

REMOTE NOTICE BOARD USING GSM WITH LED

¹Ch. Mohana Krishna, ²Tippnagiri Mahesh, ³Appari Satya Sri, ⁴Bandham Hima Bindu,

¹Asst. Professor, ^{2,3,4}B.Tech Final Year Students

¹Department of Electronics and Communication Engineering,

¹Satya Institute of Technology And Management, Vizianagaram, India.

Abstract : This paper GSM based LED scrolling Display Board is a model for displaying notices/messages at places that require real-time noticing by sending messages in the form of SMS through mobile. The project aims to develop a moving sign board which empowers the user to change the scrolling message using SMS service instantaneously unlike a PC or laptop. The user can update it even from a remote distant. The SMS is deleted from the SIM each time it is read, thus making room for the next SMS. We can see the notice board being used specially at offices and public places to display important news. To make the notice boards easy to use and more technically advance, I have used this prototype of wireless notice board where we can display the message by simply sending the message through our cell phone. The main controlling device of the whole system is Arduino. Matrix LED Display module, GSM module are interfaced to Arduino. More than one person can access the system and further the message will send to the some specific mobile numbers from LED display board.

Key Words - Arduino UNO, GSM Modem, Matrix LED Display.

I. INTRODUCTION

The paper aims at designing a LED based scrolling message display controlling from a mobile. The proposed system makes use of GSM technology to communicate from the mobile phone to LED display board.

Now a days, every advertisement or information is displayed digitally the big shops and shopping centers using the scrolling displays now. In Railways, bus stands everything i.e., ticket information platform no etc., is displaying in digital moving display but, in these displays if they wants to change the message they can send the message through using mobile GSM by using this project. If they want to display messages about something crucial within minimum time, it displays whatever wants. A standard LED display board consists of LED lights arrange in 3 sets of 8 rows*48 columns of each LED placed at a pixel of 5mm. these display units are capable of displaying messages of any kind, including alphanumeric, numbers etc., in static or scrolling formats. It includes and execute programs that runs on the Arduino for the display control of data information on the display board.

The main aim of this project is to save time and provide the information instantly by displaying the message. We have tried to implement our system in such a way that, the GSM module which is located at digital notice board receives the message from authorized user and displays on notice board which is situated at remote location and further, this message is also sent to some associate mobile numbers. So, circulation of important messages or notice takes place within very short span of time to respective mobile numbers. If any unauthorized person trying to access the system, his/her mobile number viewed by the accessing members.

II. SYSTEM DESCRIPTION

The system required for this purpose is nothing but, a Arduino based SMS box. The main components of the kit includes Arduino, GSM modem. These components are integrated with the display board and thus incorporate the wireless features. The GSM modem receives the SMS.

The AT commands are serially transferred to the modem. The Arduino validates the SMS and then displays the message in the LED display board. Various time division multiplexing techniques have been

suggested to make the display boards function efficiently.

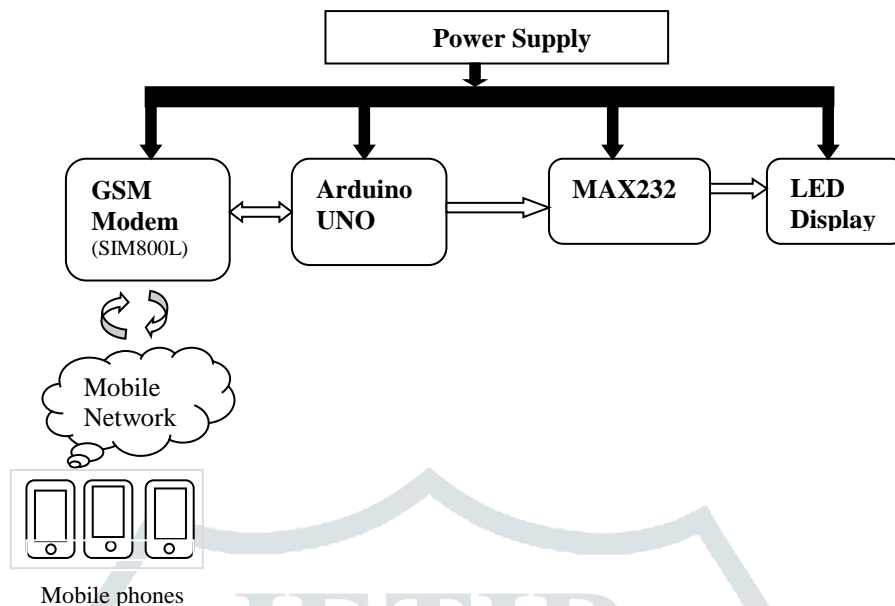


Figure1: Block Diagram of Notice Board

The Arduino UNO is used in this case and SIM900A is used as the GSM modem. In this prototype model, LED display is used for simulation purpose. During the process of implementation this can be replaced by actual display boards. In addition to address matching, data can be received only by the dedicated mobile numbers, and this data is displayed on LED. It displays the same message until it receives another verified message Then the same message is sent to the some authorized mobile numbers through the GSM Modem.

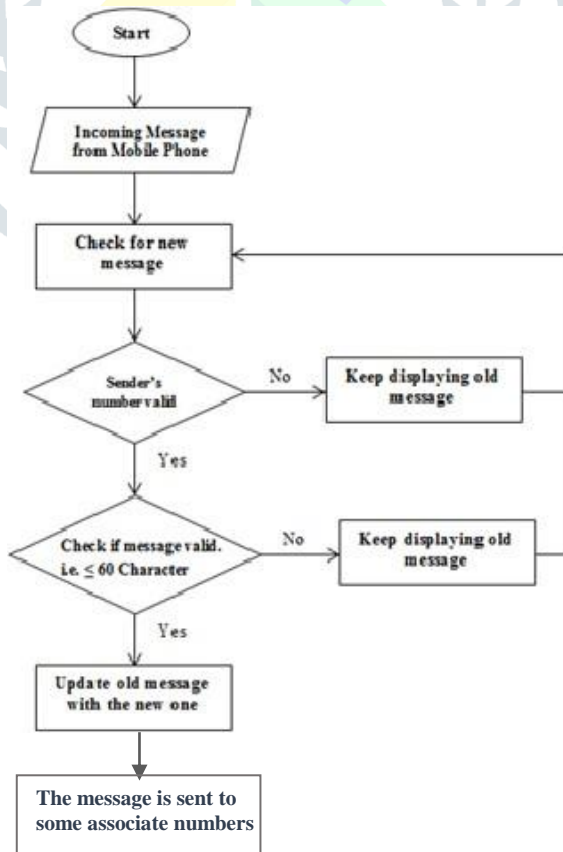


Figure.2 : Flow chart

III. HARDWARE DESCRIPTION

The System is implemented using following hardware components:

1. Arduino UNO
2. GSM Modem
3. Power Supply
4. MAX232
5. LED Display

1. Arduino Uno

The Arduino Uno is a microcontroller board based on the ATmega328(datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB to-serial driver chip. Instead, it features the Atmega 16U2(Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

Revision 3 of the board has the following new features:

1.0 pinout added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes. Stronger RESET circuit. Atmega 16U2 replace the 8U2. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino,moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform.

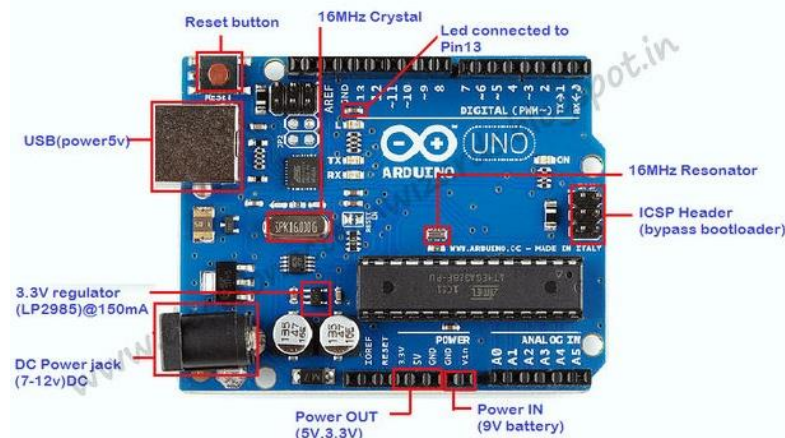


Figure 1 : Arduino UNO

Physical Characteristics:

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USB connector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digital pins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

Applications of Arduino:

Xoscillo: open-source oscilloscope.

Scientific equipment .

Arduinome: a MIDI controller device that mimics the monomer

Ardupilot: drone software/hardware

Arduino phone Water quality testing platform.

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.

Matrix Simado GDT11 is a Fixed Cellular Terminal (FCT) for data applications. It is a compact and portable terminal that can satisfy various data communication needs over GSM. It can be connected to a computer with the help of a standard RS232C serial port. Simado GDT11 offers features like Short Message Services (SMS), Data Services (sending and receiving data files), Fax Services and Web Browsing. Remote login and data file transfer are also supported. It is the perfect equipment for factory plants, resorts, dams and construction sites where wired connectivity is not available or not practicable.



Figure 2: GSM Modem

Computers use AT commands to control modems. Both GSM modems and dial-up modems support a common set of standard AT commands. GSM modem can be used just like a dial-up 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.

With the extended AT commands, various things can be done:

- Reading, writing and deleting SMS messages.
- Sending SMS messages.
- Monitoring the signal strength.
- Monitoring the charging status and charge level of the battery.
- Reading, writing and searching phone book entries

The number of SMS messages that can be processed by a GSM modem per minute is very low -- only about six to ten SMS messages per minute.

SIM

SIM abbreviates as Subscriber Identity Module. It is a chip-on small card consisting of user's information as well as phone book. User can alter the operator on the same handset as per convenience. At present dual SIM handsets are also available in the market where we can use two operators on the same handset. The SIM is inserted in a slot available on the GSM Modem.

3. Power Supply

A 12 volt power adapter is used here which acts as power Supply. It is an important part of a circuit. It provides required supply to different blocks of the circuit from input 230V AC. The main blocks include

transformer, rectifier circuit, filter circuit, and regulator circuit. Voltage regulator IC LM7805 is used as a voltage regulator. The microcontroller and other devices get power supply from AC to DC adapter through 7805, 5V regulator. The adapter output voltage will be 12V DC no regulated. The 7805/7812 voltage regulators are used to convert 12 V to 5V/12V DC.

4. MAX232

The MAX232 is an IC that converts signals from an RS-232 serial port to signals suitable for use in TTL compatible digital logic circuits. The MAX232 is a dual driver/receiver and typically converts the RX, TX, CTS and RTS signals. The drivers provide RS-232 voltage level outputs (approx. ± 7.5 V) from a single + 5 V supply via on-chip charge pumps. This makes it useful for implementing RS-232 in devices that otherwise do not need any voltages outside the 0 V to + 5 V range, as power supply design does not need to be made more complicated.

5. LED Display

LED Matrix Module We used here LED matrix module with 5 module connected in cascaded 8 rows x 40 columns to display the scrolling message.

IV. SOFTWARE DESCRIPTION

Arduino Uno Compile

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. A program for Arduino may be written in any programming language for a compiler that produces binary machine code for the target processor. Atmel provides a development environment for their microcontrollers, AVR Studio and the newer Atmel Studio.

V. CONCLUSION

We can use this Project in college Notice Board, a Professor can send message for the immediate gathering of students at department. It can be used on Highways for traffic control, like traffic on one side of the road may be blocked in view of VVIP movement or jam ahead.

The display boards are one of the major communications medium for mass media. Local language can be added as a variation in this project. This can be achieved by using graphics and other decoding techniques.

VI. RESULT



Figure3: LED Matrix Display Board



Figure4: Arduino Board interfacing with GSM and LED Display

VII. FUTURE SCOPE

- The use of microcontroller in place of a general purpose computer allows us to theorize on many further improvements on this project prototype.
- Temperature display during periods wherein no message buffers are empty is one such theoretical improvement that is very possible.
- The ideal state of the microcontroller is when the indices or storage space in the SIM memory are empty and no new message is there to display.
- With proper use of interrupt routines the incoming message acts as an interrupt, the temperature display is halted and the control flow jumps over to the specific interrupt service routine which first validates the sender's number and then displays the information field.
- Another very interesting and significant improvement would be to accommodate multiple receiver MODEMS at the different positions in a geographical area carrying duplicate SIM cards.

VIII. ACKNOWLEDGEMENT

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