

Scrolling Led Matrix Display

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Abstract— A 5x7 matrix LED Display board with 8051 microcontroller has been designed. The LED's are connected like a matrix with 7 rows of 5 LED's per each row is designed on a board to display. For a 5x7 LED matrix, it is impractical to assign one I/O pin per LED, as a 5x7 matrix requires 35 I/O pins. These characters are switched continuously with a delay of 05msec. This design can be extended to number of units by using shift registers to display a message consisting of many numbers of characters. By controlling the data bits connected to the LED's, we can display any character. The 5x7 LED matrix display with 35 LED's are arranged in 7 rows and 5 columns structure. The program required for displaying character 'A', 'B', 'C', etc. on the LED matrix, with a delay between each character display has been developed in software keil uvision4. The program code is written in to the keil uvision4 and burn into AT89c51 microcontroller and is verified by interfacing the microcontroller pins for any given character, a corresponding pattern of LED is generated and is used to display the character at run time. The application and advantages that can be used at public transport places like bus stop, railway station, and airport.

Key words: LED, Display, Matrix, Controller

I. INTRODUCTION

Visual impact is most effective mode of influencing human's minds main aim of advertisements etc. a display device serves this purpose. A display device is a device for presentation of information for visual reception, acquired, stored, or transmitted in various form.[1]. The display device is use to display the information on machines, clock, railway departure indicator and many other devices require a simple display of limited resolution. The display consist of a matrix of lights or mechanical indicator arranged in rectangular configuration (other shapes are also possible) such that by switching on or off the text or graphics can be displayed. Our initial goal was to create a display that would be useful and interactive in order to attract attention. [2]

In the development of our main goal, the modular LED array, we found that we would be dealing with three major components, Integrated circuits consisting of microcontroller, resistor array, and LED driver. Printed circuit board technologies, as well as software involved in their design. Programming in c language to drive the microcontroller and scan through individual row of LED's with the data needed to produce a message. For moving a message on display we design a A dot-matrix display contains 5x7 dots (LED's), the LED's are connected like a matrix with 7 rows of 5 LED's per each row and a matrix is designed on a board to display characters. LED dot matrices are very popular means of displaying information as it allows both static and animated text and images.[3] Perhaps, you have encountered them at gas stations displaying the gas prices, or in the public places and alongside highways, displaying advertisements on large dot matrix panels. [1]

II. PROPOSED MODEL

Light emitting diodes (LED's) provide a cheap and convenient way to display information electronically.[4] (LED's) are tiny light sources that are illuminated solely by the movement of electrons in semiconducting materials. They emit light when forward-biased, fit easily into an electrical circuit, and are durable. LED's are often arranged in patterns to display information.

The seven-segment configuration of an led arranged in the form of the digit 8 can be restrictive in that it does not adequately allow the display of some alphanumeric characters. by contrast, the versatility of a led dot-matrix arrangement allows an led unit to display complicated shapes.[5]

Let's have a discussion about LED scrolling display with circuit diagrams. Scrolling LED display can be implemented in various methods [6]. Two methods are widely in use, first one is decade counters and another one using shift registers. The shift register is easy to implement for beginners, let's discuss about led using shift registers.

The microcontroller (89c51) is programmed to generate different patterns on the LEDs. Microcontroller is connected to 74hc595 (shift register)(1)and shift registers are further connected with anodes of led matrix column wise(1st column is connected with 1st shift register and next columns are with next shift registers) i.e. each column of led matrix is operated by different shift registers and cathodes of all led's are common ground as shown In circuit diagram.

Following are the points how scrolling led matrix display works

- When microcontroller gets supply than it give signal to the shift register(1) according to program.
- By getting signal from 89c51 shift register(1) glow 1st column of led matrix according to program pattern that is programmed in 89c51
- Now a next shift register(2) is connected with the previous shift register(1), shift register(1) passes the signal to shift register(2) after some delay that provided in the program
- Than the shift register(2) activates the 2nd column of matrix and glow led's of 2nd column according to signal received from shift register(1)
- Signal reception by shift register(1) from 89c51 will continuous upto 89c51 get supply And shift register(1) also give signal(that it is received from 89c51) to next shift register(2) continuously
- There are 20 shift registers used in the project .all are serially connected one by one .
- So, similarly all the shift registers gets the signals from their previously connected shift register and operate each column of led matrix And shows the pattern according the program on the led matrix

A. Hands on Steps for LED Display

- STEP1: Select the tools from the box required for making project.

1) Required Tools

- Multimeter: Used during testing
- soldering wire
- soldering iron
- flux
- Wire cutter
- Tweezer
- STEP 2: Select the components required for project.

2) Required Components

- 89C51 controller
- Reset circuit
- Resistors
- Shift registers(74HC595)
- LED's
- IC base's (16 pin,40pin)
- 2 pin connector
- PCB
- STEP 3: Take a 40 pin IC base and solder it on the PCB
- STEP 4: Take a resistor,capacitors,crystal oscillator and solder these on PCB and then connect with 89c51 in the form of reset circuit as shown in below diagram .Also connect two pin connector on PCB by soldering and at one side connects the ground(-ve) part of whole circuit and other side +ve or V_{cc} of whole circuit[7]

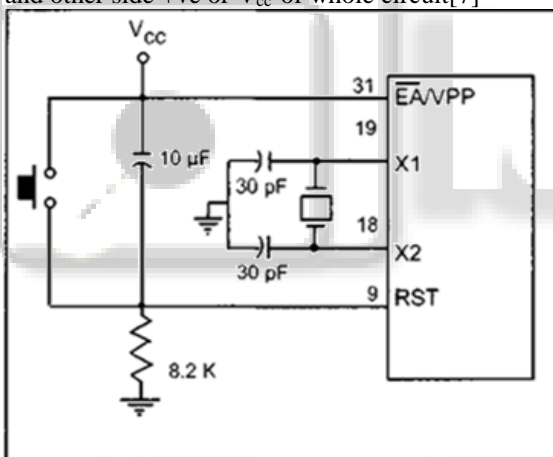


Fig. 1: Connection diagram of Crystal oscillator

- STEP 5: Take led's and solder it in form of 5*7 matrix. -ve side of each led connect with ground
- STEP 6: Take 16 pin IC base and solder it. This IC base is for 74hc595 shift register. 11th, 14th, 12th pin of this base is connect with the 1st, 2nd, 3rd pin of 89c51
- STEP 7:Connect Vcc and ground circuitry of this IC according to circuit diagram
- STEP 8:Connect the anode of LED's to shift register as shown in circuit diagram
- STEP 9: Similarly connects all the shift register's IC base in same form as shown in circuit diagram to each column of led matrix
- STEP 10: Burn program in 89c51 microcontroller using burner and place it in 40 pin IC base
- STEP 11: Also place all shift registers in the 16 pin IC's sockets

- STEP 12: Connect the power supply by using 2 pin connector

B. Block Diagram

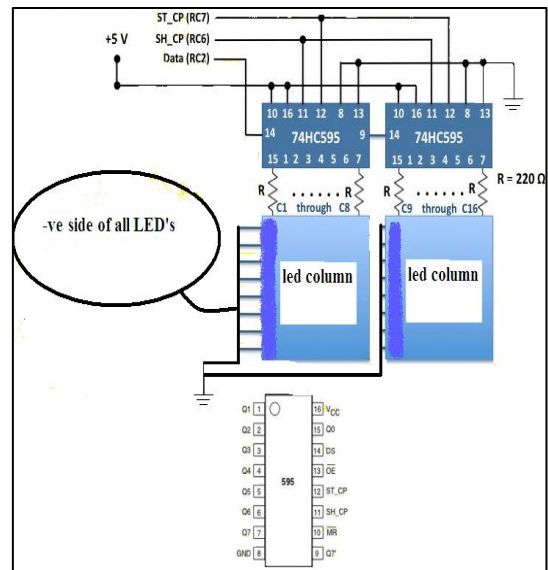


Fig. 2: Block Diagram of scrolling Display

C. Major Building Blocks of the Project

- 1) Regulated Power Supply.
- 2) 89C51 Microcontroller.
- 3) Shift registers (74HC595)
- 4) LED's
- 5) Reset Circuit

D. Proteus Design

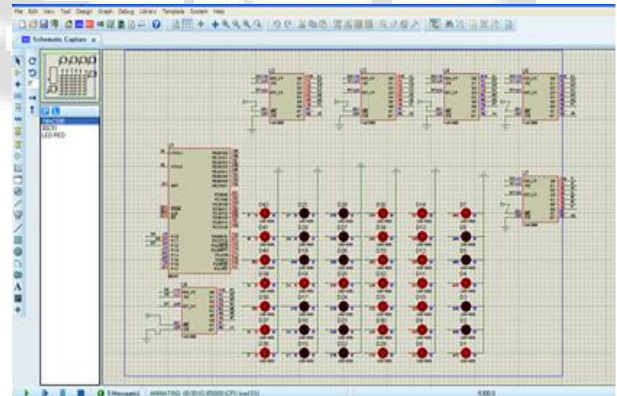


Fig. 3: Snapshot of Proteus circuit diagram

III. RESULTS

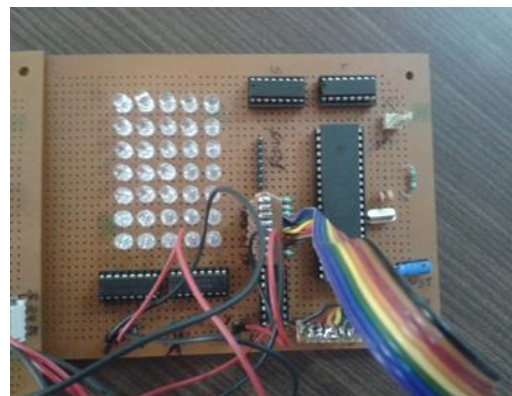


Fig. 4: Final part-1 of hardware design

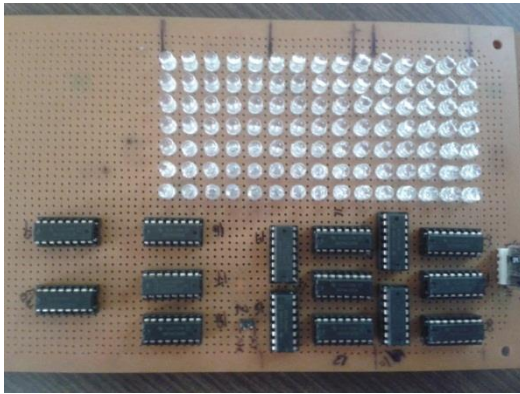


Fig. 5: Final part-2 of hardware design

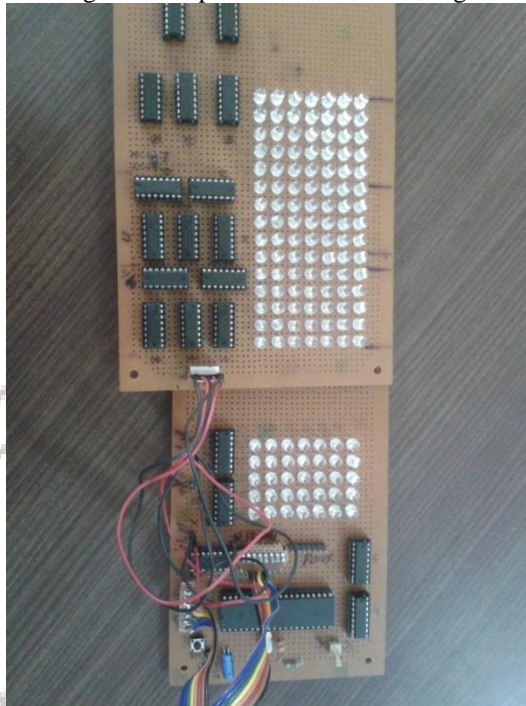


Fig. 6: Final model of Scrolling LED

IV. APPLICATIONS

A. Educational Institutions and Organizations

Currently we rely on putting up papers on notice boards to inform people of events. This method can be discarded by using scrolling led matrix display to display information in real time.

B. Crime Prevention

Display boards put up on roads will display tips on public security, accident prevention, information on criminals on the run. The board will help flash messages such as vehicle thefts as and when they occur. [7][8]

C. Managing Traffic

In cities we frequently come across traffic jams. One way to avoid this would be inform people before hand to take alternate routes. A scrolling led matrix display serves well for this purpose.

D. Advertisement

In shopping malls we get to hear the offers on various products from time to time. Instead we continuously display

the information regarding the products and related offers on electronic display boards[1]

E. Railway Station

Instead of announcing the delay in arrival of trains we can display the information.[3]

V. CONCLUSION AND FUTURE SCOPE

Scrolling 5x7 matrix LED display has been successfully made with the help of 8051 microcontroller. This model can be used in future in extended version to display larger messages & News. Also in future development we can use GSM technology to receive the data from remote location.

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