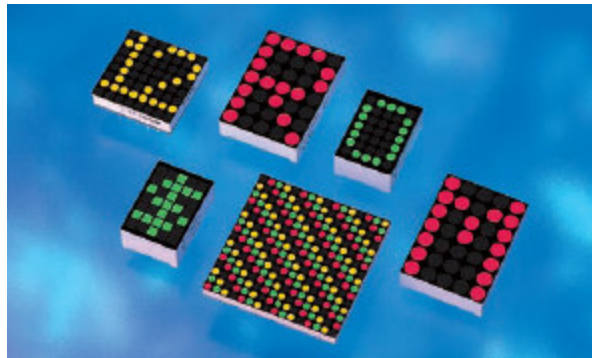


# **ECP2036**

## **Microprocessor System & Interfaces**

### **Assignment - Design Tips**

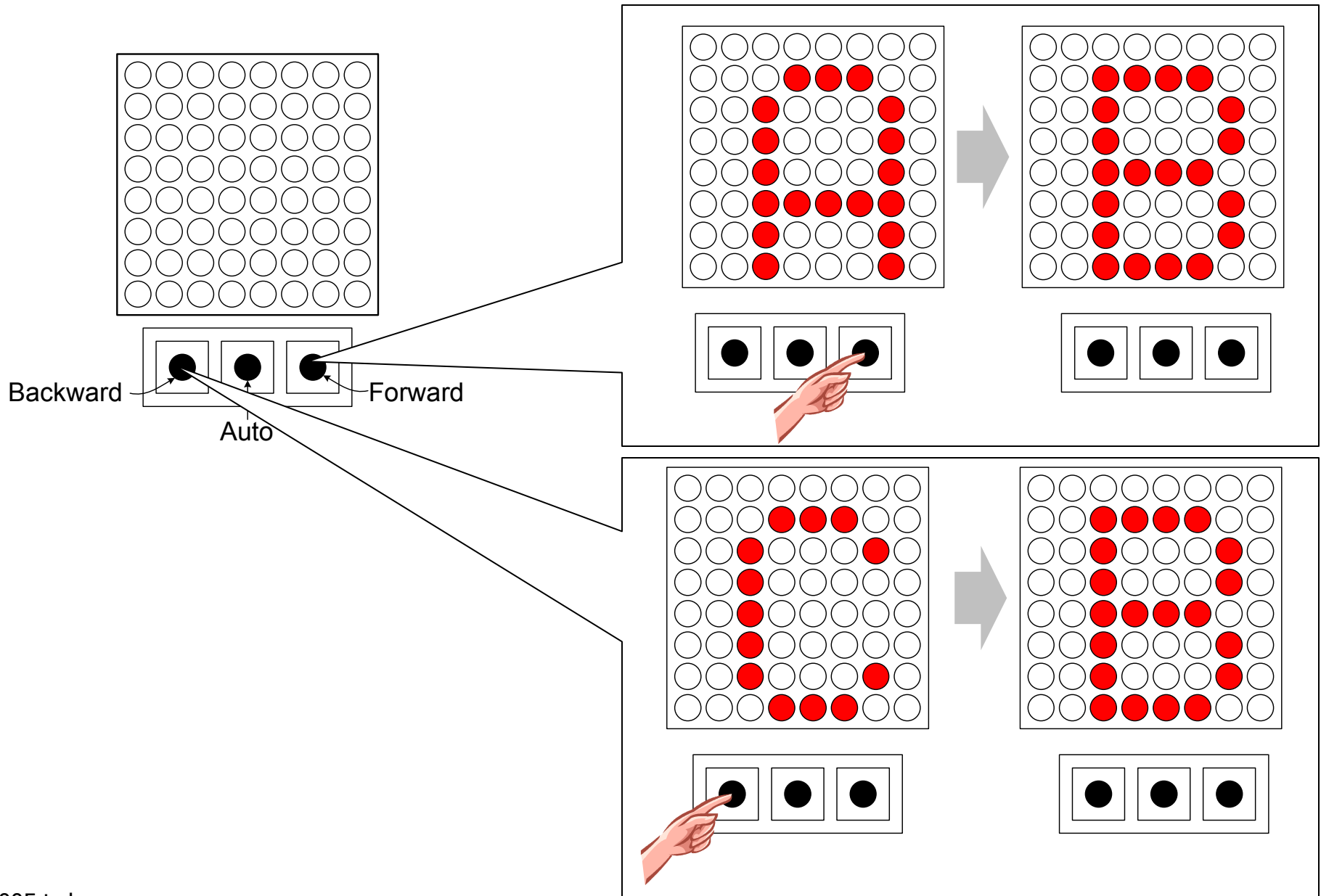
## **A Programmable LED Dot Matrix Display System**

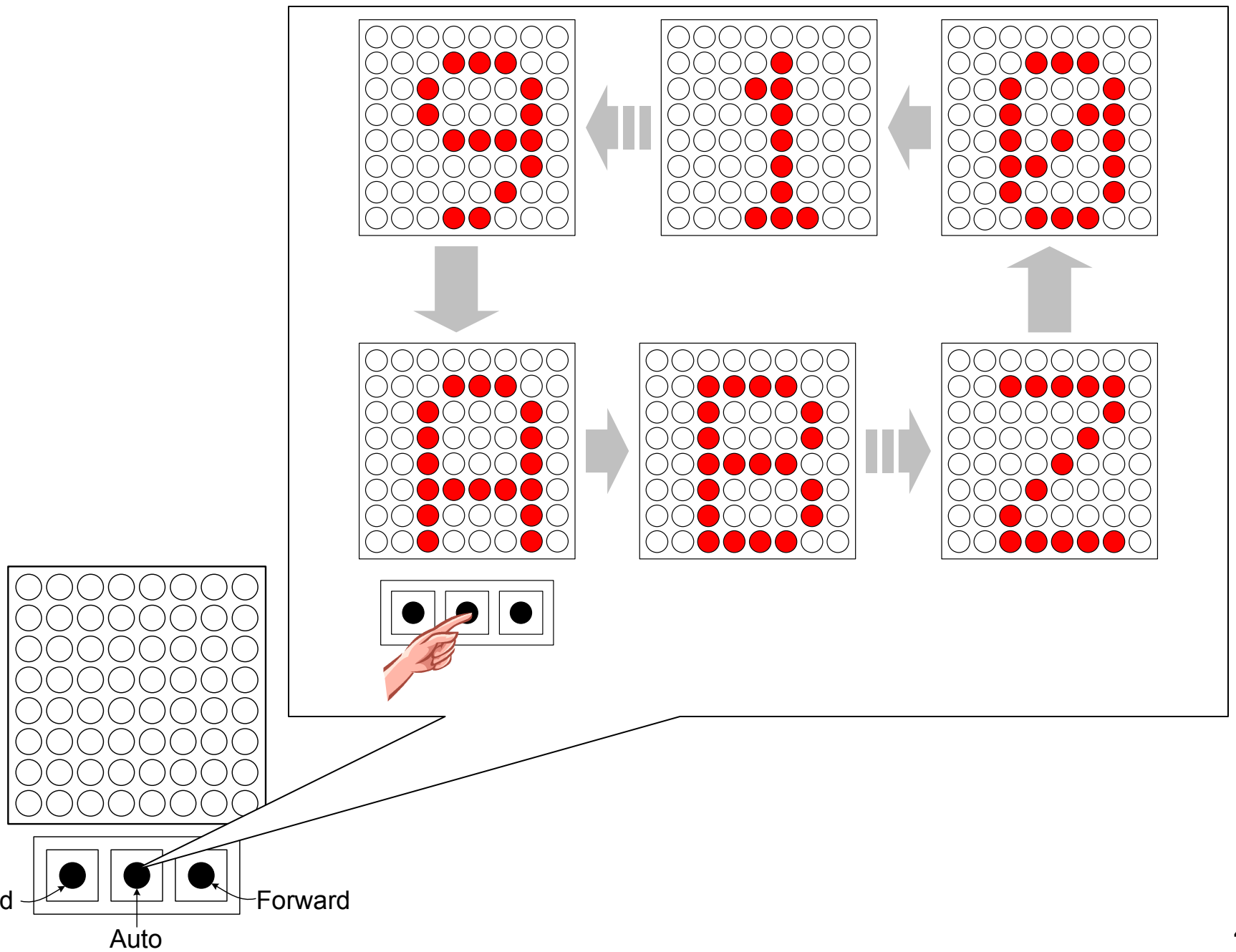


# Basic Requirement

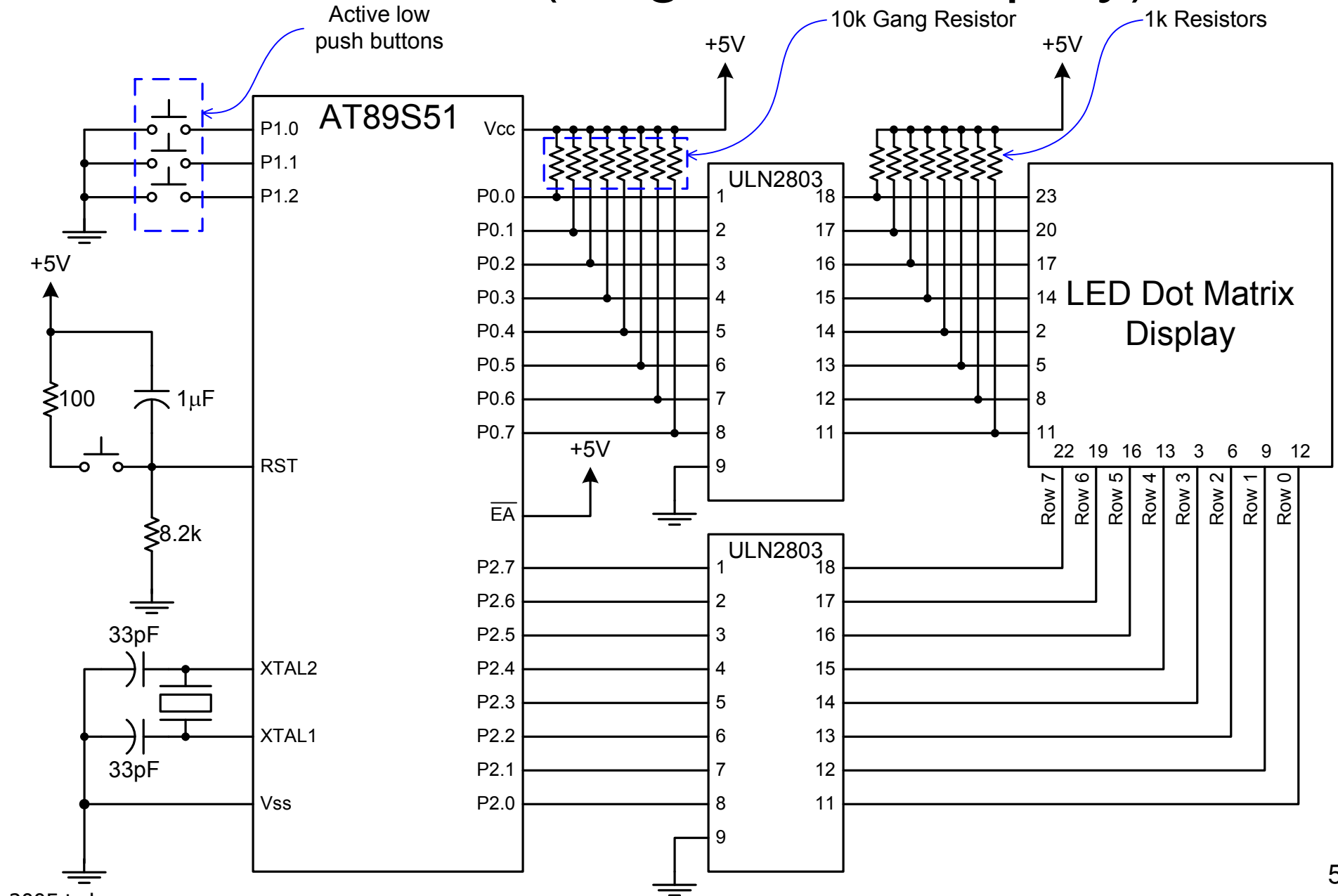
- The system should be able to display basic alphanumeric characters (numeric digit 0 to 9 and 26 alphabets [upper + lower cases]) in single color
- The circuit should consist of 3 buttons for 3 basic operations:
  - i. Forward to display the next character
  - ii. Backward to display the previous character
  - iii. Auto for automatically displaying the characters sequentially
- Extra marks will be given for additional features such as:
  - i. Display simple graphics or symbols
  - ii. Dual color display
  - iii. Animation or effect (scrolling & etc.)
  - iv. Interactive application (game and etc.)

# Basic Operations





# Schematic (single color display)



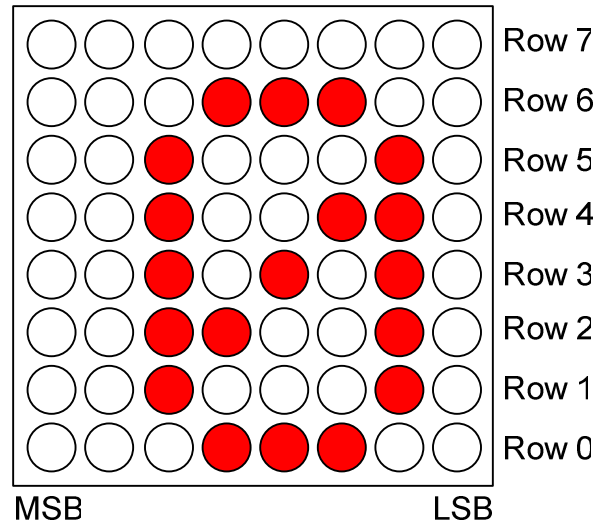
# Sample Program

```

; Show character '0' at high refresh rate such that human eyes treat it as static display
NUMBER EQU 625 ; lower value for higher refresh rate
ORG 0000H
MAIN: MOV R1, #01H ; enable Row 0
      MOV R2, #0
      MOV R3, #0 ; counter for row position
      MOV DPTR, #RED0 ; go to RED0 table
ROW:  MOV A, R3 ; load row position into A
      MOVC A, @A+DPTR ; load row data into A
      MOV R2, A ; store in R2
      MOV P0, R2 ; output to red LEDs
      MOV P2, R1 ; controlling the row
      ACALL DELAY
      MOV A, R1 ; restore the enabled row into A
      RL A ; select the next row
      MOV R1, A ; enable the next row
      INC R3 ; increment row counter
      CJNE R1, #01H, ROW ; continue until all 8 rows have been displayed
      MOV R3, #0 ; reselect the first row
      SJMP ROW ; keep displaying the character
DELAY: MOV TMOD, #01H
      MOV TH0, #HIGH(-NUMBER)
      MOV TL0, #LOW(-NUMBER)
      SETB TR0
      JNB TF0, $
      CLR TF0
      RET
RED0: DB 0E3H, 0DDH, 0CDH, 0D5H, 0D9H, 0DDH, 0E3H, 0FFH
      END

```

# Coding the characters



For character “0” (active low), it is coded as:

Row 0	Row 1	Row 2	Row 3	Row 4	Row 5	Row 6	Row 7
E3	DD	CD	D5	D9	DD	E3	FF

# Sample of dot matrix characters

A B C D E F G H I J K L M N O  
P Q R S T U V W X Y Z  
a b c d e f g h i j k l m n o  
p q r s t u v w x y z  
0 1 2 3 4 5 6 7 8 9