

Wi-Fi Enabled Scrolling LED Matrix Display

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Abstract:

There have been several advances in recent years in the ways of showing, promoting, and advertising information as a result of technical advancements. Advertisements and notifications can often be seen displayed on LED matrix display boards. These display boards have become a primary mode of promotion in educational institutes, shops & various other public places for displaying information regarding public transport timings, platforms, various advertisements regarding products, or important notices. Over the years, these display boards have become an important part of promotions and notices, and have made promoting and putting out notices significantly easier and more eye-catching. The older version of these display boards made use of wired technology for communication. Here, wireless technology, Wi-Fi is being employed for communication.

Information is entered through the keyboard of transmitter or as speech signal and send through wi-fi & nodemcu or Wi-Fi module at receiver end will receive it and send it to matrix display due to which the desired information will be displayed on LED matrix display.

Keywords –Wired display boards, Wi-fi, LED matrix display.

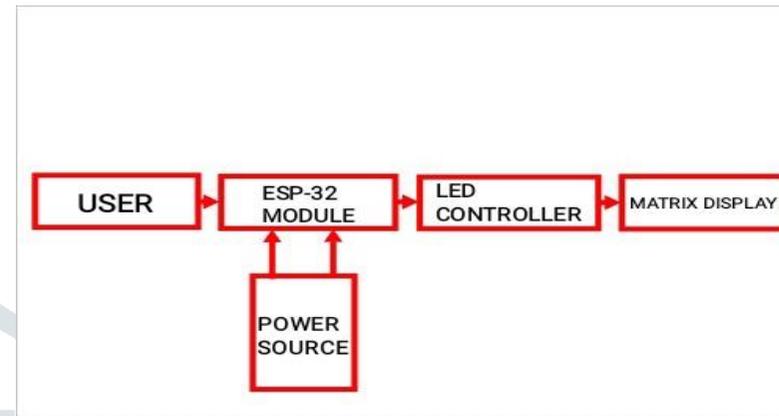
I. INTRODUCTION:-

The LED Display Systems are specifically designed to be used at colleges, universities, share market, etc. for displaying day-to-day updates, important notices and other information continuously and effortlessly. The LED display system mainly consists of a Wi-Fi module as receiver and a display toolkit which can be programmed from an authorized mobile phone or computer system. It receives the data, from a mobile phone or computer system through an application and displays the desired information after necessary code conversion. It serves as an electronic notice display board which displays the important notices instantly avoiding unwanted delays. These days the use of LED Matrix Scrolling Displays has become very popular in areas like shopping malls, movie theatres, public transports, traffic and highways signboards, etc. Being Wi-Fi- based, the system offers flexibility to display notices and announcements faster than traditional programmable systems. Being wireless, the led display it is easy to expand and allows the user to increase the number of display panels anytime and at any desired location depending on the requirement of the user. But major issue with these displays is to carry a personal computer, laptops or specialized keyboards for transmitting messages to these LED display boards. Carrying

computational assembly or keypads every time, when the user needs to change the message on the LED display boards can be quite hectic.

II. SYSTEM DESIGN:

The methodology to develop the system is describe in this section . The development process includes design of character pattern, ESP-32 Module, LED Controller, Matrix Display, Power Supply of respective pattern.



III. COMPONENTS:

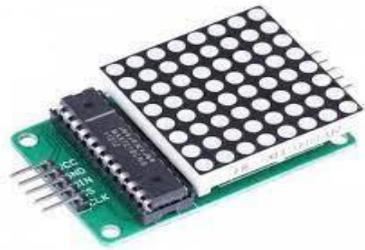
1. ESP-32 Wi-Fi Module:

ESP32 is a series of low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The ESP32 series employs either a Ten silica Xtensa LX6 microprocessor in both dual-core and single-core variations, Xtensa LX7 dual-core microprocessor or a single-core RISC-V microprocessor and includes built-in antenna switches, RF balun, power amplifier, low-noise receive amplifier, filters, and power-management modules. ESP32 is created and developed by Espressif Systems, a Shanghai-based Chinese company, and is manufactured by TSMC using their 40 nm process. It is a successor to the ESP8266 microcontroller.



2. LED MATRIX DISPLAY:

The MAX7219/MAX7221 are compact, serial input/output common-cathode display drivers that interface microprocessors to 7-segment numeric LED displays of up to 8 digits, bar-graph displays, or 64 individual LEDs. The devices include a 150µA low-power shutdown mode, analog and digital brightness control, a scan-limit register that allows the user to display from 1 to 8 digits, and a test mode that forces all LEDs on.



3. JUMPERS WIRES:

A jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering. A jump wire is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.



IV. Implementation:

Establish connection between the computer application and the Bluetooth module. The user will send messages that will be received by the Bluetooth module, and the Bluetooth module will communicate with the microcontroller using serial communication port RX, TX with baud rate 9600. This message is stored in the Arduino which is later used to display the message on the Dot Matrix LED Display. We use three shift registers (one shift register for each 8X8 block of LED set) for the input signal of LED column. A current limiting register is connected with each LED of the column. The shift register can allow current up to 8ma. The 0 and 1 are in binary code and are used for blinking the LEDs in the sequence to display the characters. Microcontrollers use ASCII code for characters to be displayed stored in the internal memory that match the pattern in character generation. Controller send the code in series of display pattern to the shift register. Any bit pattern that is '1' means turning on the LED, and any bit pattern that is '0' means turning off the LED. The clock transfer of serial data into shift register is done by the controller and the process is repeated for first line of other matrix display column segment. This process is repeated for all rows and columns. The 16-bit display buffers are used for scrolling effect in 4 display matrix and the message scroll from right to left direction.

V. CONCLUSION:

This is a Notice that uses LED Matrix Display. In this project we are going to develop a display, to which text input will be provided, using IP address. The Text input will be converted to text output using by IP Address text feature & subsequently will be viewed on the LED display.

Our goal with this project is to revolutionize, rather digitalize the traditional use of Paper-Pin notice boards in schools & colleges, etc.

VI. REFERENCES:

1- <https://ijrar.org/papers/IJRAR1ACP037.pdf>

2- <https://embedded-lab.com/blog/wifi-enabled-scrolling-led-matrix-display/>

