NITK Surathkal

THINK. CREATE. ENGINEER 2018

National Institute of Technology Surathkal Karnataka

Engineer – 2018

LED Cube

By: Aditya S Gourishetty

Abhinandhan Pathak

Parameshwar

NITK Surathkal

THINK. CREATE. ENGINEER 2018

Abstract/Aim of Project:

Making a cube which can show 3d animations using LEDs.

Parts Needed/Used:

- 512 LEDs (extra for making mistakes)
- Thick copper wire for the structure (not too thick)
- Soldering Gun
- Solder wire
- Cardboard
- Multimeter
- Copper board for PCB
- Single Strand wires
- Jumper wires
- IC holders
- PCB drilling machine
- IC 74595
- Arduino UNO

How it works:

The LED cube is made up of columns and layers. The cathode legs of every LED in a layer are soldered together. All the anode legs in one column are soldered together.
Each of the 64 columns are connected to the controller board with a separate wire. Each column can be controlled individually. Each of the 8 layers also have a separate wire going to the controller board.

Each of the layers are connected to a port of an 8-bit SIPO shift register. Each row of the 64-column grid is connected to an

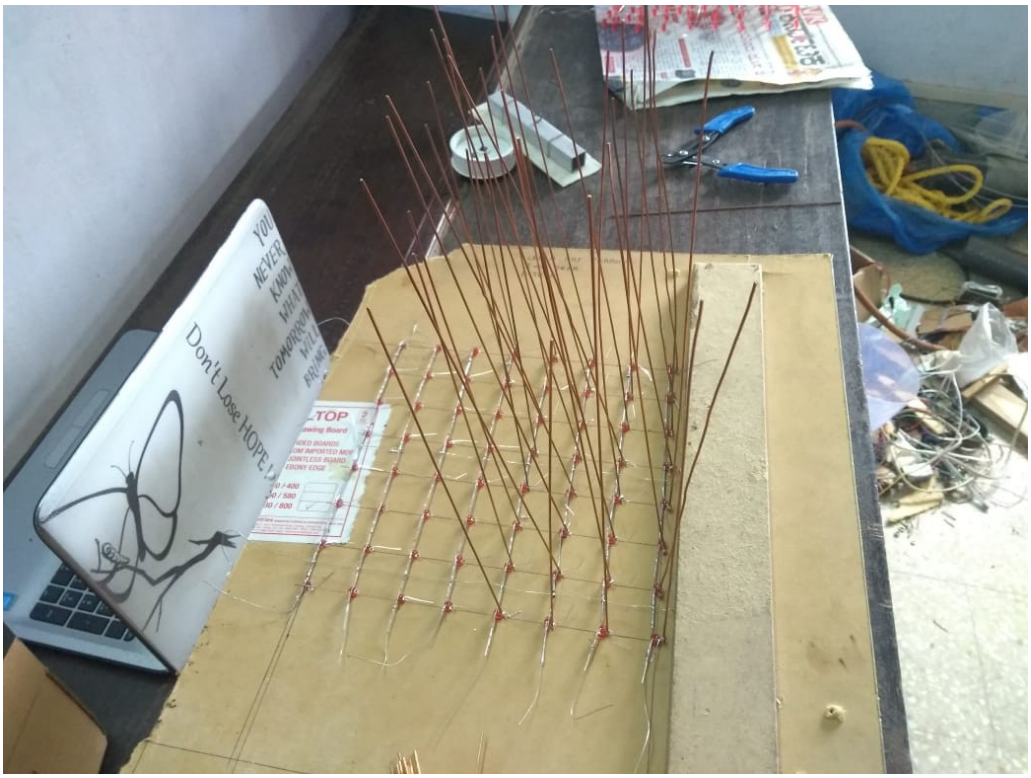
individual shift register which are connected in series. Data is transferred to the shift registers using SPI through Arduino Uno .

Steps:

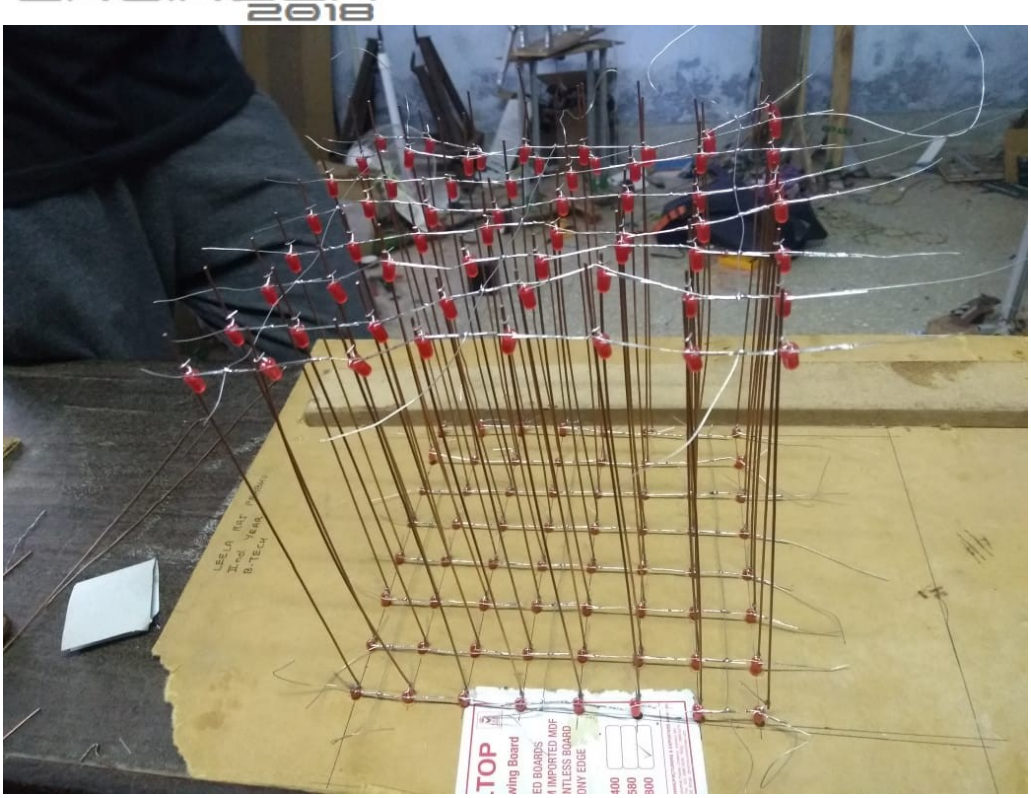
Structure

1. Drill the holes in the cardboard in an 8x8x8 grid for the shape of the base
2. Take the LEDs one by one and bend the cathode to a right angle making sure that the anode is not in line with the cathode
3. Put the LEDs in the holes and using the single strand wires as the connectors, solder the cathodes row by row making sure the anodes are not in contact. Use all the rows in the cardboard as there is always some error.
4. Once all the rows in a layer are done, connect all the rows with 4-5 single strand wires
5. Then using the thick copper wire which is going to be used, make a loop on each of the LED’s anode such that the copper wire could stand up. Make it tight.

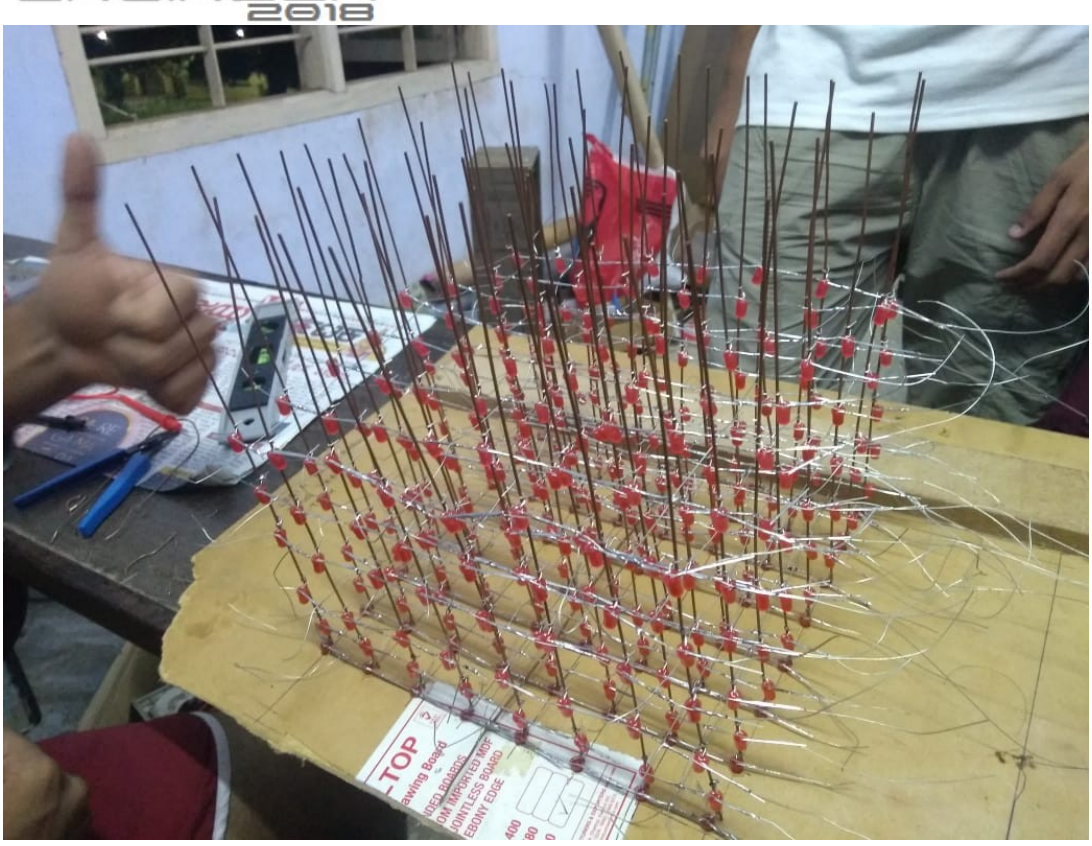
6. Once all the layers are done, make the copper wires stand with one of the layers on the cardboard by solder each anode



7. Stack up rest of the layers and solder each point.



8. Once soldering is done carefully invert the structure on the cardboard and make sure that each column copper wire goes into the correct hole.



9. Solder one wire to each one of the layers' anode and group them. Solder one wire to each one of the column copper wires and group them for each row.

PCB

1. Using EasyEDA prepare the circuit schematic
2. Get the circuit schematic printed on glossy paper(on the glossy side)
3. Cut the Copper plate of the appropriate size for the pcb and scrub the copper side of the plate to remove the oxide layer.
4. To Transfer the PCB print on to the copper plate,invert the glossy paper such that glossy side is on the copper side of the plate and place it on it making sure no air gaps are present.
5. Hold the paper on the copper plate steadily and iron the arrangement without moving for 20-30 minutes.

6. After ironing,place the board in water such that paper dissolves,and remove the paper.
7. Take a plastic box and fill it up with some water.Dissolve 2-3 teaspoons of ferric chloride power in the water.Dip the PCB into the etching solution (Ferric chloride solution, FeCl3) for approximately 30 mins.
8. This process is called Etching. Use pliers to take out the PCB and check if the entire unmasked area has been etched or not. In case it is not etched, leave it in the solution for some more time.

9. Once the board is cleaned, drill the holes in the PCB using PCB Drilling Machine.

Troubleshooting:

1. Check the LEDs with multimeter after and before soldering them every time.
2. If it is possible use thicker wires for the layers too, so that the structure is stable.
3. After the etching is done make sure all the connections are etched properly and if not complete it with permanent marker.

NITK Surathkal

THINK. CREATE. ENGINEER 2018

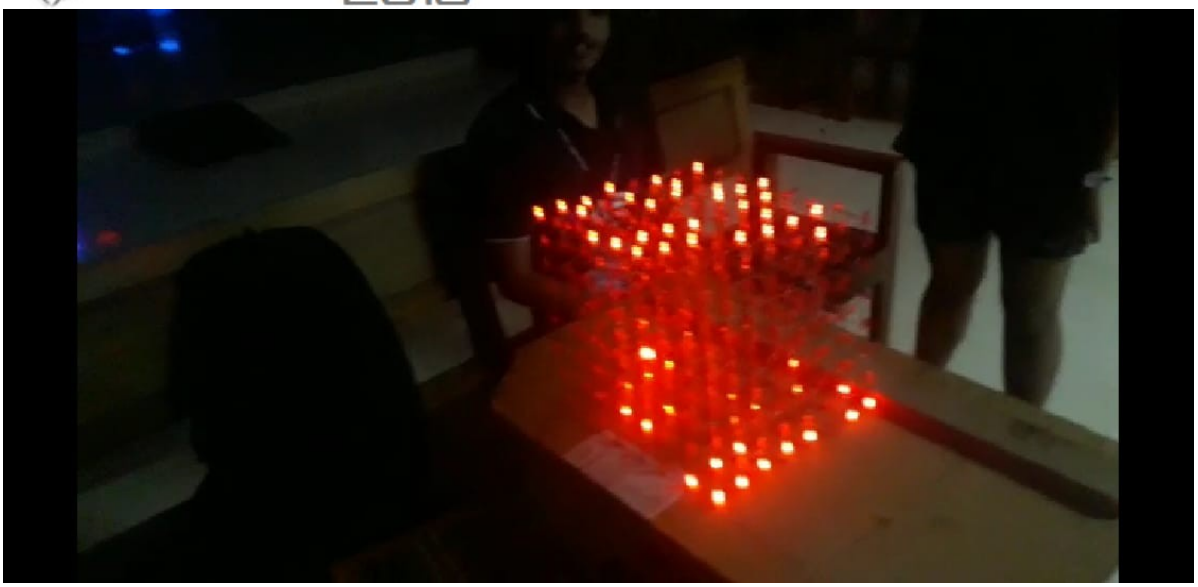
Problems Faced

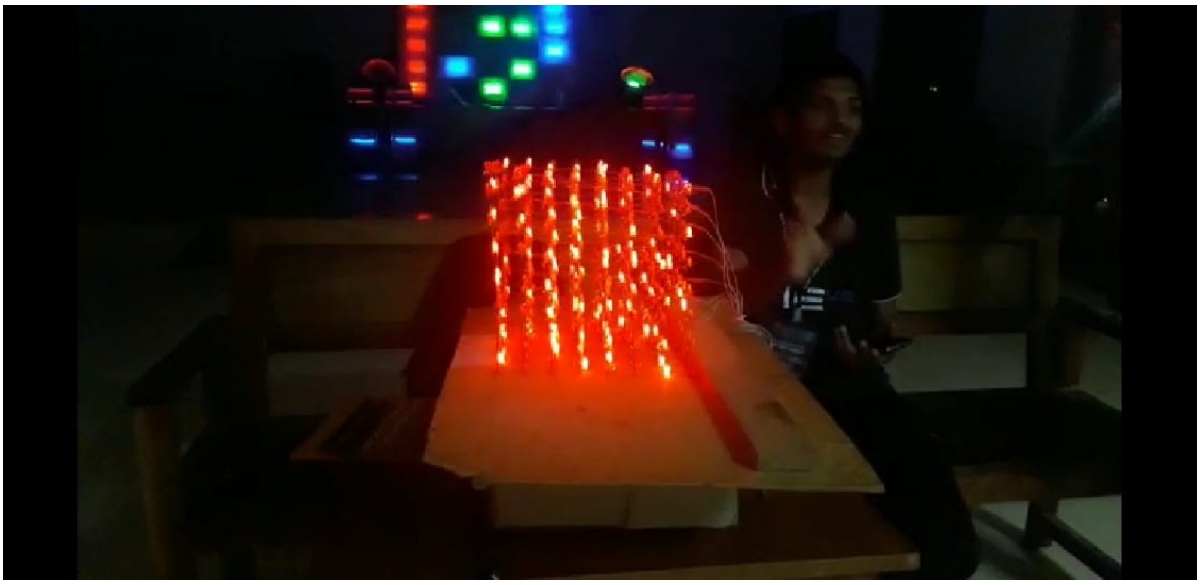
Here feel free to blame on the entire universe if your project didn’t work as expected so that next year people get a head start by not committing the same mistakes.

Demo and Picture

NITK Surathkal

THINK. CREATE. ENGINEER 2018





Link to original repo

Code:- https://github.com/VectStudio/LED_CUBE/

NITK Surathkal