

# Scrolling Led Display Using Wireless Transmission

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**Abstract:** Display Board is primary thing in any institution / organization or public utility places like Bus stations, Railway stations, Educational institutions and parks. But sticking various notices day to day is difficult process. A separate person is required to take care of this notices display. This project deals about an advance hi-tech wireless display board. The project is built around the AT89C51 micro controller from Atmel. Using RF based transceiver a wireless interfacing can be provided to make it user friendly. A software based string output sender can be programmed to send the alphanumerical string to the microcontroller and then to the display.

## I. INTRODUCTION

The main objective of the project is display of important public messages to the masses without much manual efforts. Important notices can be displayed within a short span of time and these notices can be upgraded within minutes. Thus we can achieve flexibility in notifications.

The project provides us with easy and user friendly interface to display any message on the LED matrix. There is no need to manually write the message like in conventional display boards thus it is more popular. Moreover the LED display is more catchy and can be seen from adistance compared to the conventional display boards. Furthermore there is huge future scope for modification in the message display fields. For example use of GSM device to transmit the message, android applications, use of 3 colored power led's etc.

The Project is divided into the following parts:

- A software interface to input the message string to be displayed.
- RF transmitter module on COM port to send the serial data to the RF receiver on the microcontroller unit.
- The microcontroller unit which will serially decode the data from the RF receiver.
- The LED matrix which will display the final output in the form of alphanumerical characters.

The atmel AT89C51 microcontroller is used for the main purpose of giving final output to the LED matrix. As the memoery capacity of this uC is limited, it is memory interfaced with a sufficient capacity EEPROM IC to fetch the decoding codes for the alphabets, numerical and special symbols.

Use of LED provides many advantages like low cost, high brightness, low power consumption, ease of maintainence, easily available etc. The Software interface to be used here works like the hyperterminal which are used to sends the binary data via com ports. We can manually adjust the baud rate and data form to be sent to the display board.

## II. STEPS OF PROPOSED WORK

The initial step is to design the LED matrix which will display the moving message. Next is the power supply to drive the LED matrix. After that the designing of the microcontroller unit with external EEPROM interfacing. The microcontroller coding for encoding the alphanumeric data into hex codes according to the dimensions of one character on the matrix, here (5x7). RF transceiver assembly and finally the software based user interface to input the message to be displayed.

### A. LED matrix and Power supply.

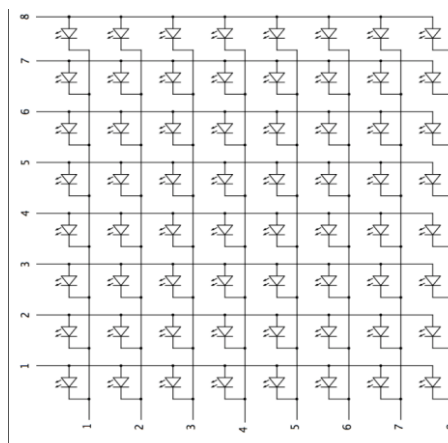


Fig 1a.LED matrix logic

The LED matrix designed is 5x7 per character matrix. The anodes of the rows are made common and their common terminal is given to the power supply via transistor array and the cathodes of the columns are made common and given to the negative

terminal of the supply via transistor array. The anodes in the rows and cathodes in the columns are made common so that it forms a logic wherein we can access a particular LED with controlled inputs from the microcontroller port.

Now here we are using a large LED matrix which requires its individual power supply as microcontroller port cannot drive large current devices. Hence transistor array is used with common rows and columns. The transistor acts as a switch and port output from the uC triggers the transistor to provide supply to the required row of the LED matrix.

The columns of the LED matrix driven by the shift registers. The AND gates connected in cascade are used to control the output of the shift registers. The AND gates passes the control to one shift register at a time so that the desired column is driven at the given time slot.

**B. The Microcontroller Unit**

The sample figure shows how the microcontroller unit is used to drive a small LED matrix. Port 1 of uC gives the output to the shift register which is selectively controlled to drive one row at a time. The 8 pins of the port 3 are given to the cathodes of the LED matrix to drive one column element of the matrix at a time.

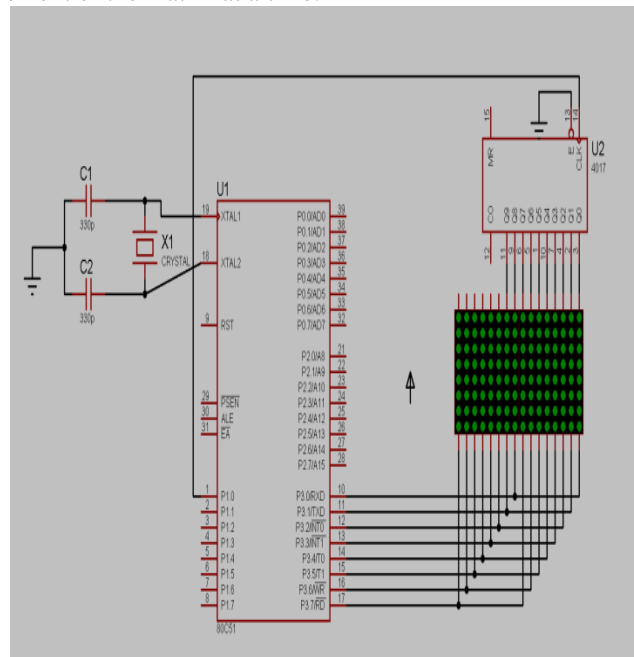


Fig 2. The Microcontroller Unit

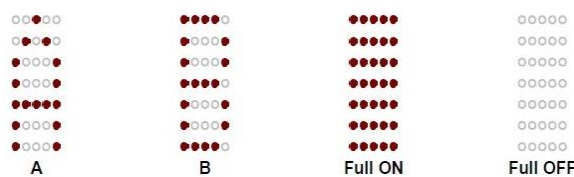
We can increase the size of the LED matrix by adding more shift registers as per our requirement. The only difference is that as the power consumption increases we have to add individual power supply to the matrix and drive it through the transistor array. The other modification needed is the increasing of the storage capacity to handle large amount of codes for decoding the alphanumeric and special characters to be displayed on the LED matrix. An external memory IC such as EEPROM has to be interfaced to the microcontroller from where the uC fetches the decoding codes of the characters.

**C. Character Coding.**

The Characters to be displayed on the matrix are first decoded in a particular format according to the dimensions of per character spacing on the matrix. The character codes to be accessed by the microcontroller are written in C language and converted to equivalent hex format with the help of KEIL uVision software.

Given below are some of the codes of the alphanumeric data to be displayed on the LED matrix. Each row of the LED is driven for a brief period before switching to the next row. Because of a visual phenomenon termed *persistence of vision*, rapid switching between rows produces the illusion that all of the rows are ON at the same time. To function as intended, the two additional requirements must be met are:

1. The LEDs must be *overdriven* proportionately or they can appear dim. The dimness occurs because a row is ON for only a fraction of time.
2. The rows must be updated often enough (for example, each row is scanned about 30–40 times per second), to avoid display flicker.



For ex: consider the character A

Table 1. Display Pattern for the Character A\*

	C0	C1	C2	C3	C4	C0	C1	C2	C3	C4	Data
R0	OFF	OFF	ON	OFF	OFF	1	1	0	1	1	0x1B
R1	OFF	ON	OFF	ON	OFF	1	0	1	0	1	0x15
R2	ON	OFF	OFF	OFF	ON	0	1	1	1	0	0x0E
R3	ON	OFF	OFF	OFF	ON	0	1	1	1	0	0x0E
R4	ON	ON	ON	ON	ON	0	0	0	0	0	0x00
R5	ON	OFF	OFF	OFF	ON	0	1	1	1	0	0x0E
R6	ON	OFF	OFF	OFF	ON	0	1	1	1	0	0x0E

Note: \*0 = LED ON; 1 = LED OFF.

the data array for character A (ASCII value = 0x41) is:

```
{ 0x1B, 0x15, 0x0E, 0x00, 0x0E,
0x0E, 0x0E }
```

Similarly the data array for every alphanumerical and special symbol character is made and used in the codes. Sample coding is shown below which can be modified as required.

```
#include<reg51.h>
void delay(void);
void main()
{
int p,q,x,o,ii,jj,k,l,s,len;
unsigned char a[6],msg[]="welcome to ETC",m; //message
char dr[36],r; r=0; q=0;
while(msg[q]!='\0')
{
len++; q++;
}
while(1)
{
k=0; for(ii=0;ii<11;ii++)
{
for(jj=0;jj<=5;jj++)
{
dr[k]=0; k=k+1;
}
}
for(x=0;x<len;x++)
{
m=msg[x];
switch(m)
{
case 'A': a[0]=0x1B; a[1]=0x15; a[2]=0x0E
a[3]=0x00; a[4]=0x0E; a[5]=0x0E
```

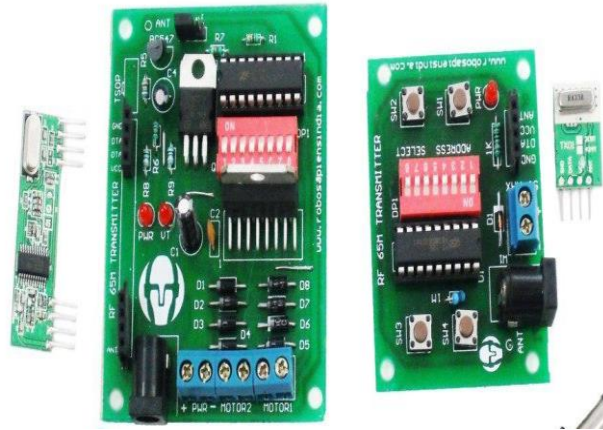
and similarly cases are added for other characters.

#### D. RF Transceiver

The message to be displayed is written on the software based user interface in the PC. The string message is sent to any of the com port (RS 232) where the RF transmitter is connected. The RF transmitter serially decodes the ASCII codes into binary and sends it in a particular frequency band to the receiver.

RS-232 voltage levels, logic 1 varies from -3 to -15 volts and logic 0 from +3 to +15 volts. The microcontroller which works on TTL logic levels, logic 1 is +5 volts and logic 0 is 0 volts. Therefore to interface the two we use a MAX 232 driver IC manufactured by Maxim.

The receiver is connected to the microcontroller unit at the LED matrix. This receiver fetches the serially sent data from the transmitter and gives it to the microcontroller wherein the decoding takes place and the desired message is displayed on the LED matrix.



### E. PC INTERFACE

The PC interface should provide user with the message window where the input message is sent to the RF transmitter on the COM port. This interface can provide with the data baud rate and the transmission format of the message to be displayed on the LED matrix. Some examples of such interfaces are the hyperterminal or the putty which provides such features.

### III. CONCLUSION

The desired messages to be displayed on the LED matrix are written on the software interface in the PC and this message is transferred using wireless technology and is eventually obtained on the LED matrix. Thus we are using modern technology nowadays to replace conventional display boards and further innovative modifications like the GSM and the android app interface can make this system even more user friendly and popular.

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