comfort and safety to human life.

Also, in trains and buses the information like platform number, ticket information is displayed in digital boards. People are now adapted to the idea of the world at its finger-tips. The use mobile phones have increased drastically over years. Control and communication has become important in all the parts of the world. This gave us the idea to use mobile phones to receive message and then display it on an electronic board. The GSM technology is used. GSM stands for Global System for Mobile Communication. Due to this international roaming capability of GSM, we can send message to receiver from any part of the world. It is has the system for SMS- Short Message Service. This project is a remote notice board with a GSM modem at the receivers end. So if the user wants to display any message, he can send the information by SMS and thus update the LCD display accordingly. As engineer's main aim is to make life simple with help of technology, this is one step to simplify real time noticing.

In this paper, it is proposed to design a model where the message to be displayed is sent through a SMS from an authorized transmitter. The GSM receives the SMS, validates the user and displays the desired information after necessary code conversion. The main components of the Circuit contains microcontroller Atmega328p which is interfaced with GSM Sim800. We use Arduino serial port to interface GSM. A 20x4 Character LCD display is attached in byte mode to Arduino. This display will be used to display the messages /advertisements. Microcontroller coding will be done using Arduino IDE. The modem transmits the stored message through the COM port. The microcontroller displays the message in the LCD display board. The microcontroller used in this case is Atmega328p. Sim800 module is used as a GSM modem. In the prototype model, LCD display is used for simulation purpose. While implementation this can be replaced by actual display boards.

## 2. DESIGN LAYOUT

The complexity of coding substantially increases, but once programmed the module works at its robust best since it is a dedicated embedded system and not a general purpose computer. The design procedure involves identifying and assembling all the required hardware and ensuring fail safe interfacing between all the components. Then we have the coding process which has to take care of the delays between two successive transmissions and most importantly the validation of the senders number. The number of valid mobile numbers can be more than one. The limiting constraint is the RAM of the

microcontroller rather than the coding-complexities. Arduino 1.0.6 version is used for programming. It is very simple to programming and code conversion.

The block diagram For Wireless GSM based electronic notice display is shown in figure 2.1.

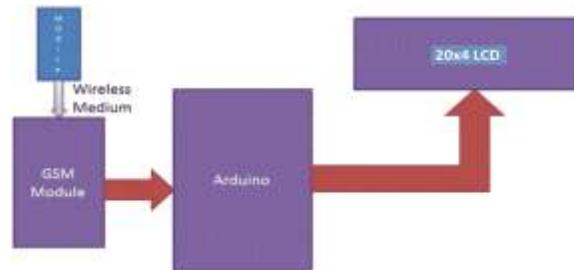


Fig.2.1 Block Diagram of the System

The whole system is basically divided into two sections: Transmitting and Receiving.

Transmitting section consists of just a mobile. Any type of user (sim number) can be used, as users are assigned password for accessing the system. Authorised users send the message that they want to display on the notice board to the receiving section's mobile number and the message will be displayed.

Receiving section on the other hand consists of a GSM(Sim800) modem to receive message. Received SMS is then extracted by Arduino with the help of a program using AT commands. SMS are then sent to microcontroller using the inbuilt MAX232 IC of Sim800 module . Microcontroller finally displays it on LCD display.

### 3.HARDWARE DESCRIPTION

#### 3.1 Microcontroller

The high performance Atmel 8-bit AVR RISC based Micro controller combines 32kb ISP Flash memory with read-while-write capabilities, 1kb EEPROM, 2kb SRAM, 23 General purpose I/o lines., 32 general purpose working registers, 3 flexible Timer/Counters with compare modes, Internal and external Interrupts, serial programmable USART, a Byte-Oriented 2-wire serial interface, SPI serial port,6-channel 10-bit A/d converter, Programmable watchdog timer with internal oscillator and Five software selectable power saving modes. The device operates between 1.8-5.5 volts.

By executing powerfull instructions in a single clock cycle, the device achieves throughputs approaching 1MIPS/MHZ, balancing power consumption and processing speed.

#### 3.2 GSM Modem

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. Like a GSM mobile phone, a GSM modem requires a SIM card from a wireless carrier in order to operate.

Generally, computers use AT commands to control modems. Reading of message from the SIM card inserted into the modem is done by sending the appropriate AT command to the modem.

In addition to the standard AT commands, GSM modems support an extended set of AT commands. These extended AT commands are defined in the GSM standards. Here we use GSM SIM800 it is Best for interfacing with any microcontroller-8051, AVR, PIC, ARM, RaspberryPI, Arduino etc. or with a computer. It followed Most common AT Commands .

SIM800 - GSM/GPRS module Designed for global market, SIM800 is a quad-band GSM/GPRS module that works on frequencies GSM 850MHz, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz.

SIM800 features GPRS multi-slot class 12/ class 10 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

With a tiny configuration of 24\*24\*3mm, SIM800 can meet almost all the space requirements in users' applications, such as M2M, smart phone, PDA and other mobile devices. It is Arduino Compatible.

### 3.2.1 Specifications:

- SIM800 Quad Band GSM Module
- Voltage Supply Required- 9VDC to 12VDC with atleast 2A Peak Current Capability
- GSM- Speaker, Mic, TTL Rx and TTL Tx and DB9 Connector Based RS232 Outputs
- External Finger type antenna
- Switching Regulator Based Power Supply

### 3.2.2 Features:

- Bands: GSM 850MHz, EGSM 900MHz, DCS 1800MHz, PCS 1900MHz
- Coding schemes: CS-1, CS-2, CS-3, CS-4 Tx power: Class 4 (2W), Class 1 (1W)
- Small package: 23 \* 23 \* 3mm
- Low power: down to 1mA in sleep mode
- TCP/IP AT firmware
- Operating temperature: -40C to +85C
- Audio channels which include a microphone input and a receiver output.
- One SIM card interface.

Some commonly used and SMS related SIM800 AT commands are as Shown below.

SMS Text mode :

Command	Description
AT+CSMS	Select message service
AT+CPMS	Preferred message storage
AT+CMGF	Message format
AT+CSCA	Service centre address
AT+CSMP	Set text mode parameters
AT+CSDH	Show text mode parameters
AT+CSCB	Select cell broadcast message types
AT+CSAS	Save settings
AT+CRES	Restore settings
AT+CNMI	New message indications to TE
AT+CMGL	List messages
AT+CMGR	Read message
AT+CMGS	Send message
AT+CMSS	Send message from storage
AT+CMGW	Write message to memory
AT+CMGD	Delete message

Fig.3.2.2.1. AT Commands

### 3.3 Display Unit

One of the most common devices attached to an Arduino is an LCD display. Here we have used 20x4- that means 4 rows and 20 characters. It is a Hitachi HD44780 compatible module, having 16 pins including 2 pins for backlight.

To program the LCD module, first we have to initialize the LCD by sending some control words. RS should be low and E should be high when we send control. R/W pin 0 mean write data or control to LCD and R/W pin 1 means read data from the

LCD. To send a data to LCD, make RS high, R/W low, place the data in pins 7 to 14 and make pin E high and low once. To make this let us first build a circuit. We are going to write on the LCD module and not reading back. So, R/W is connected to ground directly. We need not have to input any data through, so all output pins are used in our application. Data pins of LCD are connected to data pins of the port as shown in fig 3.3.1

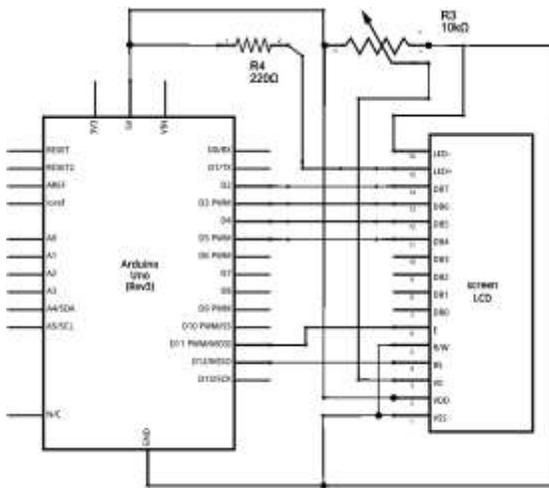


Fig. 3.3.1 Interfacing Arduino with LCD

Many functions as Rolling or still message display, speed variation, manage time for display is also added to the display board.

### 3.4 MAX 232

The MAX232 is a dual driver/receiver that includes a capacitive voltage generator to supply EIA-232 voltage levels from a single 5-V supply. Each receiver converts EIA- 232 inputs to 5-V TTL/CMOS levels. Each driver converts TTL/CMOS input levels into EIA-232 levels. It is also inbuilt in the GSM SIM800.

GSM Modem, which works at RS-232 voltage levels, logic 1 varies from -3 to -15 volts and logic 0 from +3 to +15 volts. The microcontroller which works on TTL logic levels, logic 1 is +5 volts and logic 0 is 0 volts. Therefore to interface the two we use a MAX 232 driver IC. The Gsm sim800 have its inbuilt Max232 IC.

### 3.5 Power Supply

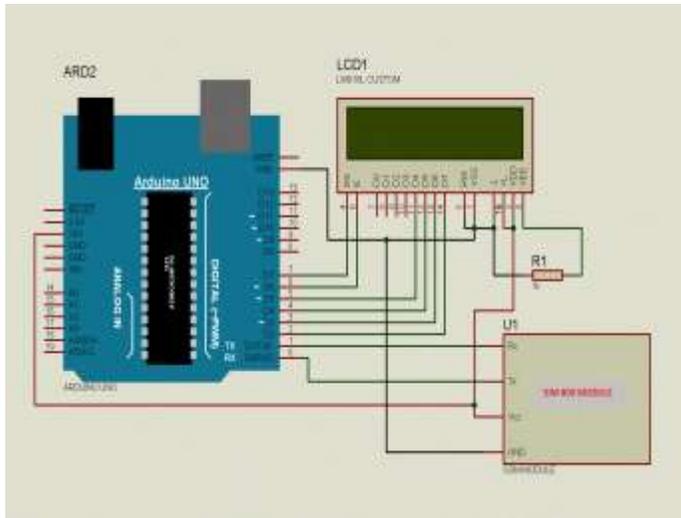
Power Supply is an important part of a circuit. It provides required supply to different blocks of the circuit from input 5v dc to the Arduino and GSM .

The main blocks include transformer, rectifier circuit, filter circuit, and regulator circuit. Voltage regulator IC LM7805 is used as a voltage regulator.

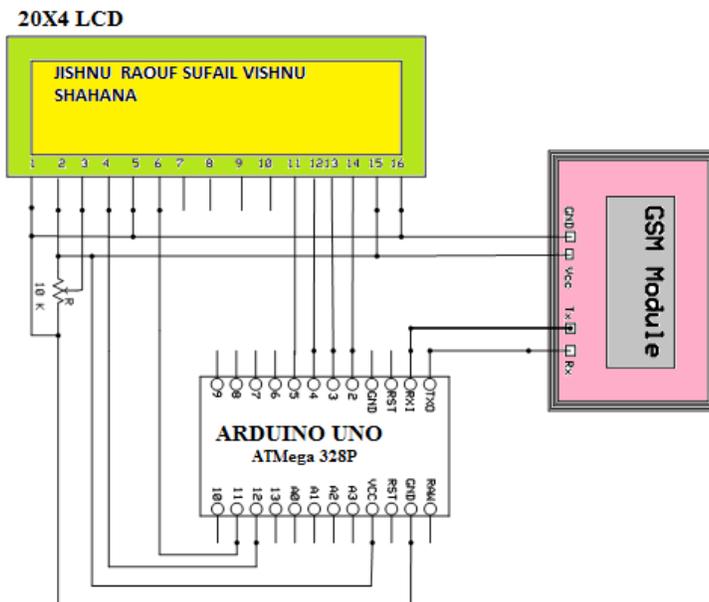
## 4. CIRCUIT DIAGRAM DESCRIPTION

Connections of **Wireless Notice Board using GSM and Arduino** are simple and shown in the figure below. Here a liquid crystal display (LCD) is used for display the “Notice” or message, which is sent though the mobile phone as SMS. Data pins of LCD namely RS, EN, D4, D5, D6, D7 are connected to arduino digital pin number 12, 11, 5, 4, 3, 2. And Rx and Tx pin of GSM module is directly connected at Tx and Rx pin of Arduino respectively. And GSM module is powered by using a 12 volt adaptor.

The microcontrollers control the whole system. It consists of GSM module which receives the message from the transmitted source. The Max 232 IC converts the TTL logic to RS232 protocol. The received message is displayed to LCD only if the sender mobile number is valid, otherwise it will discarded.



**Fig.4.1 Schematic Circuit Diagram of the system**



**Fig.4.2 Circuit Diagram of the system**

## 5. SOFTWARE USED

### 5.1 Arduino 1.0.6 IDE

**Arduino** is common term for a software company, project, and user community, that designs and manufactures computer open-source hardware, open-source software, and microcontroller-based kits for building digital devices and interactive objects that can sense and control physical devices.

The project is based on microcontroller board designs, produced by several vendors, using various microcontrollers. These systems provide sets of digital and analog I/O pins that can interface to various expansion boards (termed *shields*) and other circuits. The boards feature serial communication interfaces, including Universal Serial Bus (USB) on some models, for loading programs from personal computers. For programming the microcontrollers, the Arduino project provides an integrated development environment (IDE) based on a programming language named Processing, which also supports the languages C and C++.

### 5.2 Proteus professional 8

Our project was simulated by Proteus professional 8. It must need the Arduino library. The GSM is a virtual terminal in the Proteus As shown below.

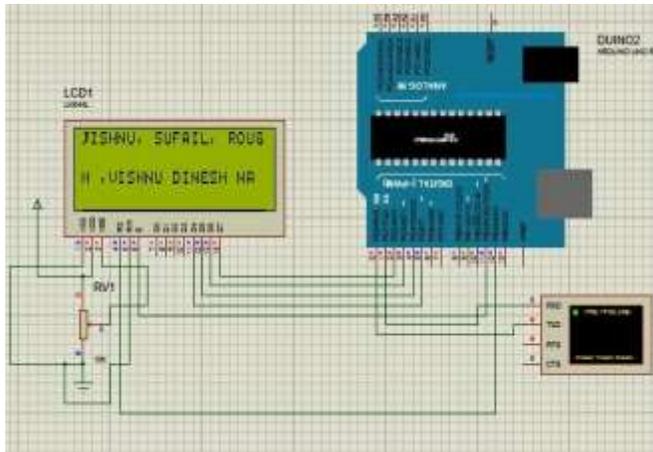


Fig.5.2.1 Simulation with proteus

## 6. RESULTS

The wireless Notice Board using Arduino and Gsm was designed and Implemented Successfully. The working condition and the various constrains were popularly Studied before going through the dsigning step. We choose easily available components throughout the designing. The final output of the sytem is received message from Gsm is displayed in LCD with our conditions.

## 7. CONCLUSION

By introducing the concept of wireless technology in the field of communication we can make our communication more efficient and faster, with greater efficiency we can display the messages and with less errors and maintenance. This model can be used very efficiently in establishments like chain restaurants wherein the order and special discounts can be displayed at all branches simultaneously, in colleges wherein students and staffs can be informed simultaneously in no time. It can be set up at public transport places like railways, bus station, and airport and also at roadside for traffic control and in emergency situations, it is cost efficient system and very easy to handle. Latency involved in using of papers in displaying of notices is avoided and the information can be updated by the authorized persons.

### 7.1 Future Enhancements

1. A commercial model can be able to display more than one message at a time.
2. Alphanumeric LCDs have a limitation on size as well as no of characters. These can be replaced with large LED display boards which are not only eye catching but display characters in a moving fashion one after the other.
3. In our project we are sending messages via GSM network and displaying on a LCD by utilizing AT commands. The same principle can be applied to control electrical appliances at a distant location.

4. Robots can be controlled in a similar fashion by sending the commands to the robots. This can be used for spy robots at distant locations, utilized by the military to monitor movement of enemy troops.

## 8. REFERENCES

1. BOOKS: GSM AND PERSONAL COMMUNICATIONS HANDBOOK

- SiegmundRedl,
- MatthiasWeber
- MalcolmW. Oliphant

- 2.Books: Principles and Applications of GSM

- Vijay Garg

- 3.Books: Artificial intelligence – Elain Rich & Kevin Knight, Tata Mc Graw hill, 2<sup>nd</sup> edition.

- 4.Books: Introduction to Robotics – P.J.Mc Kerrow, Addison Wesley, USA, 1991 Bernard Sklar, Digital Communications: Fundamentals and Applications, Prentice Hall, 2001

5. Web site - <http://www.alldatasheets.com>

6. Web Site - <http://www.robotroom.com/AlphanumericDisplay.html>

7. Web Site - <http://www.beyondlogic.org/serial/serial.pdf>

8. Web site – <http://www.gsma.com/home/>

9. Web site – <http://www.webopedia.com/TERM/G/GSM.html>.

- 10.Pdf– Systronix\_20x4\_lcd\_brief\_data

- 11.Pdf- SIM800\_Series\_AT\_Command\_Manual\_V1.05(1)