IOT BASED MESSAGE SCROLLING LED DISPLAY

Dr.S.Surendiran[1], M. Mathumathi[2], S. Nivetha[3], A. Pon Lucina[4]

[1]Professor, Department of Electrical and Electronics Engineering, Paavai Engg. College, Namakkal, India
[2,3,4]UG Student, Department of Electrical and Electronics Engineering, Paavai Engg. College, Namakkal, India

---

Abstract

Notice boards are playing a very important role in our day to day life. By replacing conventional analog type notice board with digital notice board we can make information dissemination much easier in a paperless community. Notice board could be a primary factor in any establishment or public places like bus stations, railway stations, colleges, malls etc. Sticking out numerous notices day to day could be a tough method. A separate person is needed to take care of this notice display. The objective of our project is to design a dot-matrix moving message display using microcontroller and IOT where the characters shift from left to write continuously. In this project we have used ATMega8 microcontroller. ATMega8 is a family of 8-bit microcontrollers. It has a maximum rated processor frequency of 16MHz. The ATMega8 lends itself extremely well to prototyping due to its simple requirement of a 4.5V-5.5V power source. It has a shift out frequency of around 100MHz and storage register of 3-stage output and finally we have used 16x32 dot- matrix display. At first a code was developed. And we got our desired result there. This project is regarding advanced wireless notice board. In IOT based Web Controlled Notice Board, Internet is employed to wirelessly send the message from Browser to the LED display. The main objective of the project is to develop a wireless notice board that displays messages sent from the user's mobile application.

Keywords: IOT, GSM, ATMega8 Microcontroller and Dot Matrix

1. INTROGUCTION

Electronic notice board is a common device that is used to display information. The information or messages are displayed using dot matrix. The wireless system for dot matrix display is a method using Radio Frequency as transmission medium. The system consists of two modules; transmitter and receiver. The transmitter module is used by a user to place a message through an input module such as keypad or keyboard or smart phone. The information then transmitted using WI-FI technology to the receiver. It then will be decoded and displayed on electronic noticeboard.

Information dissemination among employees of a company is necessary for management and administration purposes. Consequently this has been of interest for system designers in a diverse set of applications ranging from development of generalized Chabot or forming an online help assistant. An information exchange tool for knowledge transfer can exist in two ways, the first is performed in the form of a question answer system in which a person readily answers all the queries that one might have. Alternately, there could also be a social forum for information transfer. In companies and educational establishments,

information is usually disseminated by means of information counters.

However, with such organizations usually having personal spread over a large area, it is not always possible for every employee to be able to get access to the most up- to-date information. Educational institutions also have a similar situation wherein students can be present in any part of the campus and might miss important updates such as rescheduling of classes etc. Furthermore students and employees might not to know important information in-time for it to be useful to them as they might not be able to pass through those notice boards regularly. Project based notice boards are especially cumbersome to maintain due to many people posting information with no mechanism for removing them. In every institute or industry there is always an information desk that provides information about the staff, institute, and its departments and about everything related to that institute. The problem is that it requires some staff that is dedicated to that purpose and that must have up to date information about the institute and the recent happenings in the institute. The second issue is that a person needs to go in the institute at the information desk in order to get information from them. The solution to this is to use technology and make technology responsible to answer all the queries asked by people. Similar work has already been done by many people around the world. The best tool is Cell phones, which are available to almost everyone and that is connectable to internet to download latest information. What if the information is not updated over internet in those cases where the information is not being updated over internet, we need to call customer support to know important information in-time for it to be useful to them as they might not be able to pass through those notice boards regularly. Project based notice boards are especially cumbersome to maintain due to many people posting information with no mechanism for removing them. It would therefore be beneficial as well as convenient for there to be some mechanism by which users could be updated immediately about a change in normal routine or be able to access the most current information at their will.

Figures 1.1 LED Display

2. Arduino Microcontroller

The Arduino Uno is a microcontroller board based on the ATMega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, 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 an 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 ATMega8U2 programmed as a USB- to-serial converter. 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 version of Arduino, moving forward. The Uno is the latest in a series of USB.

Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, 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 Atmega8U2 programmed as a USB-to-serial converter. Uno means one in Italian and is named to mark the upcoming release of Arduino 1.0.

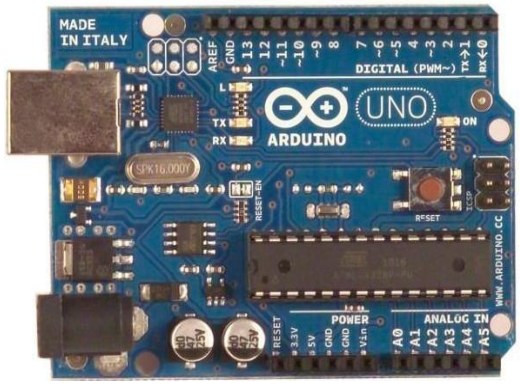

Figure 2.1 Arduino Uno Board

2.1 GSM Module:

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 in order to operate.

The operation of the system is very simple. It sends message from any of the remote area to the distant located e-notice board using GSM mobile. For sending the text message from remote area we need to interface the mobile phone with GSM Modem. For developing some of GSM based applications we need to have some commons peripherals including GSM MODEM, SIM, microcontroller, LED (Light Emitting Diode), power supply and also some connecting wires. The main advantage of the switching power supply is greater efficiency than linear regulators because the switching transistor dissipates little power when acting as a switch. Other advantages include smaller size, lower noise, and lighter weight from the elimination of heavy line- frequency transformers, and comparable heat generation. Standby power loss is often much less than transformers. The transformer in a switching power supply is also smaller than a traditional line frequency (50 Hz or 60 Hz depending on region) transformer, and therefore requires smaller amounts of expensive raw materials, like copper.

The problems faced by the wooden or conventional type notice boards are resolved by the implementation of our digital notice board. It will bring an advanced means of passing notices around in the world in a much easier and efficient way.

Figure2.2 GSM Module Computer use AT Commands to Control Modem

3. Mechanism of Proposed System:

This project is regarding advanced wireless notice board. In IOT based Web Controlled Notice Board, Internet is employed to wirelessly send the message from Browser to the LED display. The main objective of the project is to develop a wireless notice board that displays messages sent from the user's mobile application. A block diagram containing the part of an IOT is shown in figure 3.1.

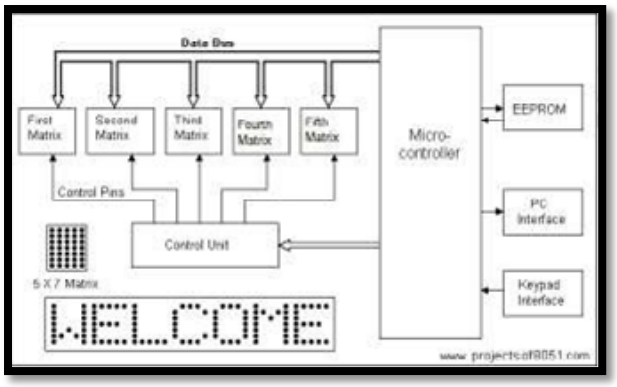

Figure 3.1 Circuit Diagram of Proposed System

To display a content whatever typed by the principle or administration or coordinator using LED matrix display board through wireless fidelity technology. The project is built around the FM6124 module. This acts as a controller and Wi-Fi module provides all the functionality of the display. Display is obtained on LED Matrix Display Array on a printed circuit board. The scrolling speed text can also be changed according to user requirement using a mobile. This can be done using Wi-Fi wireless communication.

3.2 DOT MATRIX DISPLAY:

LED – Light Emitting Diode an LED display is a flat panel display, which use an array of light-emitting diodes as pixels for a video display. LED displays are capable of providing general illumination in addition to visual as when used for stage lighting or other decorative purposes. The block diagram of Dot Matrix display is shown in figure 3.2

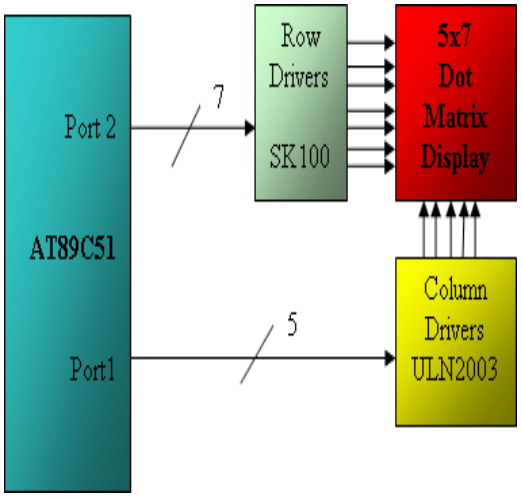

Figure 3.2 Block Diagram of DOT Matrix LED display

The B32CDM is an 8 X 8 (row by column) dot matrices red LED display combined with a multiplexed drive, integrated circuit with a cascade serial interface. The serial interface is compatible with SPI, QSPI and MICROWIRE. User selectable jumpers allow the data-in/data-out functions to be swapped from left to right. The displays are designed so that they can be mounted in a horizontal chain and can also be expanded in a vertical plane allowing versatile displays to be built. The 8 X 8 matrix gives enhanced characters over a 7 X 5 matrix and the excellent optical

performance allows high visibility and viewing angle. The command set includes 16 level digital dimming, test modes, null command (for cascading) and a shutdown mode that reduces current consumption to 150uA. A single +5 volt supply is required. Applications include message displays, large area display assemblies and graphics panels. LED sizes include (active display area) 32mm by 32mm, 38mm by 38mm and 64mm by 64mm. alphanumeric character generation using the BIFQ2.

3.3 SCROLLING DISPLAY MODULE-P10:

16x32 high brightness Red LED. It can be viewed easily from a distance of 12 meters in outdoor conditions. Tough and high quality plastic frame with screw hole for mounting. Black back ground with cap over each led for best display results and operates in 5V.All the controller chips are on board, only power and clocked data need to be given externally. Dimension is 320(W) x 160(H) x 14(D) mm 30(D) mm including near connectors.

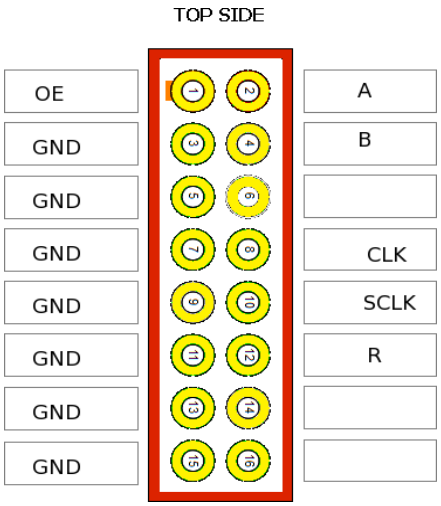

Figure 3.3 P10 LED display-Top Side

4. SOFTWARE DESCRIPTION:

4.1 Arduino IDE:

The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows into file is required. The Arduino software includes a serial monitor which allows simple textual data to be sent to and from the Arduino board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1).

A Software Serial library allows for serial communication on any of the Uno's digital pins. The ATMega328 also supports I2C (TWI) and SPI communication. The Arduino software includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library.

The B32CDM is an 8 X 8 (row by column) dot matrices red LED display combined with a multiplexed drive, integrated circuit with a cascade serial interface. The serial interface is compatible with SPI, QSPI and MICROWIRE. User selectable jumpers allow the data-in/data-out functions to be swapped from left to right. The displays are designed so that they can be mounted in a horizontal chain and can also be expanded in a vertical plane allowing versatile displays to be built. The 8 X 8 matrix gives enhanced characters over a 7 X 5 matrix and the excellent optical performance

allows high visibility and viewing angle. The command set includes 16 level digital dimming, test modes, null command (for cascading) and a shutdown mode that reduces current consumption to 150uA. A single +5 volt supply is required. Applications include message displays, large area display assemblies and graphics panels. LED sizes include (active display area) 32mm by 32mm, 38mm by 38mm and 64mm by 64mm. alphanumeric character generation using the BIFQ2.

4.2 Programming:

The Arduino Uno can be programmed with the Arduino software (download). Select Arduino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATMega328 on the Arduino Uno comes pre burned with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available. The ATMega16U2/8U2 is loaded with a DFU boot loader, which can be activated by On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2. On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

4.3 IOT:

Generic Wi-Fi-BT-BLE MCU module that targets a wide variety of application ranging from low power sensor networks to the most demanding tasks such as voice encoding, music streaming and MP3 decoding. At the core of this module is the ESP32 chip, which is designed to be scalable and adaptive. There are 2CPU cores that can be individually controlled or powered, and the clock frequency is adjustable from 80MHz to 240 MHz. The user may also power off the CPU and make use of the low power co- processor to constantly monitor the peripherals for changes or crossing of thresholds. ESP32 integrates a rich set of peripherals, ranging from capacitive touch sensors,

Hall sensors, low noise sense amplifiers, SD card interface, Ethernet, high speed SDIO/SPI, UART, I2S and I2C.The integration of Bluetooth, Bluetooth LE and Wi-Fi ensures that a wide range of applications can be targeted, and that it is future proof using Wi-Fi allows a large physical range and direct connection to the internet through a Wi-Fi router, while using Bluetooth allows the user to conveniently connect to the phone or broadcast low energy beacons for its detection. As such the chip does offer industry leading specifications and the best optimized performance for electronic integration, range and power consumption, and connectivity.

5. RESULT AND DISCUSSION:

This project explains how to control the display of characters on a 16x32 LED moving message display using ATMega328 Arduino Microcontroller. This project is a world wide access of LED using IOT. It provides implementation of displaying

characters on an LED matrix without any time and place boundary. In which the scroll and blink display modes are supported. It is easily accessible and more user friendly. It overcomes the disadvantages of GSM and has various advantages over it.

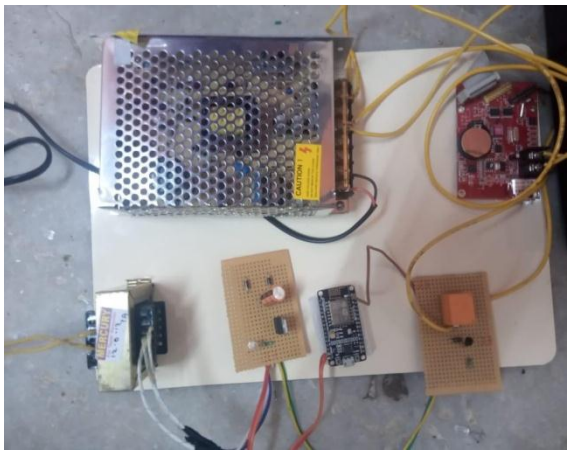

Figure 5.1 Photo View of Proposed System

If Wi-Fi module is interfaced with the microcontroller of this project and one application is written for Wi-Fi enabled PC/laptop, then any such PC having that app installed will be able to change the message on the display.

6. CONCLUSION:

This project is regarding advanced wireless notice board. In IOT based Web Controlled Notice Board, Internet is employed to wirelessly send the message from Browser to the LED display. The main objective of the project is to develop a wireless notice board that displays messages sent from the user's mobile application. Thus this project gives the easiest approach of sending and displaying information in important places like schools and colleges.

7. REFERENCES:

1. Adkins B, "Toward the implementation of a topic specific dialogue based natural language Chatbot as an undergraduate advisor", 2013 International Conference on Informatics, Electronics & Vision (ICIEV), 2013, pp. 1-5.

2. Barua J.J, "TEKPAC (Technical Electronic Knowledge Personal Assistant Capsule)", 2001 IEEE International Semiconductor Manufacturing Symposium, 2001, pp. 29-31.

3. Chai J, "An evaluation of the chat and knowledge delivery components of a low-level dialog system. The AZ-ALICE experiment", Decision Support Systems, 2007.s

4. Darshil J.M, "The role of natural language conversational interface in online sales: a case study," International Journal of Speech Technology., Nov. 2001, vol. 4, pp. 285-295.

5. Dhiluk , "Mass media and the concept of interactivity: An exploratory study of online forums and reader email", Media, culture & society, vol. 22, issue. 2, pp.205-221.

6. Fungo , "Back packers as a community of strangers: the interaction order of an online backpacker notice board". Qualitative Sociology Review, vol. 3, issue. 2, 2007