48 X 8 Scrolling LED Matrix Using Arduino

by kksjunior

Hello all!

This project is about making a 48x8 Programmable Scrolling LED Matrix using an Arduino UNO and 74HC595 shift registers. This was my first project with an Arduino development board. It was a challenge given to me by my teacher to try to build one. So at that time of accepting this challenge, i didn't even knew how to blink an LED using an arduino. So, i think even a beginner can do this with a little bit of patience and understanding. I found the circuit diagram online and that was my only reference to build this project. I started off with a little research about shift registers and multiplexing in arduino.

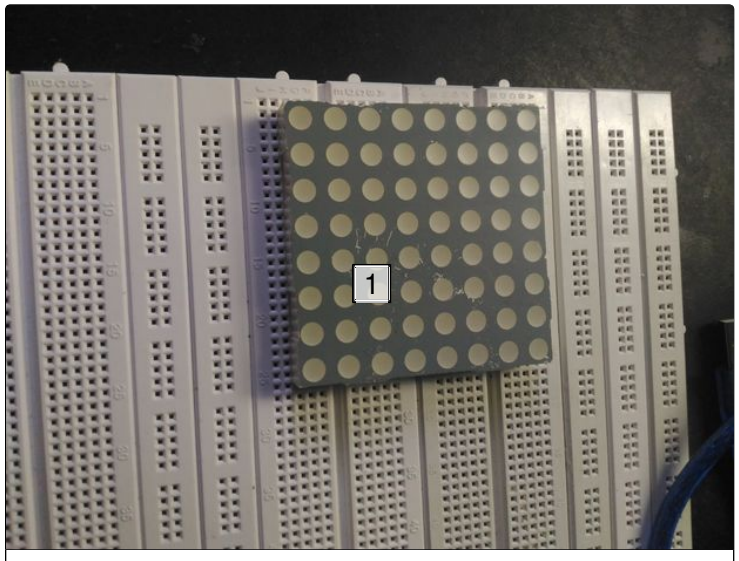
Step 1: Gathering the Tools & Components.

Components

- 1. Arduino Uno R3 - 1
- 2. 74HC595 8 bit Serial to Parallel Shift Registers. - 7
- 3. BC 548 Transistors - 8
- 4. 470 Ohms Resistors - number of columns + 8
- 5. Pref Board 6x4 inches - 4
- 6. Color coded wires - As required
- 7. IC holders - 7
- 8. 5 mm or 3 mm 8x8 common cathode mono color LED Matrix - 6
- 9. Male and Female Headers - As required.

Tools Required

- 1. Soldering kit
- 2. Multimeter
- 3. Glue gun
- 4. De-soldering pump
- 5. 5V Power Supply



1. I built the matrix using 5 mm Red color common cathode 8x8 LED matrix. Got this from an online store.

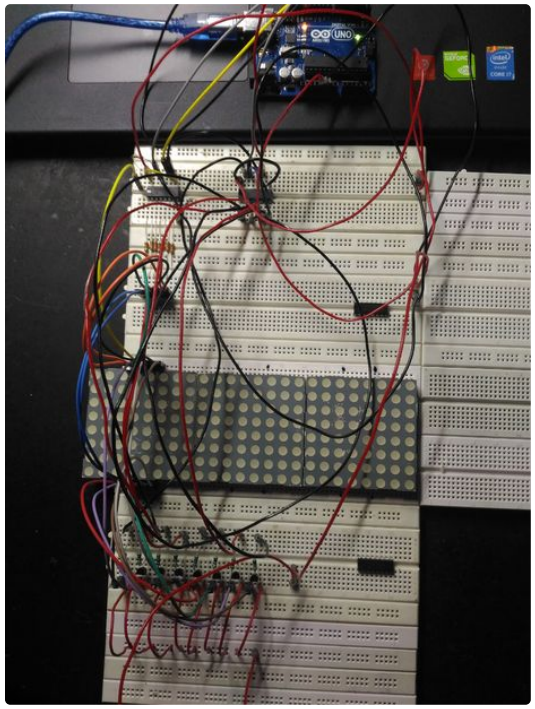
Step 2: Building on Breadboard

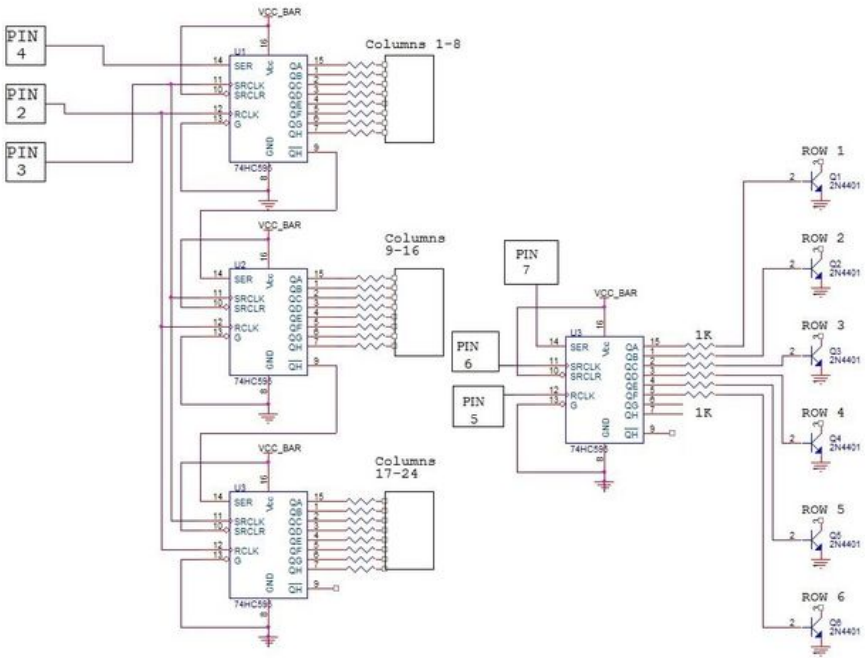
Making the Prototype.

The first thing you must do before building the prototype is to draw a pin diagram of your 8x8 matrix and mark a reference point for identifying the pins in all your matrices. This might help you while assembling the circuit.

It's shown in the circuit that a single shift register is used to control the 8 rows and for controlling the columns, we use one shift register for each 8 columns.

So if you are able to make a simple 8x8 matrix, you can simply just replicate the portion of the circuit for the column control and extend the matrix to any number of columns. You just need to add one 74hc595 for every 8 columns (one 8x8 module) you add in to the circuit. Keeping that in mind, i made my 8x8 prototype.





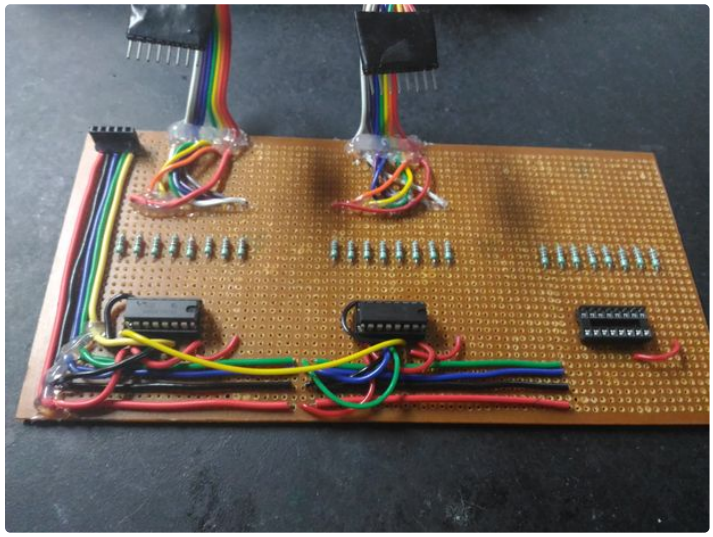
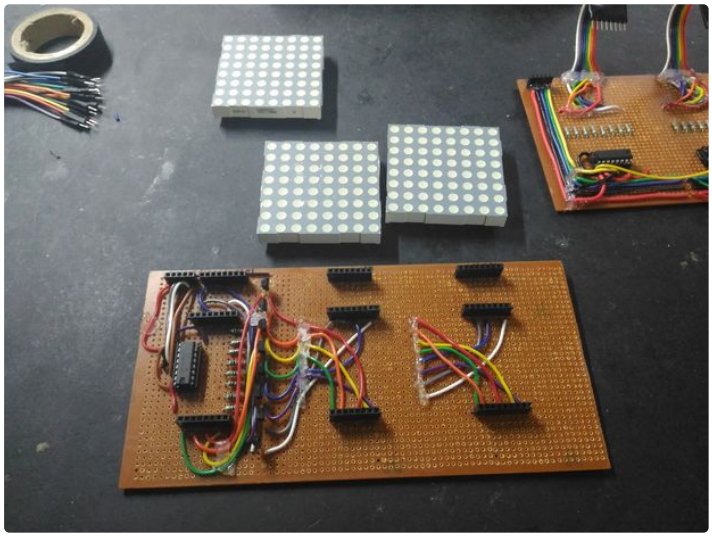
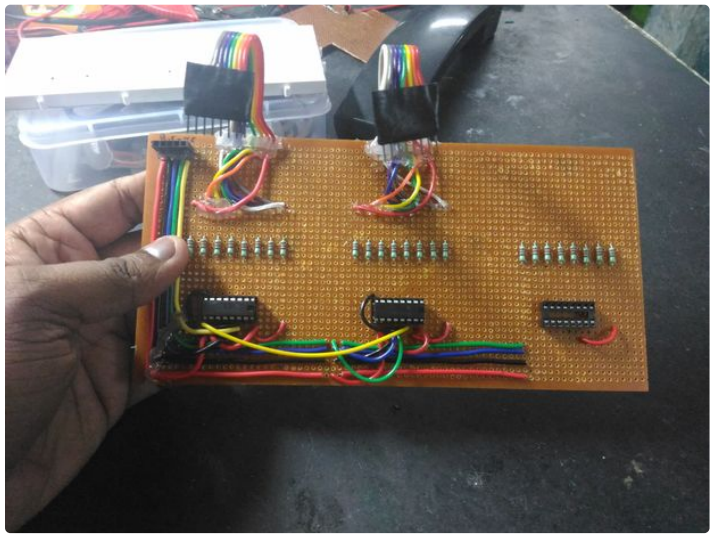
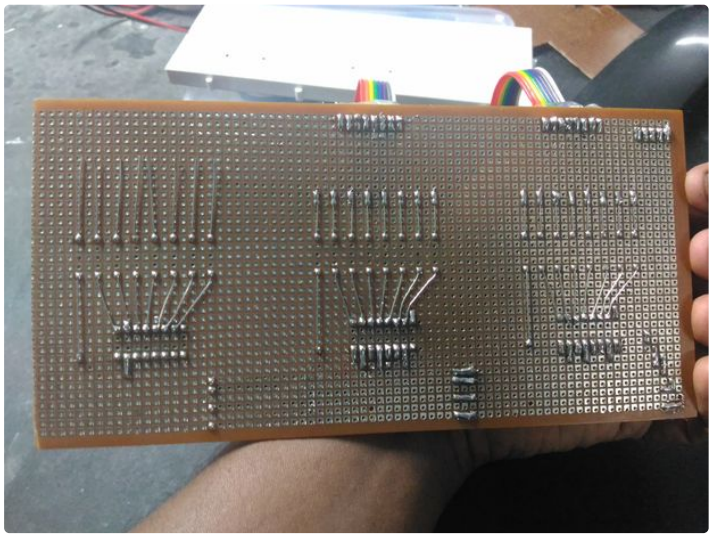
Step 3: Making the Row and Column Control Boards.

It's better to take separate dot boards for the row and column controls and extend wires and headers to connect them together. Otherwise if you are good at PCB designing, you can make a smaller custom PCB as well.

Be sure to put a 470 ohms resistor to every pin leading to the matrix.

Refer to the circuit diagram to get a clear idea.

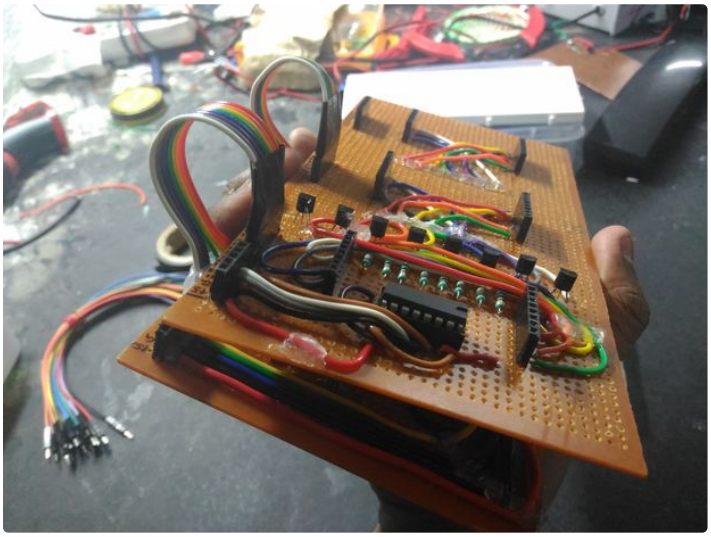
Once you've successfully made an 8x8 matrix you just need to daisy-chain more shift registers with common clock to drive the columns. it just need a single 74HC595 to drive all the rows. So based on the number of columns, more shift registers can be added, there is no limit for the number of columns you can add in to this matrix.

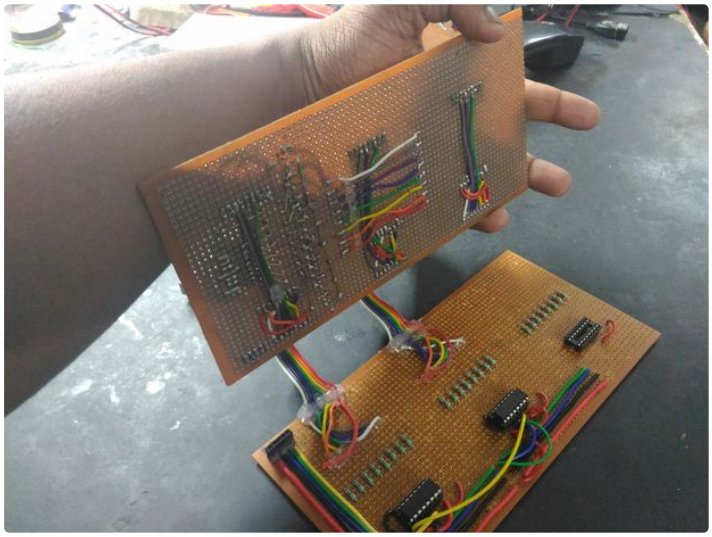





Step 4: Connecting the Row and Column Control Boards.

As we've made separate boards to put the shift registers for the row and column controls, we need to now extend wires from one board to the other. In my case, the upper board is for controlling the rows and the board in the bottom is for controlling the columns.

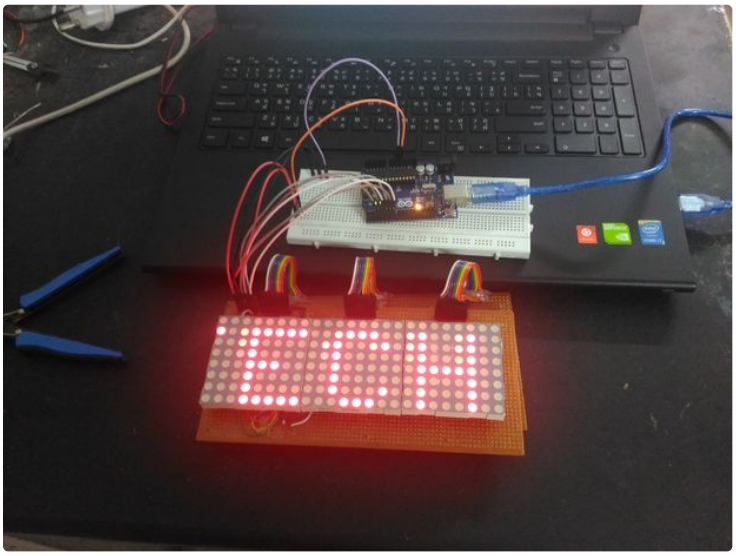
Each shift register is used to feed 8 columns, so each 8x8 matrix's column pins are connected to the column control board using wires. Later i changed them all to headers for more compactness.





Step 5: Testing the Finished First Half.

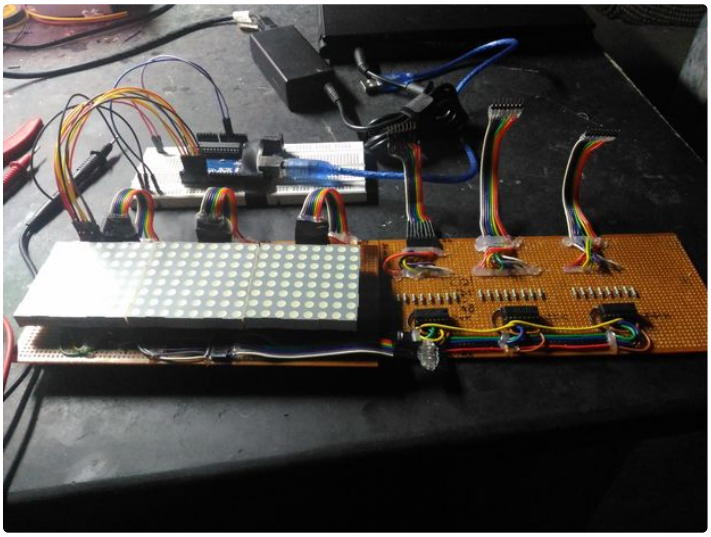
Once you've successfully made a smaller matrix, you just need to add more shift registers and extend the same circuit for column control to add more columns to the matrix.

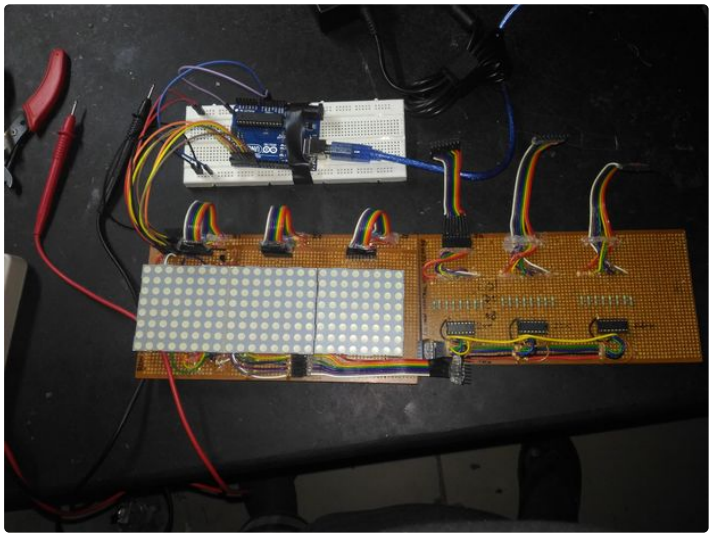


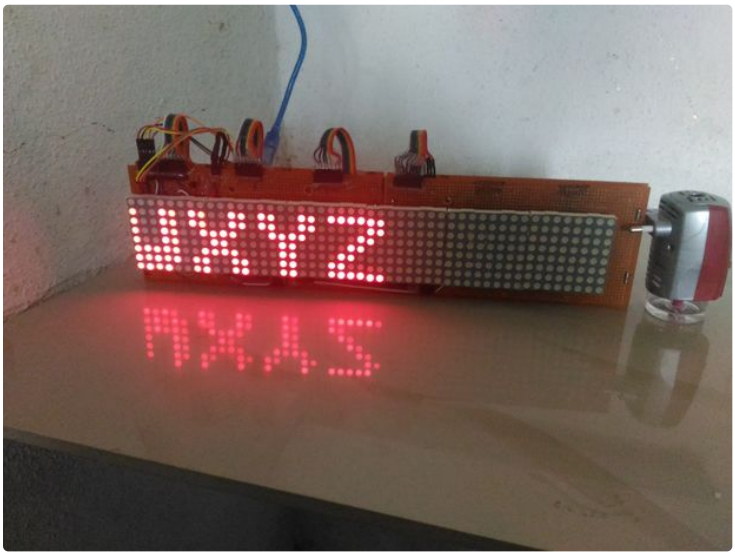
Step 6: Building the Second Half.

Extend the same column control circuit.

Daisy chain the shift registers with common clock pins to add more columns.







Step 7: The Result

It's always better to design a custom case using Fusion 360 or any other 3D design tool and 3D print the case. As i didn't had access to 3D printing at that time, i approached a carpenter to make a wooden case for this project. The case he made was a bit bigger than i expected but still looked neat and had holes for connecting the power and usb cable.

Video - Part 1

Video - Part 2

Thank you! :)

https://www.youtube.com/watch?v=UeCKvJZpWeY&index=1&list=PLF0SNoOHbfdRgIleQg64EnKHRKEtpLaqF&t=10s