IIT BOMBAY

Project Report

REMOTE CONTROL LED GRID

Submitted to-

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By---

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Introduction

The aim of this project is to design an Arduino device that takes in any characters, numbers, letters etc.as an input and display the same characters, numbers or letters by lighting the LEDs in the same pattern with the help of LEDs, shift register, Arduino uno and a Bluetooth sensor. WE have designed an 8*8 LED matrix for this purpose and an application that is installable in our cell phone to send the input through the Bluetooth module (A simple means of wireless communication).

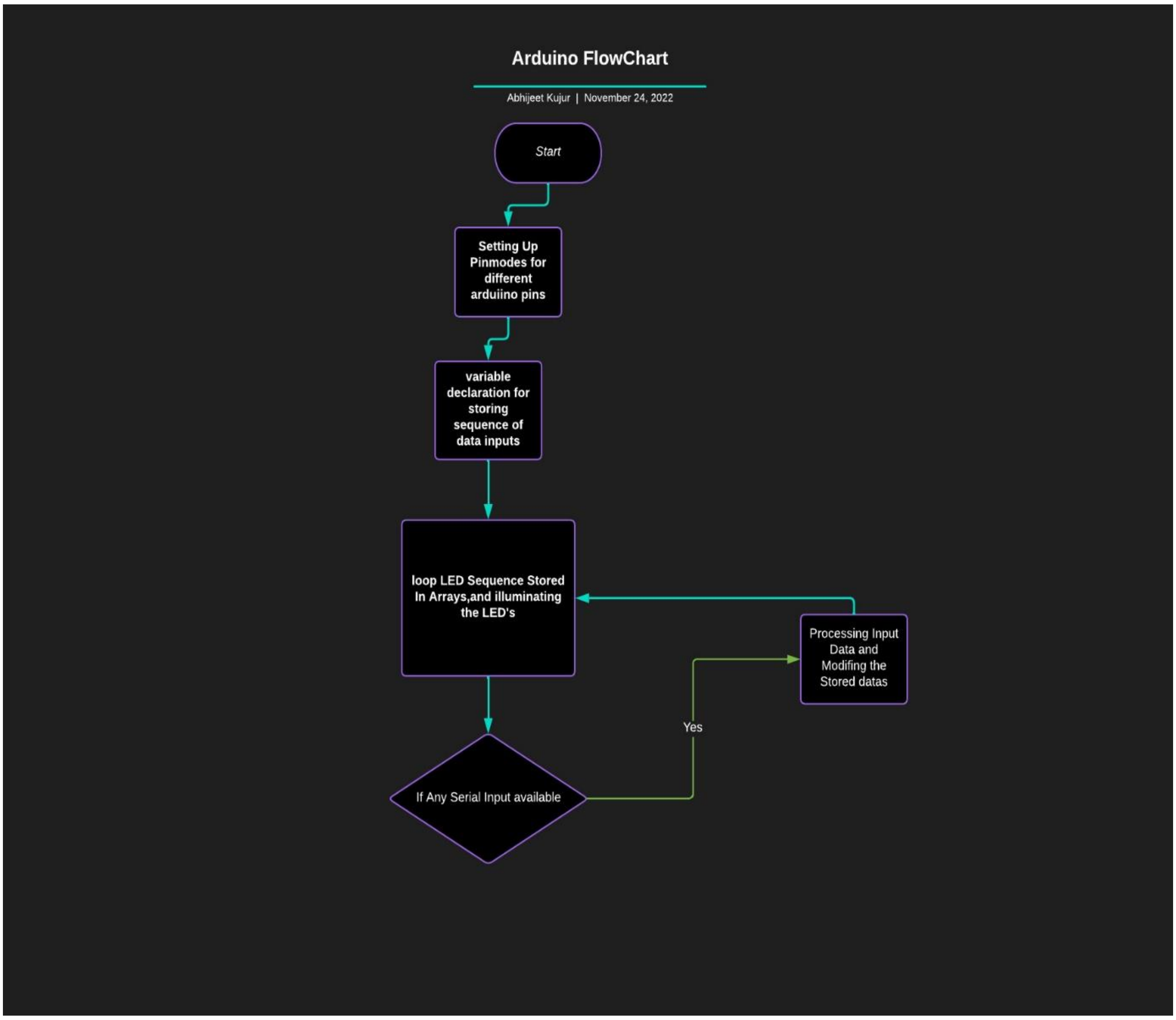
Motivation

The motivation for this project is the sign board, what if we could use the same board for different purposes such as displaying some written information or displaying directions. For example—during orientation program PhD students, Masters students of different disciplines had orientation in different lecture halls, in this kind of situation we can use this device to display both directions along with the information of different disciplines or Degree.

Methodology

1) Designed an android application that has 64 grid points for each 64 LEDs. This application will be installed in the cell phone. The main purpose of this app is to transfer the input data through Bluetooth module.
2) The data input is fed to Arduino uno. The Arduino then sends the output to shift register and the LED pins.
3) The main question arises as why are we using shift register with Arduino. The reason for that is Arduino contains 11 pins that we set it as output, and so the problem arises as we need 16 output pins to control the LED grids i.e., 8 pins connected to positive terminal and 8 pins connected to negative terminals. The problem is resolved by using Shift register to provide additional 8 output pins. Three pins from Arduino Uno 10,11 and 12 is connected to latch pin, clock pin and data pin of shift register.
4) Now we have total of 16 output pins i.e., 8 from Arduino and 8 from shift register. The output pins from shift register are connected to the positive pins of the LED grid and the output pins from Arduino is connected to the negative pins of the LED grid.
5) The last step involves excessive coding which is fed to the Arduino.

Flow Chart


Arduino FlowChart
Abhijeet Kujur | November 24, 2022
Start
Setting Up Pinmodes for different arduiino pins
variable declaration for storing sequence of data inputs
loop LED Sequence Stored In Arrays,and illuminating the LED's
Processing Input Data and Modifing the Stored datas
Yes
If Any Serial Input available

Algorithm

First in Setup (), we defined OUTPUT pins, Baud rates , and Lowered all pin to Low

We defined array and function to store data and process the data

Then in the Void () Function,

We look for Serial Input, which will be given through mobile using HC05 module.

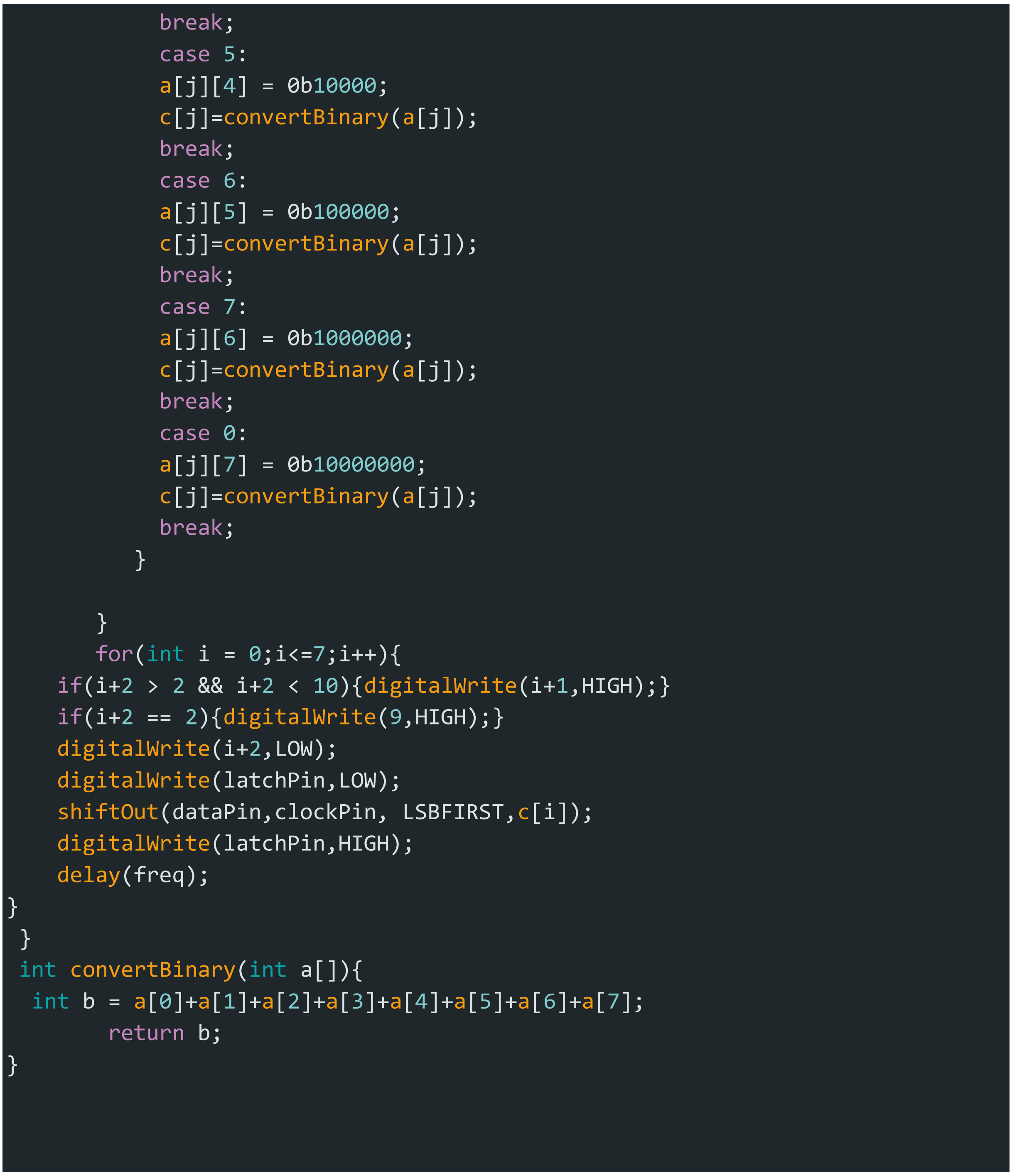
The Input will come in integer form which will be processed to reform the array to get the required led sequence output.

And once input is received.

The Arduino lights up the led grid line by line with certain frequen cy which depends on the delay () function.

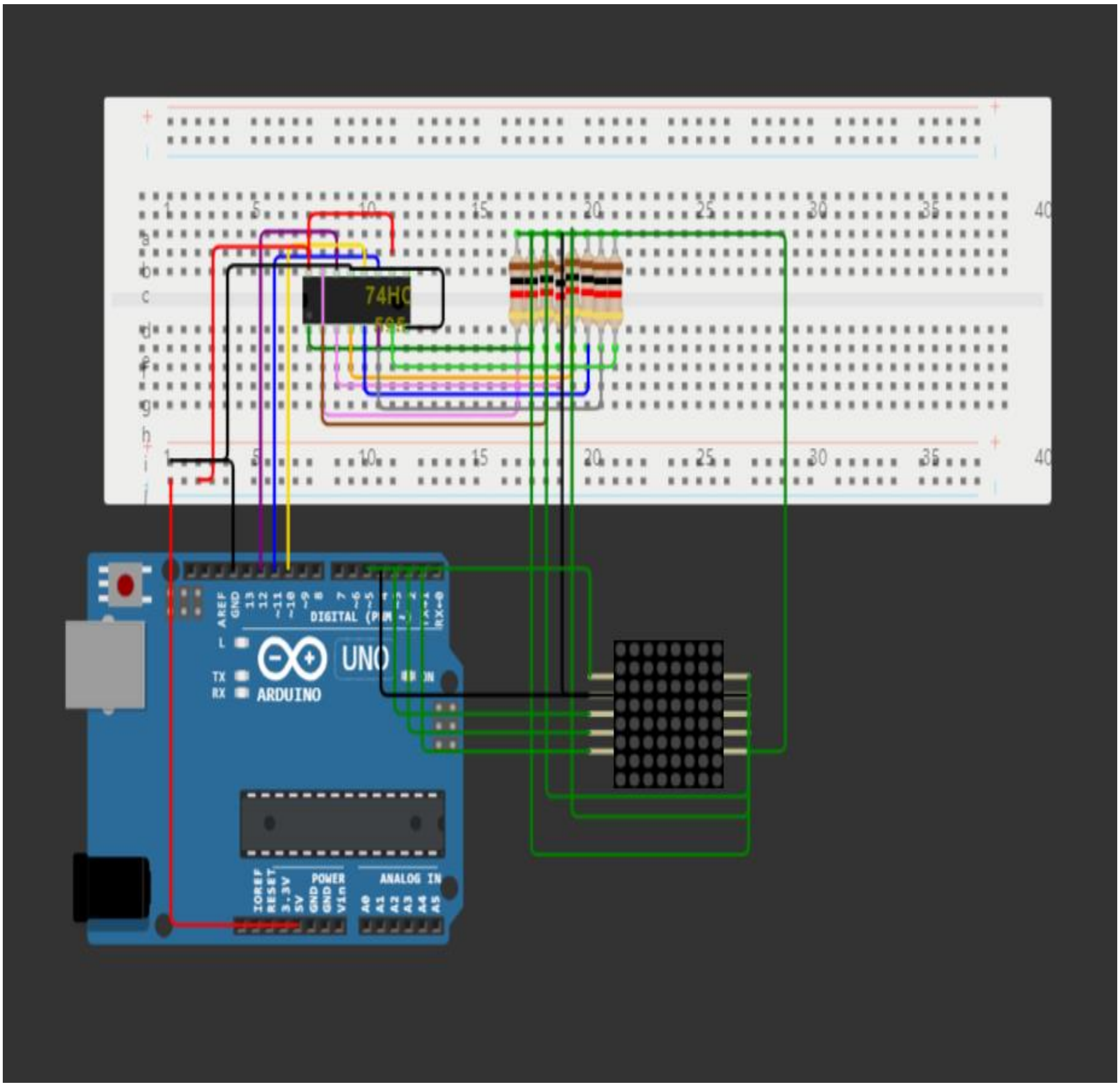
And hence we get the output.

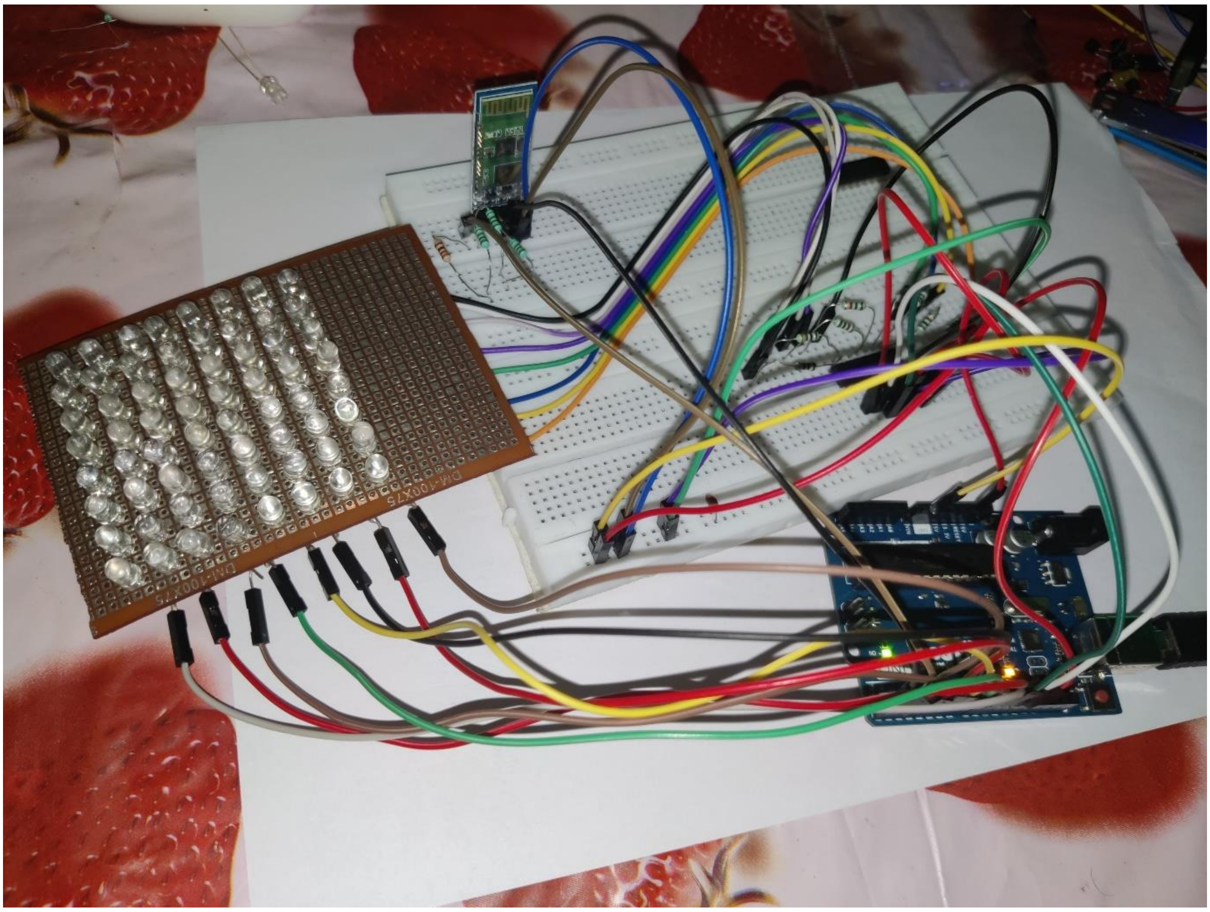
```
byte arrivingdatabyte;
int latchPin = 10;
int clockPin = 11;
int dataPin = 12;
int freq = 1;
int convertBinary(long int a[]);
int a[8][8] =
{{0,0,0,0,0,0,0,0},{0,0,0,0,0,0,0,0},{0,0,0,0,0,0,0,0},{0,0,0,0,0,0,0,0},{0,0,
0,0,0,0,0,0},{0,0,0,0,0,0,0,0},{0,0,0,0,0,0,0,0},{0,0,0,0,0,0,0,0}};
int c[8] = {0,0,0,0,0,0,0,0};
void setup( )
{

 Serial.begin(9600);
  pinMode(latchPin,OUTPUT);
  pinMode(clockPin,OUTPUT);
  pinMode(dataPin,OUTPUT);
  pinMode(2,OUTPUT);
  pinMode(3,OUTPUT);
  pinMode(4,OUTPUT);
  pinMode(5,OUTPUT);
  pinMode(6,OUTPUT);
  pinMode(7,OUTPUT);
  pinMode(8,OUTPUT);
  pinMode(9,OUTPUT);
  digitalWrite(2,HIGH);
  digitalWrite(3,HIGH);
  digitalWrite(4,HIGH);
  digitalWrite(5,HIGH);
  digitalWrite(6,HIGH);
  digitalWrite(7,HIGH);
  digitalWrite(8,HIGH);
  digitalWrite(9,HIGH);
}
void loop( )
{
while(Serial.available( ) > 0)
{

arrivingdatabyte = Serial.read( );
if (arrivingdatabyte > 64){
    freq=pow(10,arrivingdatabyte - 65);
    break;
  }
  if (arrivingdatabyte == 0){
    for(int s=0;s<8;s++){
      for(int r=0;r<8;r++){
        a[s][r] = 0b0;
      }
      c[s] = 0b0;
    }
    break;
  }
int j,k;
 for(int n = 1 ;n<=64;n++){
        if(n == arrivingdatabyte){
           j = (n-1)/8;
           k = n%8;
           break;
           }
        }
          switch(k)
          {
            case 1:
            a[j][0] = 0b1;
            c[j]=convertBinary(a[j]);
            break;
            case 2:
            a[j][1] = 0b10;
            c[j]=convertBinary(a[j]);
            break;
            case 3:
            a[j][2] = 0b100;
            c[j]=convertBinary(a[j]);
            break;
            case 4:
            a[j][3] = 0b1000;
            c[j]=convertBinary(a[j]);
```



```
            break;
            case 5:
            a[j][4] = 0b10000;
            c[j]=convertBinary(a[j]);
            break;
            case 6:
            a[j][5] = 0b100000;
            c[j]=convertBinary(a[j]);
            break;
            case 7:
            a[j][6] = 0b1000000;
            c[j]=convertBinary(a[j]);
            break;
            case 0:
            a[j][7] = 0b10000000;
            c[j]=convertBinary(a[j]);
            break;
          }

       }
       for(int i = 0;i<=7;i++){
    if(i+2 > 2 && i+2 < 10){digitalWrite(i+1,HIGH);}
    if(i+2 == 2){digitalWrite(9,HIGH);}
    digitalWrite(i+2,LOW);
    digitalWrite(latchPin,LOW);
    shiftOut(dataPin,clockPin, LSBFIRST,c[i]);
    digitalWrite(latchPin,HIGH);
    delay(freq);
}
 }
 int convertBinary(int a[]){
  int b = a[0]+a[1]+a[2]+a[3]+a[4]+a[5]+a[6]+a[7];
        return b;
}
```

Circuit


74HC595
DIGITAL (PWM ~)
UNO
ARDUINO
POWER
ANALOG IN
AREF
GND
13
12
~11
~10
~9
8
7
~6
~5
4
~3
2
TX→1
RX←0
L
TX
RX
ON
IOREF
RESET
3.3V
5V
GND
GND
Vin
A0
A1
A2
A3
A4
A5
1
5
10
15
20
25
30
35
40
a
b
c
d
e
f
g
h
i
j



Results and Discussions

We have 64 grid point on the cellphone’s screen which corresponds to the 64 LED grid. When we click on the point of cell phone’s screen then the corresponding LED light up. Whatever pattern we draw on the cellphone’s screen the same pattern appears on the LED grid.

Conclusion

Doing this project has helped us a lot in different aspects. We learnt how we can set up a communication between Arduino Uno and different kinds of electronic devices. We learnt how to handle input data and convert it into different form of output.