

# Wireless E-Notice Board Using Wi-Fi and Bluetooth Technology

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**Abstract**—This document deals with an innovative rather an interesting manner of intimating the message to the people using a wireless electronic display board which is synchronized using the WI-FI 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 than the old traditional way of passing the message on notice board. This proposed technology can be used in colleges, many public places, malls or big buildings to enhance the security system and also make awareness of the emergency situations and avoid many dangers. Using WI-FI module and Bluetooth module display the message onto the display board.

**Index Terms**— WI-FI module, Bluetooth module, Arduino, 8x8matrix display, microcontroller, muti terminal

## 1. INTRODUCTION

In this world Mobile Phones and the related technologies are becoming more and more prevalent. Various technical arenas in the field of Telecommunication and Embedded Systems are becoming omnipresent in the people. The use of cell phones has rapidly increased over the last decade and a half. Upgradation in networking technologies has encouraged the development and growth of very dense networks. Now-a-days the general mass prefer communicating while on the move therefore landlines usage has been drastically reduced.

Notice boards are one of the widely used ones ranging from primary schools to major organizations to convey messages at large. A lot of paper is been used and which is later wasted by the organizations. This in turn leads to a lot of deforestation thus leading to global warming. Small innovative steps in making use of technology for regular purposes would have an adverse effect on the environment issues which we are presently concerned about. The main aim of this paper is to design a SMS driven automatic display Board which can replace the currently used programmable electronic display and conventional notice boards.

It is proposed to design to receive message in display toolkit which can be used from an authorized mobile phone. The

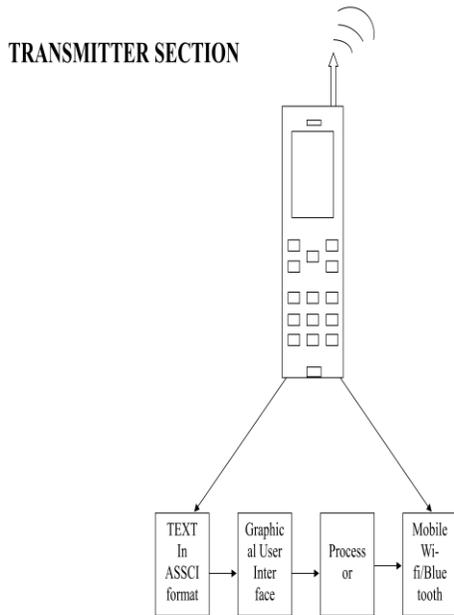
whole process can be described from the transmitter and receiver section. The WIFI/BLUETOOTH module receives a message from the authorized mobile phone and the message is extracted by the microcontroller from the WIFI/BLUETOOTH module and is displayed on the MATRIX display board. Serial to parallel communication is used for the entire process from WIFI module to Microcontroller and from microcontroller to the matrix display. And for the acknowledgement LCD display is used.

This proposed system in this paper has many upcoming applications in educational institutions and organizations, crime prevention, traffic management, railways, advertisements etc. Been user friendly, long range and faster means of conveying information are major bolsters for this application. By using this proposed methodology we can enhance the security system and also make awareness of the emergency situations and avoid many dangers.

## 2. RELATED WORK

Intimating the message to the people using a wireless electronic display board which is synchronized using the 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 than the old traditional way of pasting the message on notice board. This proposed technology can be used in many public places, malls or big buildings to enhance the security system and also make awareness of the emergency situations and avoid many dangers. Using various AT commands is used to display the message onto the display board. GSM technology is used to control the display board and for conveying the information through a message sent from authenticated user.

3. PROPOSED MODEL:



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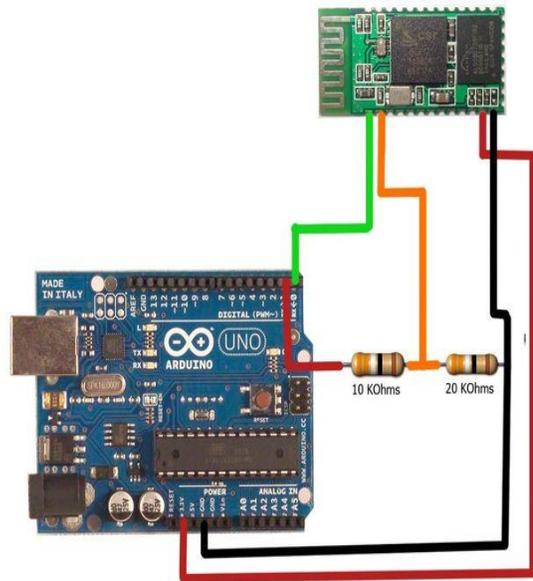
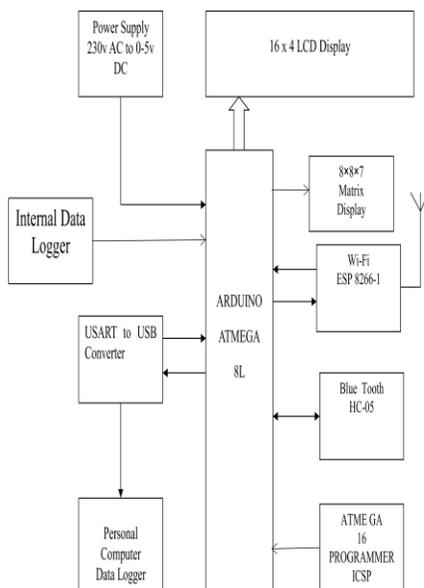
casually acquire live data. The equipment is claimed to work over 10m. I have used it over 15m with clear line of sight. One wall of lightweight domestic construction will cut the range to about 5m maximum, and a single layer of foil building insulation can kill it stone dead. This last can mean that indoor to outdoor communication could be pretty risky.

B. *Equipment used:*

- 1) A standard Arduino Uno or Mega. Any 5volt Arduino should suffice.
- 2) An HC-05 or HC-06 bluetooth module is used. The HC-06 operates as a slave only but is entirely suitable for this exercise. The HC-05 can operate as a master and thus has more commands. I don't think there is much difference in the price, and its extra versatility may be of value in the future.
- 3) A means of connection. I use a four-conductor cable to a header on a proto shield. A breadboard lashup would suffice, or female-male leads direct into the Arduino headers. You could solder the module directly into a proto shield. In this event, it would be wise to have a jumper in the 5v line so that Bluetooth can be isolated while the code is uploaded.

This may be as simple as running 1k and 2k between Tx and ground. The picture shows an example,

RECEIVER SECTION:



Connecting Arduino with **Bluetooth**.

3.1 DESCRIPTION OF THE PROPOSED METHOD :

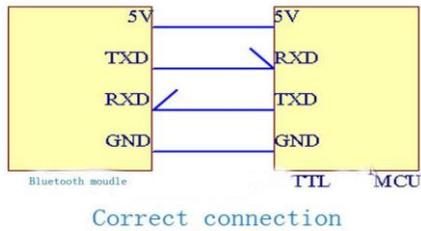
3.1.1 USING HC-05:

A. *Operating environment.*

The objective is to be able to stand near the Arduino and

C. *The communication method and the connections required:*

This is all about using the standard serial protocol using hardware, using pins D0 and D1 on the Arduino, which are clearly marked for the purpose. Pin D0, Rx, is the receiver and therefore connected to the Tx pin on Bluetooth. This means D1 is connected to Rx on Bluetooth.



This is not about the alternative procedure, known as “software serial” so, if in the unlikely event that you really do have a need to use software serial for Bluetooth, read no further.

The only other connections required are the standard 5v and ground. I believe all HC-05s come with six pins. You don’t need the other two for this exercise. And yes, the HC-0x modules are 3.3v devices but note that the JY-MCU package level shifters on board for the power supply and is clearly labelled for 3.6 to 6v operation.

Note particularly that, while Bluetooth modules come in two types, master and slave, these characteristics are entirely irrelevant to this exercise, and the words will not be mentioned again until the appendix at the end – a section that you don’t need to read.

*D. Notes on what the bluetooth module is about:*

The bluetooth is a separate device between Arduino and Android. To the Arduino, it is just another serial device, indeed it is indistinguishable from the serial monitor and is used in the same way. To the Android, it is just another Bluetooth device to be paired with, and the fact that there is an Arduino connected to it is immaterial. What this particularly means is:

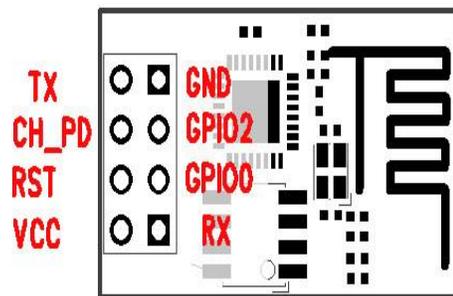
- 1)Arduino is not involved with the pairing. It is just providing the power and, if there was another source of power, it needn’t be connected.
- 2)Consequently, a successful pairing is just between Bluetooth and Android, and does not guarantee successful communication with the Arduino.
- 3)Similarly, the serial communication between Bluetooth and Arduino does not guarantee successful communication with Android. Note that there is no way of checking communication from Arduino to Bluetooth other than getting the signal all the way to Android.
- 4)All the procedure for pairing and establishing connection is done at the Android end.

3.1.2. USING ESP8266:

*Description:* The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any

microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers. The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community. This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces, it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts. There is an almost limitless fountain of information available for the ESP8266, all of which has been provided by amazing community support. In the Documents section below you will find many resources to aid you in using the ESP8266.

*ESP8266 Pin diagram:*



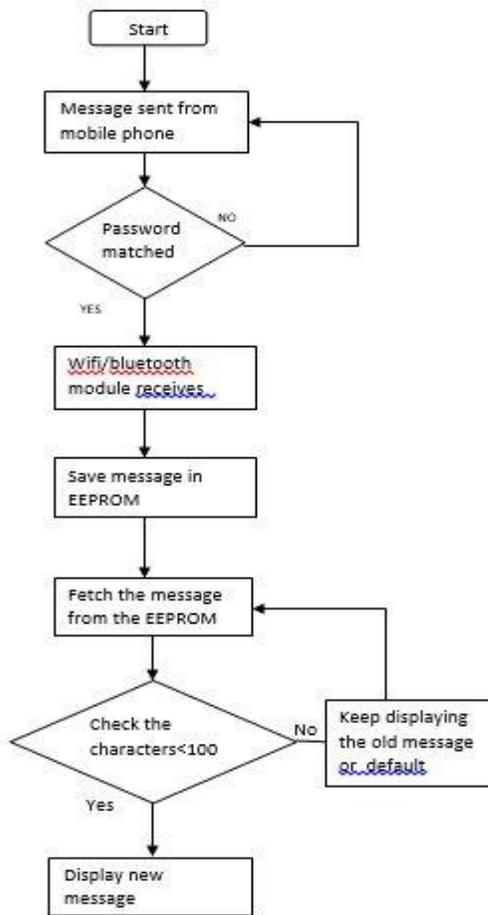
4. SOFTWARE USED:

4.1..PROTEUS:

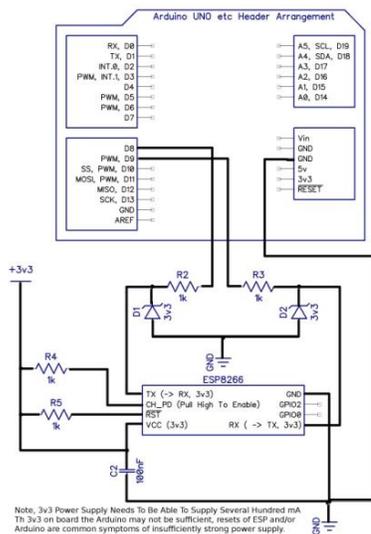
The functional approach and the extensive library of built-in functions allow to write very short but powerful scripts; to keep them comprehensible, medium-length keywords were adopted. The user, besides writing new high-level functions in Proteus, can add new functions in C/C++ by following the guidelines and using the templates available in the software development kit; the new functions can be invoked exactly the same way as the predefined ones, passing expressions by value or variables by reference. Proteus is an interpreted language: programs are loaded into memory, pre-compiled and run; since the number of built-in functions is large, execution speed is usually very good and often comparable to that of compiled programs.

5. OPERATIONAL FLOWCHART:

FLOWCHART:

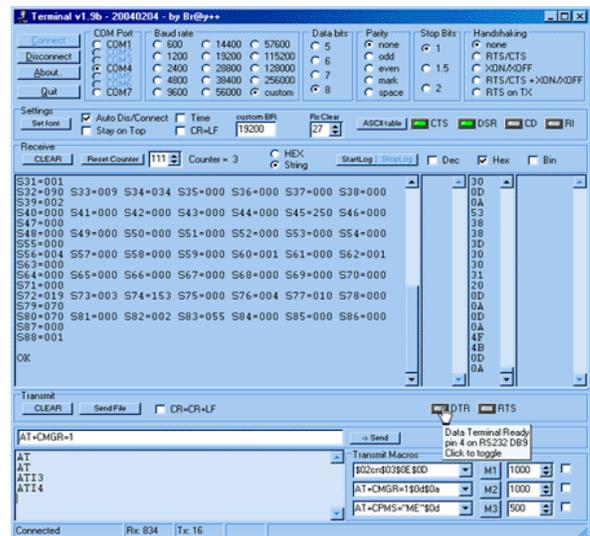


6. CONNECTING THE ESP TO AN ARDUINO:



The logic connections between Arduino and ESP are very simple: ESP-Rx goes to Arduino Tx, ESP-Tx goes to Arduino Rx. However, all ESP-8266 run on 3.3V, while Arduino pins run on 5V. Before connecting them, you shall provide a way to adapt these voltages, or you could damage your ESP.

7. SERIAL TERMINAL SOFTWARE :



7.1.BASIC TERMINOLOGIES:

Here are some terms you should be familiar with when working within a serial terminal window. Many of these terms are covered in a lot more detail in our Serial Communication tutorial. It highly recommended that you read that page as well to get the full picture.

**ASCII** - Short for the American Standard Code for Information Interchange's character encoding scheme, ASCII encodes special characters from our keyboards and converts them to 7-bit binary integers that can be recognized by a number of programs and devices. ASCII charts are very helpful when working with serial terminals.

**Baud Rate** - In short, baud rate is how fast your data is being transmitted and received. 9600 is the standard rate, but other speeds are typical amongst certain devices. Just remember that all the links in your chain of communication have to be "speaking" at the same speed, otherwise data will be misinterpreted on one end or the other.

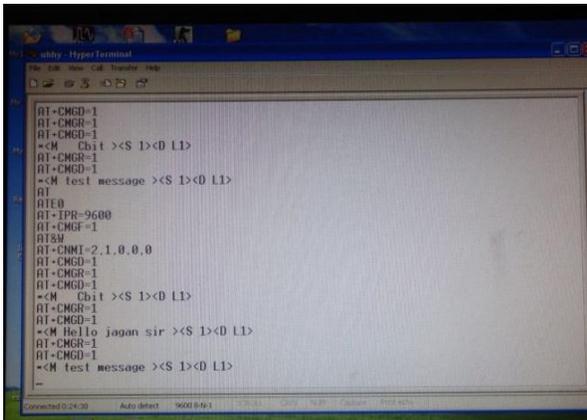
**Transmit (TX)** - Also known as Data Out or TXO. The TX line on any device is there to transmit data. This should be hooked up to the RX line of the device with which you would like to communicate.

**Receive (RX)** - Also known as Data In or RXI. The RX line on any device is there to receive data. This should be hooked up

to the TX line of the device with which you would like to communicate.

**COM Port (Serial Port)** - Each device you connect to your computer will be assigned a specific port number. This helps to identify each device connected. Once a device has a port assigned to it, that port will be used every time that device is plugged into the computer. Note that Mac and Linux COM ports have a different naming convention.

7.2. TERMINAL WINDOW:



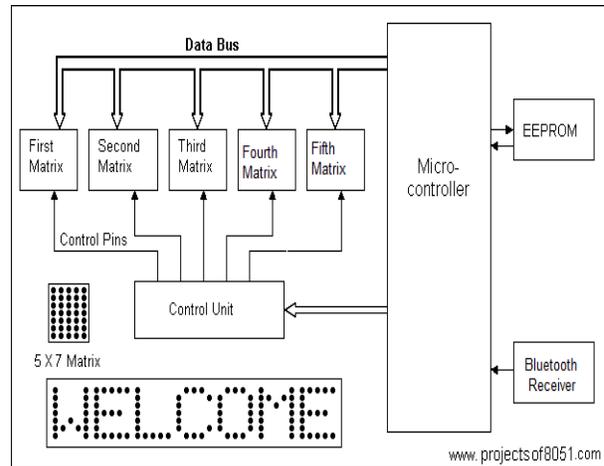
when a message is sent in the specified format, then a series of commands are executed which can be seen in a Hyper Terminal when the kit is connected to the COM PORT of PC.

8. MATRIX DISPLAY:

*Connecting Dot Matrix LED Display with microcontroller:*

An LED Matrix consists of an array of LED's which are interconnected such that the positive terminal (anode) of each LED in the same column are connected together and the negative terminal (cathode) of each LED in the same row are connected together. Note that this could be the other way around as well, with the positive terminals connected to the rows and the negative terminals connected to the columns. 8x8 LED Matrix Schematic An LED dot matrix display ("dot" refers to the circular lenses in front of the LEDs) can also come with multiple LEDs of varying colors behind each dot in the matrix. For example, the matrix used in this project has a Red, Green and Blue LED behind each dot in the 8x8 grid. A configuration with multiple LEDs behind each dot adds another control pin to every column (positive terminal) for each additional color of LED, while the rows (negative terminals) are still all connected together. Therefore an RGB matrix has 32 control pins compared to the 16 pins. Controlling the LED Matrix Since all of the individual LED's in a matrix share their negative and positive terminals in each row and column, it is not possible to control each individual LED at the same time. Instead, the matrix is controlled by

cycling through each row very quickly while triggering the correct column pins to light the desired LED's for that particular row.



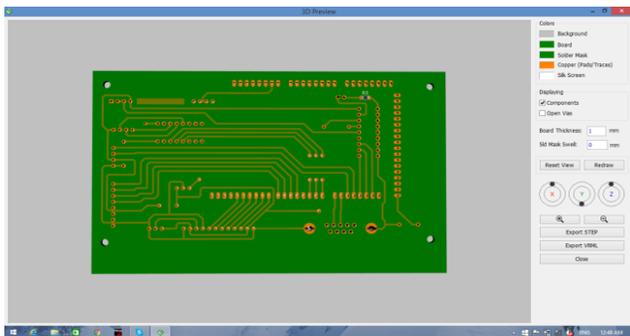
8x8 dot matrix led connection with microcontroller.

If the switching is done at a quick enough rate, there will be no visible flicker and the LED matrix display will appear to have each LED turned on at the same time. This works because of the principle known as Persistence of Vision, which is the theory that the retina of the human eye retains an image for about a tenth of a second. Thus an LED matrix must be very precisely controlled, with the Rows being scanned through sequentially at a rate greater than about 40Hz (to be safe) while sending out the column data at the exact same rate. This kind of control is most easily accomplished with the aid of a microcontroller, plus some additional components.

**Programming the Microcontroller** The Atmel ATMEGA8L can be programmed using BASIC, C, or Assembly language. After the code is written, it is compiled using the compiler which outputs a Hex file that can then be directly downloaded to the microcontroller. The Hex file is downloaded via an In-Circuit Programmer that connects the microcontroller to the parallel port of a PC.

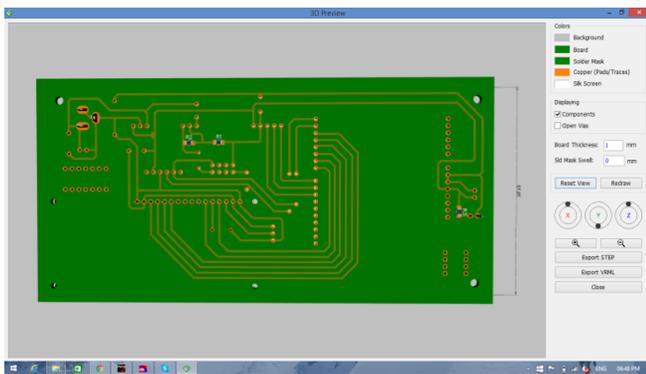
9. SIMULATION RESULTS

Before going on to the proposed design practically, the results were verified in 8051 simulator. Using this simulator various modules of the project are constructed with the tools available in the simulator. And then by making the appropriate circuit connections as discussed earlier using the virtual wires and then writing the hex code onto the virtual microcontroller we can observe the results of the proposed method. The process of simulation of the project is as follows.



*BOTTOM SHIELD for mother board.*

Figure shows the schematic diagram built using the tools available in the simulator. It shows all the components of the project such as WI-FI module, Microcontroller and Display board and the connections between them.



*Daughter board view 1.*

This figure shows the initialization process of module and microcontroller using AT commands. The two virtual terminal windows in above figure shows the commands execute in the microcontroller that are passed onto the display board.

*OUTPUT :*



Initially when power is switched on and all the modules are kept ready, as there is no message is sent to the WIFI module, the board displays the default message fed into it as shown in above figure.

**10. MULTI TERMINAL:**

*Android application:*

The MultiTerminal is intended for simultaneous management of multiple accounts, such as WIFI and BLUETOOTH for which is mostly helpful for transmitting messages to the display.

The new terminal successfully combines great functionalities that allow effective transferring with many accounts and with exceptional usability Terminal can easily get acquainted to this new program within a few minutes. After installing the application in mobile phone it need to configure with password.



**11. CONCLUSION:**

As the technology is advancing every day the display board systems are moving from Normal hand writing display to digital display. Further to Wireless display units. This paper develops a photo type laboratory model wireless notice board system with WIFI MODULE and BLUETOOTH connected to it, which displays the desired message of the user through an SMS in a most populated or crowded places. This proposed system has many upcoming applications in educational institutions and organizations, crime prevention, traffic management, railways, advertisements etc. Been user friendly, long range and faster means of conveying information are major bolsters for this application. By using this proposed methodology we can enhance the security system and also make awareness of the emergency situations and avoid many danger

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