

Wireless Based LED Dot Matrix Message Display

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Abstract: The information sharing aspect of information technology is playing a prominent role in all kinds of business either it's non-profit organization or profit organization. Now a days, all types of business requires and adopts the facility of advertisement to promote their services and products. Digital advertisement is the current requirement of the modern businesses sand information world. Scrolling led dot matrix displays are used at international airports, stock exchanges, metro railway stations, shopping complex, bus stations etc. led display is an effective mode on displaying information but the complicated task is to make the message dynamic as the users have to change the message content according to this specific requirements. In case of changing the message content the user have to connect the led display with the computer, so that the display board cannot be placed any where because of dedicated and complex wiring pattern. Wireless based dot matrix display makes the wireless connection between user mobile and led display. It provides the facility of real time message displaying means the user can change the message content that is to be display. A mobile is used to send the message to the led display and the microcontroller does all processing of displaying the message content on the led display in scrolling pattern. The aim of the project is to develop a wireless scrolling message board that facility the user to change the message content without connecting the display board with the computer or laptop through a cable. The user can update the message content through Bluetooth or Wi-Fi.

Index Terms: LED, Dot-matrix display, Arduinio uno, Bluetooth, Wi-Fi LED Controller

I. Introduction

This project is based on the idea of designing a led display system for wireless communication between mobile and led display. In this, wireless communication is done by Wi-Fi or Bluetooth. Now a day every mobile consist of Wi-Fi and Bluetooth features. The users having mobile hand set can send message to the display to flash or to display message content in scrolling pattern. Bluetooth module is used to receive the message in circuit. The message content sent by the user is stored in Bluetooth module in case, the user can sent message by using wifi then led controller was received the message and stored in it. The led dot matrix display consist 8*8 matrix with a distance between the rows or pins is 10mm. a preprogrammed microcontroller is used to supply with the standard format of character set containing character and alphabets with the possibility of generating and displaying punctuation marks, numbers, special characters, simple graphics. Each character is display in the pattern based on hexadecimal values that are stored in the microcontroller that is termed as look up or match table. The microcontroller looks or matches from pattern and sent out the data bits serially and clock signal. Shift registers are used to shift dada between the pins connected to each led. Persistence of vision is the based of the fast scanning of data that is set on rows and column, which allows the pattern to be display because of persistence of vision. Decode counter is used to control the rows on the bases of pulses that is connected to the clock input of the microcontroller the design involves both hardware and software. The wireless system of communication requires the following hardware components

- LED dot matrix Display
- HC-05 Bluetooth module
- Arduino Uno
- Power Supply (5V)
- WIFI Led controller

II .BLOCK DIAGRAM:

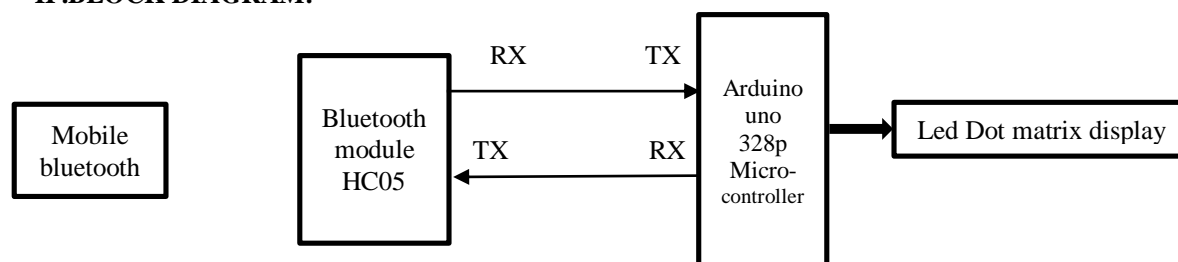


fig.1 block diagram of bluetooth based led dot matrix display

III .Led dot matrix display

The name itself informs that the LEDs are connected in a matrix format i.e., in rows and columns the matrix can be formed with the desired number rows and columns. However 7*5 and 8*8 dot matrix display are readily available as module. The originator can utilize these modules or can assemble a cluster by utilizing singular LEDs. As the LEDs have two terminals, the matrix orientation are of two types. The row terminals are of anode type and column terminals, the matrix orientation are of two types. The row terminal are of cathode type and the column terminals are of anode type. Below are the image of the matrix displays for the common anode and common cathode types.

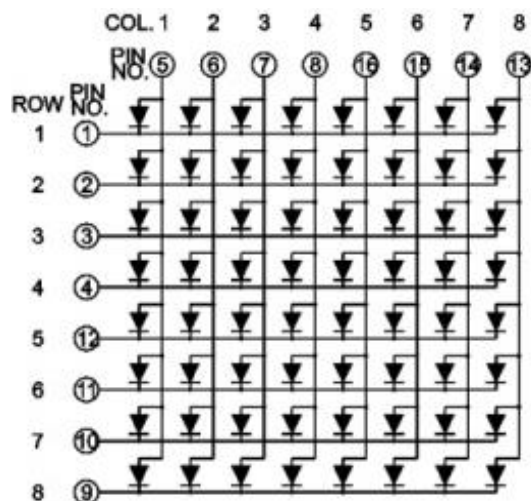


fig.2 rows to cathode

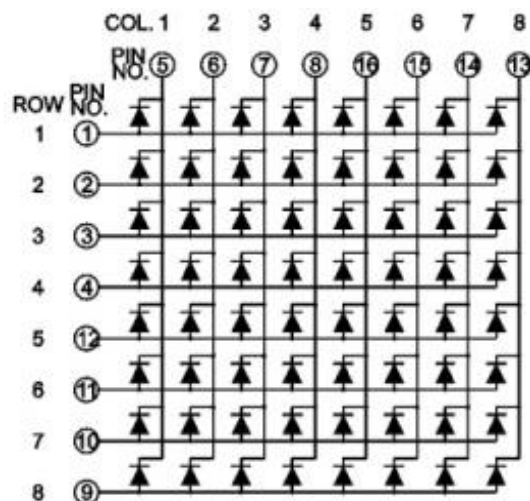


fig3. rows to anode

3.1. Shift Registers

Shift registers are a type of sequential logic circuit, mainly for capacity of digital information. They are a gathering of flip-flops associated in a chain so the yield from one flip-flop turn into the contribution of the flip-flop. Most of the registers possess no characteristics internal sequence of states. All the flip-flops are driven by a typical clock, and all are set or reset simultaneously. In this project 74HC595 shift register are user to control the flow of current in the column of the display. It has a 8bit storage register and a 8bit shift register. Information is written to the shift register serially, then latched onto the capacity register. The storage then control 8 output lines

3.2 Decade Counter

Decade counter stores the stage that has count 10 states: it can count through decade or 10 states per stage. Rather binary code decimal, decade counter counts in decimal digits, decade counter is also a binary counter designed to count decimal 10(1010b). decade counter counts from 0 to 9 and reset to zero. The set the counter output zero needs to pulse reset line low, then each clock pulse increment is counted until it reaches decimal 9 or 1001. Both NAND gate inputs are high when there is an increment to decimal 10 or 1010. After increment to decimal 10 NAND output goes low and counter resets to zero . 4017 is 5 stage decade counter, with 10 decoded outputs Q0 to Q9, Q5,to Q9 are the most significant flip-flop output provider, CP0 and CP1 are two clock inputs and MR is an overriding master reset input

IV .Arduino uno

The arduino uno is open source microcontroller board based on the micro chip ATMEGA328p microcontroller is developed by arduino cc. the board is equipped with sets of digital and analog inputs and outputs pins that may be interfaced to various expansion boards and other circuits the board have 14 digital pins and 6 analog pins and programmable with the arduino IDE via a type b USB cable. It can be powered by a USB cable or by an external 9volts battery and it capacity voltage range is 7 and 20volts

4.1. Atmega328p Microcontroller

In our project ATMEL 8-BIT MICROCONTROLLER is used to control all input output peripherals of LED Display and bluetooth. It creates the interface between Bluetooth module and LED Dot matrix display.

Atmega328p features

1. High performance, low power ATMEGA-AVR-8BIT Microcontroller family
2. High Endurance Non volatile memory segments
3. Advanced rise architecture
4. 131 power full instructions
5. 32*8 general purpose working registers

6. Fully static operation
7. On-chip 2-cycle multiplier
8. Operating voltage: 1.8-5.5volts
9. Temperature range :40c to 85c

4.2. Crystal 16.00 MHz Oscillator

To create an electrical signal, it works on the mechanism of piezoelectric material with a very precise frequency. This frequency is commonly used to maintain track of time. Crystal is used for achieving a baud rate of 9600 for serial communication with module. It is also a higher value of crystal is of importance in this project which has effect of reducing the flicker are seen in the LEDs.

V .Working Procedure

Establish between connectivity between android application and the Bluetooth module. The user will send message that will be received by the Bluetooth module, and the Bluetooth module communicate with 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. Message Display on LED Matrix process. Figure LED Matrix 8*32 According to the figure three shift registers are used (one shift register for each 8X8 block of LED set) for the input signal of LED column , the decade counter is used for the row of dmd input signal control. The eight display matrix row, the output of the atmega328p, that is controlling 4017 decade counter as well as 74HC595 shift register for 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 is used for blinking the LEDs in the sequence to display character. Microcontroller use ASCII code for character to be display stored in the internal memory that matches 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 turn on the LED, and any bit pattern that is '0' means off 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 now decade counter first pin controls the first row of the matrix in dmd. All high LED display the character pattern. 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.

VI .Hardware Setup

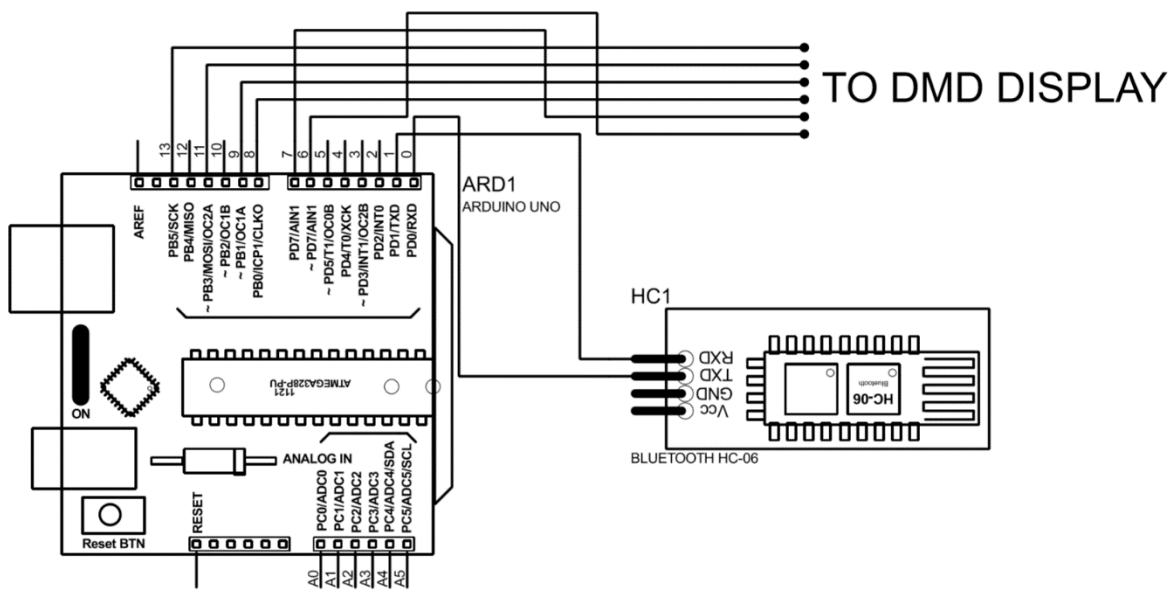


fig.4 interfacing of arduino uno and bluetooth and dot matrix display

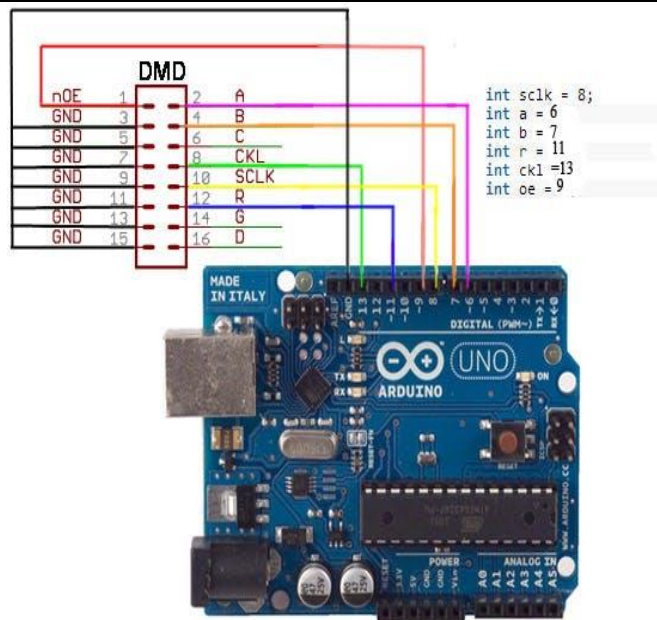


fig.5 arduino uno interfacing with led display

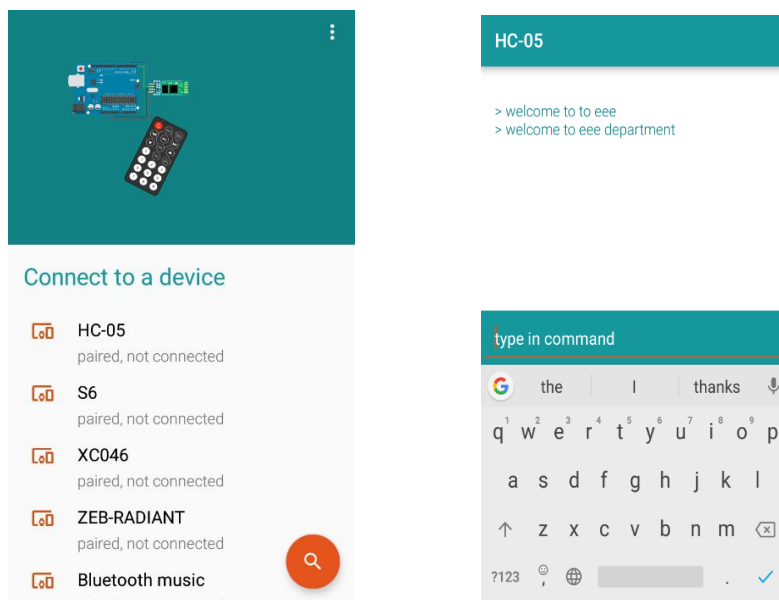


fig.6 sending message by bluetooth android application



fig.7 led dot matrix display

VII .Block diagram of wifi based led controller and led display:

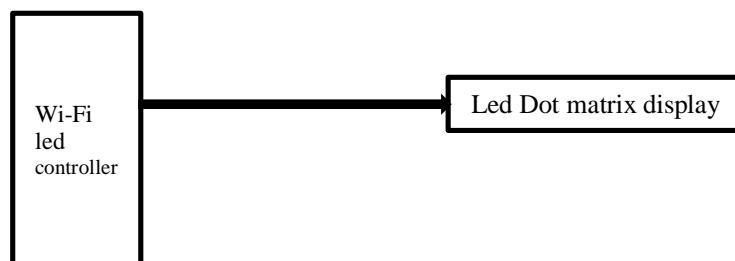


fig.8 block diagram of wifi based led controller and led display

VIII .Wi-Fi led controller:

8.1 Function feature

W60 is a W-series control card, W means Wi-Fi, which updates programs through Wi-Fi. In addition, it consist USB port, can also using the U disk to update the program. It has simple software interface, easy to operate, better display information, supports variety kinds of single-color display. The whole HD2016 control system are simple operation, strong function, it is easy to learn and use, support image-text , Excel, JGP, BMP, GIF, SWF, video, text, animation word etc. Text, animation word Excel, timer countdown, up, button count down , up count, lunar calendar, Temperature and humidity, Pray area etc., it can support serials port(including 232 and 485). Ethernet port, WIFI, U-disk etc. It have multiple control communication, can meet the application of different situations.

8.2 Features

1. **Up port module**
Single Colour, Dual Colour , Tricolour conventional scanning methods
2. **Control range**
Single colour: 512*32
Dual colour: 256*32
Tricolour: 320*16
3. **FLASH**
Capacity 2M Byte
4. **Communication Port**
U-Disk, Wi-Fi
5. **Program Quantity**
Max 1000pcs Programs. We can play by time section or control by buttons.
6. **Area Quantity**
20 areas with separate zone and separated special effects and border are designed
7. **Display Showing**
Text, Picture, 3DText, Animation (SWF), Excel, Timing, Temperatures (humidity, Count, Lunar calendar
8. **Display**
Sequence display, button switch, remote control
9. **Display effect**
 - i. Text, Picture, Time, digital clock, Temperature or temperature and humidity (external module required) Display
 - ii. Support program border, regional border settings, custom borders
 - iii. A variety of action display
 - iv. More than 40 kinds of text effects display
10. **Extended Equipment**
Temperatures, Humidity, IR Remoter, Photosensitive sensors, etc.
11. **Automatic switch screen**
Support timer switch machine
12. **Dimming**
Support three brightness adjustment mode

HD-W60

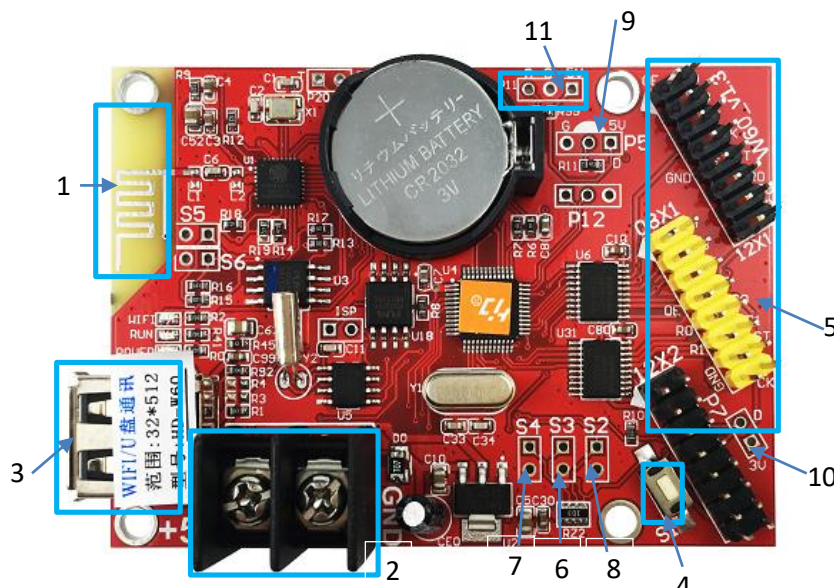


fig.9 led Wi-Fi controller (hd-w60)

1. Connect the laptop or USB port for Update the program by U-disk.
2. Mobile through Wi-Fi to send parameters and programs.
3. Power supply 5v
4. Test button for click to switch screen test led's status and reset the screen.
5. 2 -HUB12 , 1 HUB08, 16pin out for connect the display.
6. S3, Connect the point switch across s3 terminals, switch the previous program, timer reset, count down.
7. S4, Connect the point switch across s4 terminals, program control, timing pause, count reset.
8. S2, Connect the point switch across s3 terminals, switch to the next program, the timer starts, count plus;
9. P5, Connect the temperature/humidity sensor.
10. P7, Connect the brightness sensor.
11. P11, Connect the IR, by remote control.

IX .Working procedure

Establish between connectivity between android application and the Wi-Fi led controller. The user can edit the test and time, other settings in android application. The user will send message that will be received by the Wi-Fi led controller, This message is stored in the Wi-Fi led controller which is later used to display the message on the dot matrix led display. Message Display on LED Matrix process. Figure LED Matrix 8*32 According to the figure shift registers are used (one shift register for each 8X8 block of LED set) for the input signal of LED column , the decade counter is used for the row of dmd input signal control. 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 now decade counter first pin controls the first row of the matrix in dmd. All high LED display the character pattern. This process is repeated for all rows and columns.

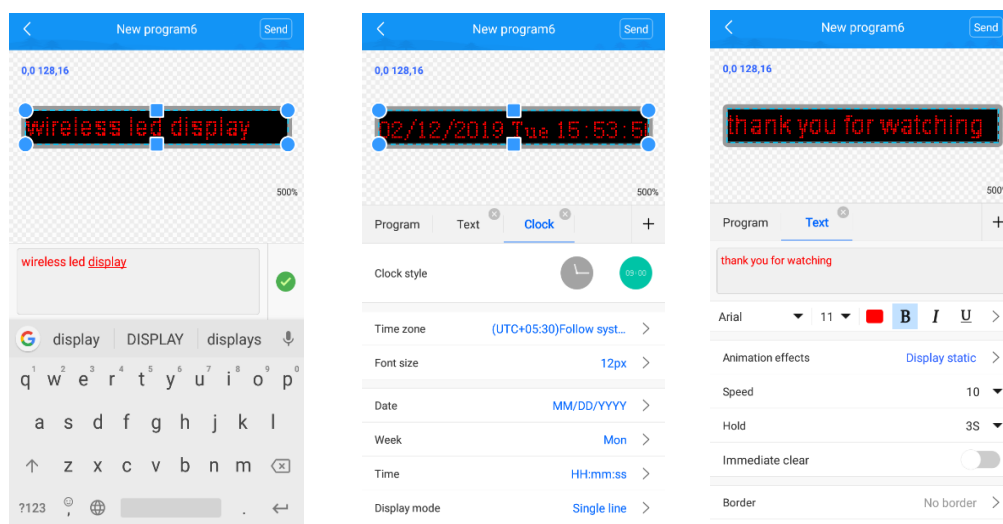


fig.10 message editing in ledart android application



fig.11 time, date and text showing on led display

X .Conclusion

Wireless communication play vital role in technology, this project describes how a person can develop a led matrix that can display scrolling message with support of Bluetooth, Wi-Fi and other specified hardware. The multiplexing technic is used to for displaying character on matrix and the scrolling speed can be controlled by the microcontroller. This project can be used anywhere as it based on wireless communication. Its dynamic message display nature makes with feasible for use in every field where the content keeps of change like stock exchange, railways, airports, restaurants, etc. The major advantage of this project is advertising as the display board can be placed any height, there is no requirement of wires to communicate.

XII .References:

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