HardWare Implementation report

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AIM

To generate random numbers and display them using a seven segment display.

COMPONENTS USED

1) 7474 IC (D-Flip Flops) -2
2) 7486 IC (XOR Gate) -1
3) 7447 IC (Seven segment display decoder) -1
4) seven segment display - 1
5) 555 IC (Clock) - 1
6) Type A USB Connector - 1
7) Resistor (1k) - 1
8) Resistor (10M) - 1
9) Capacitor (470nF) - 1
10) Capacitor (47nF) - 1
11) Jumper Wires - 20

Output

The seven segment display displays hexadecimal numbers ranging from 1 to 15.The numbers after 9 after displayed using special symbols

Description

The circuit uses 2 IC 7474 each having 2 D-Flip flop in it.It is used4 to generate random numbers.After each iteration the output values change giving rise to different random numbers.An X-OR gate is also used for this.The output of D3 is fed into XOR gate whose output is given to D0.

The BCD coded number generated by the 7474 IC's are given to the 7447 IC which is the seven segment display decoder.For example if 0001 is the number then b and c segments of the seven segment display lights up.

The 555 IC is used as a clockThe information propagats only when the clock signal is high.The clock signal provides enough delay so that the numbers are visible as the propagation time for each cycle is very low

The clock produces a high and low voltage waveform as output.The waveform had a time period of 200ms , or a frequency of 5Hz.If the frequency of the clock is very high then the clock speed is very high or clock time period is very low so the seven segment display will change values very quickly and we wont be able to see the random numbers.

The values of capacitors and resistors decide the clock frequency,decreasing the value of capacitance result in increasing clock speed or the time duration of each number displayed will be decreased.Increasing the resistance value also will decrease the clock speed. I used capacitors of value 470nF and 47nF for this and resistor of value of 10M.

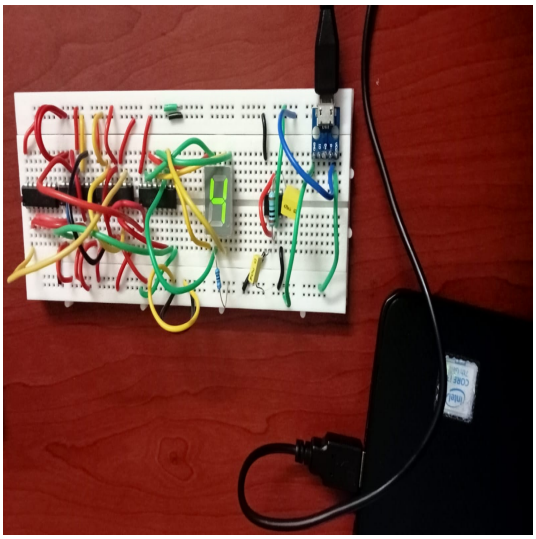
The brightness of the sevent segment display depends on the resistance connected to it.Greater the value of resistance dimmer will the seven segment display.

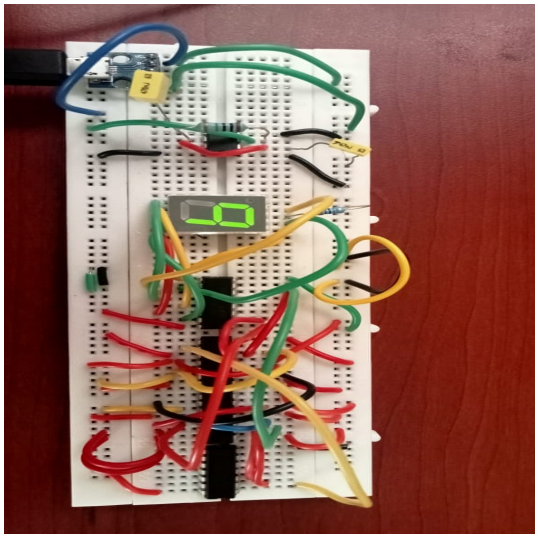
The different power rails are given voltages as ground,clock output and Vcc(5V).

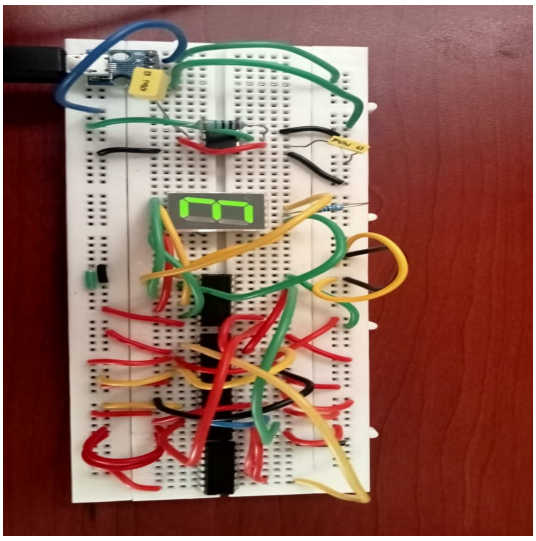
The Vcc and ground is got by using Type A USB Connector.The USB connector is powered by connecting to the laptop using a cable.

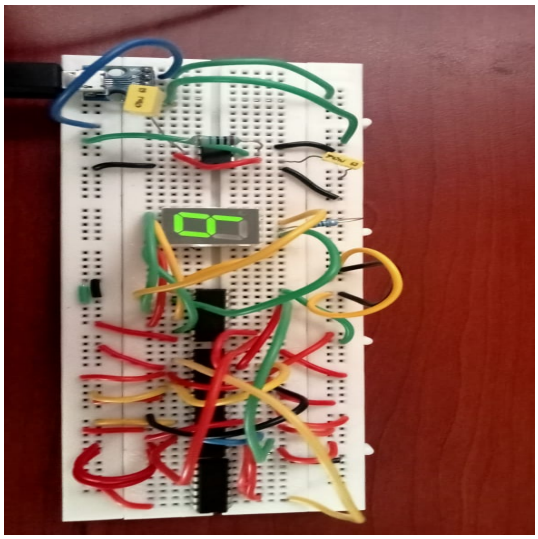
Initially the flip flop generate a random number.This BCD signal is sent to the decoder which decodes the BCD to display the number onto the seven segment display. Bases on the output from the XOR gate a new random number is generated by the flip flop which is displayed on the seven segment.This cycle continues till the original number is generated again.Now the same series keeps on repeating again and again

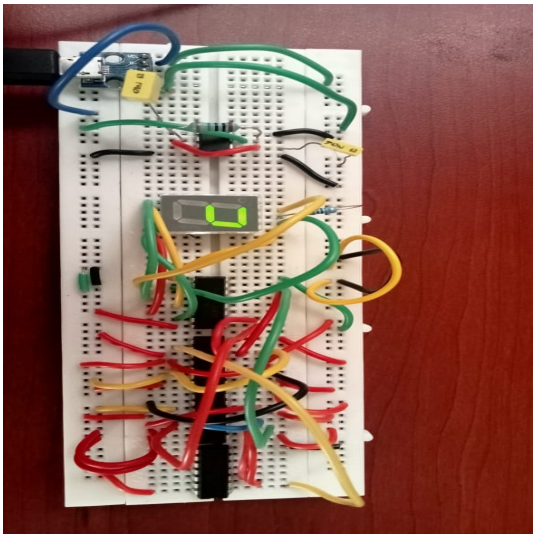
Hence we are able to implement the hardware for generating random numbers.











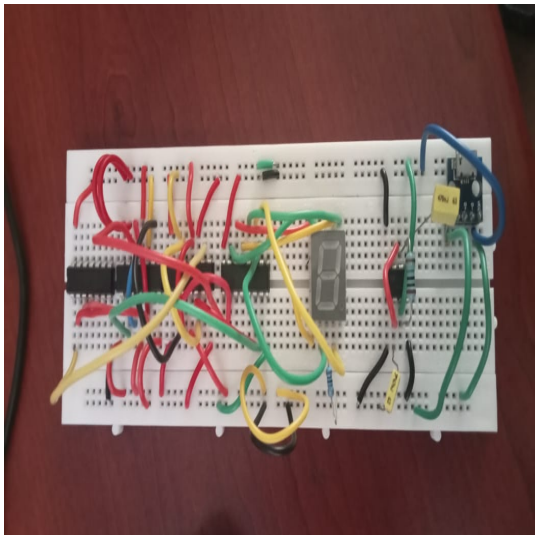


Fig. 11. Picture of the BreadBoard(unpowered)

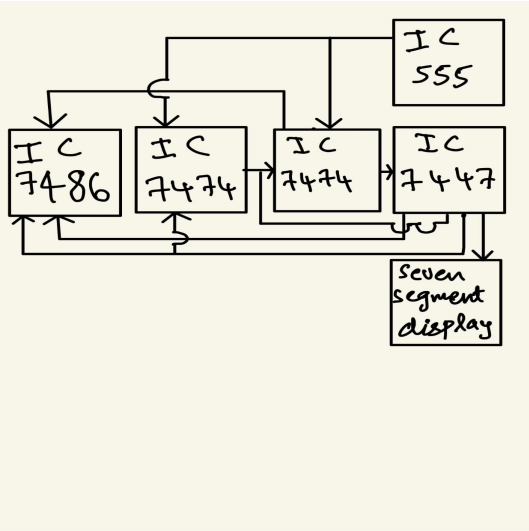


Fig. 11. Block diagram