LED dot matrix display.

An LED dot matrix display consists of a matrix of LED’s arranged in a rectangular configuration. The desired character or graphics can be displayed by switching ON /OFF a desired configuration of LED’s. Common display configurations available are $7 \times 5$, $8 \times 8$, $7 \times 15$, etc. LED dot matrix can be used in simple display applications where the resolution is not a big concern. The figure below shows the arrangement of LEDs in a typical $7 \times 5$ dot matrix display.

Any individual LED or a group of LEDs in the matrix can be activated by switching the required number of rows and columns. For example, in the above figure if Row1 is made high and Column1 is made low, the top left LED (address R1C1) will glow. As a demonstration, let’s see how we can display letter “A” using the display. The tables given below show the logic levels at each pin for displaying A.
Quick switching across the columns (~1mS interval) will result in alphabet "A"
In the above diagram you can see that only one LED in a row will be ON at a time but any number of LEDs in a column can be ON at a time. That means the microcontroller’s port pin can directly drive a row but it requires additional circuit for driving the column lines. The circuit diagram for interfacing dot matrix display and 8051 microcontroller is shown below.

Circuit diagram.

ULN2003A driver IC.
The purpose of ULN2003A here is to drive the column lines of the display. ULN2003A is a high voltage (50V), high current (500mA per channel) darlington transistor array. Each IC has 7 channels with individual output clamp diodes. ULN2003A an active high device, which means a logic high must be applied to the input to make the corresponding output high. The input pins are designated as 1B, 2B, 3B, 4B, 5B, 6B, 7B while corresponding output pins are designated as 1C, 2C, 3C, 4C, 5C, 6C, 7C. The pin configuration and simplified internal logic of ULN2003A is shown in the figure below.
ORG 00H

MOV P3,#00000000B        // initializes port 3 as output port
MOV P1,#00000000B        // initializes port 1 as output port

MAIN: MOV P3,#01111110B
      MOV P1,#11111110B
      ACALL DELAY
      MOV P3,#00010001B
      MOV P1,#11111011B
      ACALL DELAY
      MOV P3,#00010001B
      MOV P1,#11110111B
      ACALL DELAY
      MOV P3,#01111110B
      MOV P1,#11101111B
      ACALL DELAY
      SJMP MAIN         // jumps back to the main loop

DELAY: MOV R6,#255D     // 1ms delay subroutine
       HERE: DJNZ R6,HERE
       RET

END

Source : http://www.circuitstoday.com/interfacing-dot-matrix-led-display-to-8051