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LED Matrix Tutorial

An LED Matrix is a 2-dimentional array of LEDs. It is used for display purposes, with each LED acting as an individual pixel.

Structure of Led Matrix:

In a matrix format LEDs are arranged in rows and columns. You can also think of them as y and x coordinates. Let's assume we have 4×4 matrix. Rows would be marked from A to D and columns from 1 to 4. Now we can address each LED by row and column. Top left led would be (A,1). Bottom down led would be (D,4).

Led matrices come in two flavours. Common-row anode (left) and common-row cathode (right).

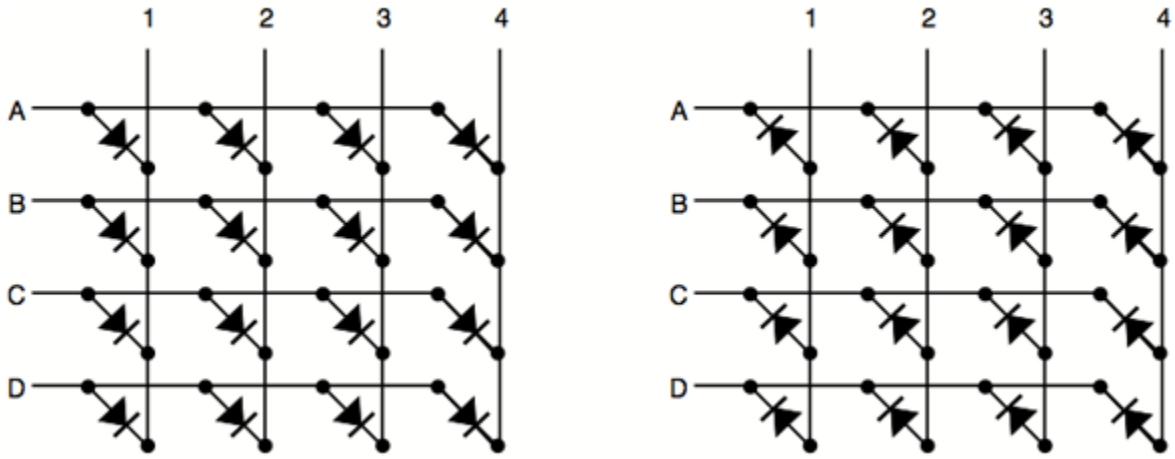

Figure above shows the different configurations. The difference between these two configurations is how you lit a led. With common-row anode current sources (positive voltage) are attached to rows A..D and currents sinks (negative voltage, ground) to columns 1..4. With common-row cathode current sinks are attached to rows A..D and currents sources to columns 1..4.

For example. To light bottom down led (D,4) of common cathode matrix you would feed positive voltage to column 4 and connect row D to ground.

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In the common-row cathode type itself, let's say that we want to glow more than 2 LEDs (A,1) and (D,4). Then we will supply 0 to A and D, and +5V to 1 and 4. But then, you will find that unintentionally (A,4) and (D,1) will also glow. The following section describes how to sort this problem out.

Multiplexing and Persistence of Vision:

Multiplexing can be used to display arbitrary patterns with led matrices. Multiplexing is sometimes also called scanning. It scans rows (usually from up to down) and lights needed leds only in one row at time. Something like following:

1. Start by having everything disconnected.
2. Connect positive voltage all the needed columns.
3. Connect row to ground. This lights the needed leds in the row.
4. Disconnect the row and all columns.
5. Do the same steps one by one to all rows and then start from the beginning.

Do this slowly and you would see blinking LED rows. Do it really fast and human eye can see the whole pattern. Phenomenon is called persistence of vision.

Note: The tutorial has been extracted from the following website:

http://www.appelsiini.net/2011/how-does-led-matrix-work

(Visit the link for more information or for sample codes)