Probability Hardware Assignment

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***Abstract*—Shift registers were used to create a random number generator for this assignment.**

Components used

Component	Value	Quantity
Breadboard		1
Seven Segment Diplay	Common Anode	1
Decoder	7447	1
Flip Flop	7474	2
X-OR Gate	7486	1
555 IC		1
Resistor	1 KΩ	1
Capacitor	100 nF	1
Capacitor	10 nF	1
Jumper Wires		

TABLE 0
Components used

Procedure

1) 555 timer circuit was assembled as shown in the figure.

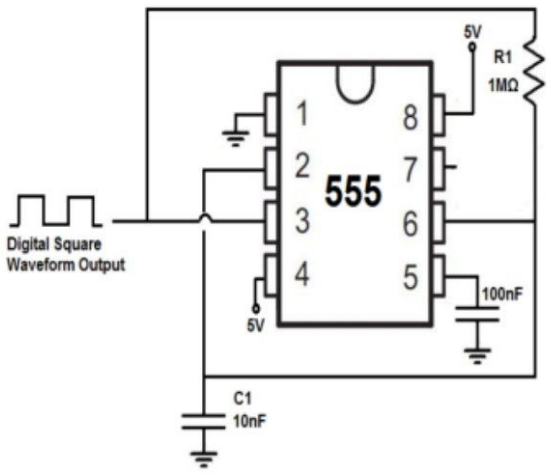

Fig. 1. Connection in 555 timer circuit

2) Then, we coupled the 555 timer's clock output to the D-flip flops' clock signal.

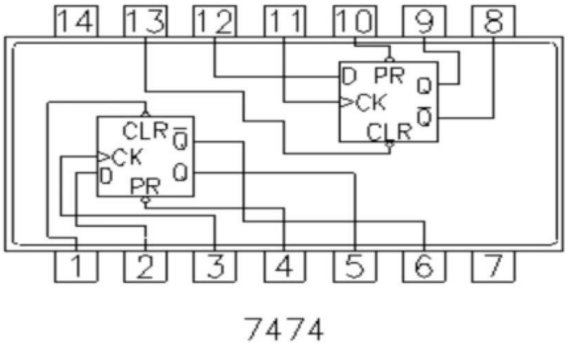

Fig. 3. Connection in 7474 IC

3) Now we make the circuit for shift registers using a 4 D-Flip flops (using two 7474 IC's)
4) XOR gate was connected(7486 IC) according to the figure.

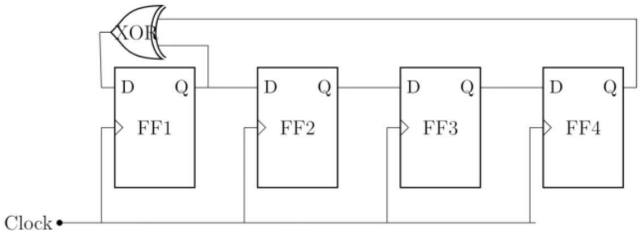

Fig. 4. XOR gate

5) The decoder (7447 IC) was then connected such that its A,B,C,D were connected with Q_0,Q_1,Q_2,Q_3 respectively as per the figure 5
6) After that, with reference to the table the seven segmented display and decoder (7447 IC) was connected.
7) All the components were linked with wires before connecting to a power supply.

Output

Random numbers are generated on the display.

Fig. 5. Decoder gate

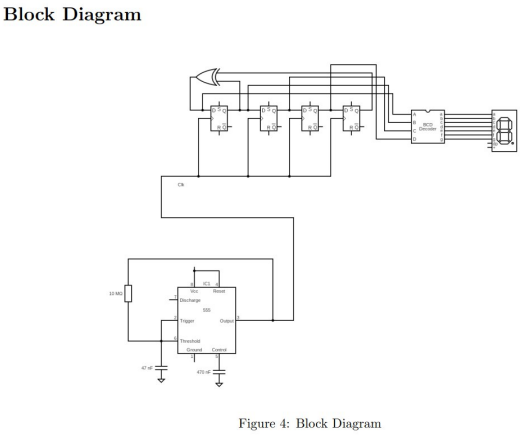

Figure 4: Block Diagram

Fig. 7. Block Diagram

7447	$\bar{a}$	$\bar{b}$	$\bar{c}$	$\bar{d}$	$\bar{e}$	$\bar{f}$	$\bar{g}$
Display	a	b	c	d	e	f	g

Fig. 6. Connection of seven segmented display with decoder

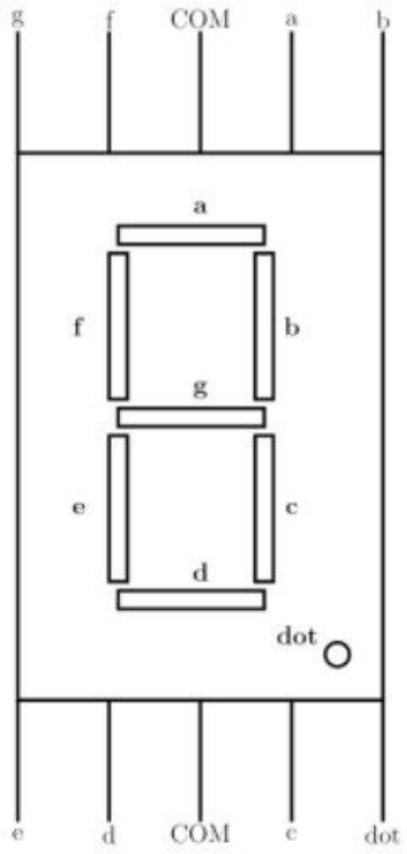

Fig. 6. Seven segmented display

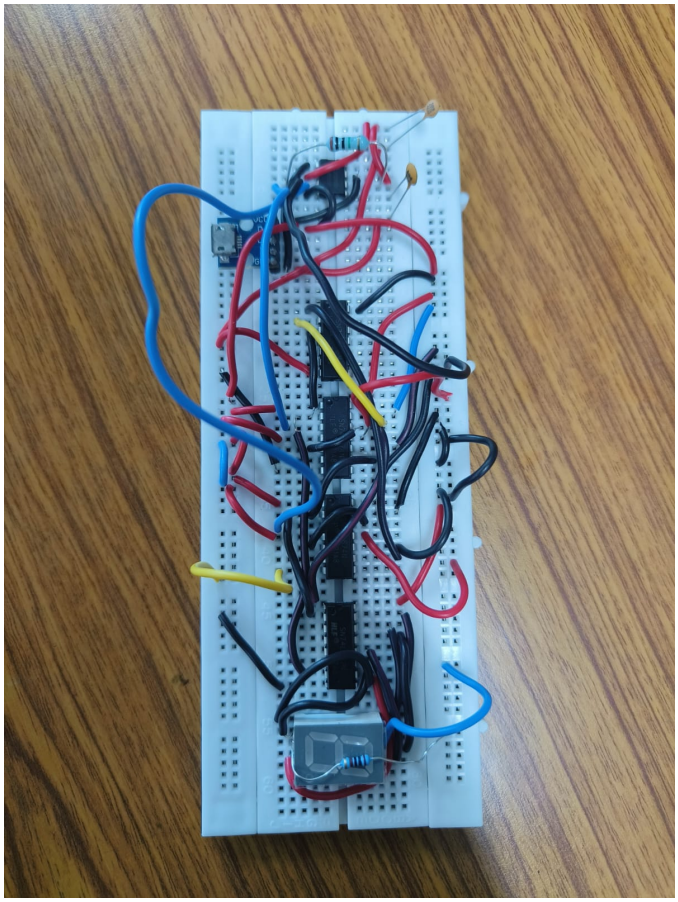

Fig. 7. output

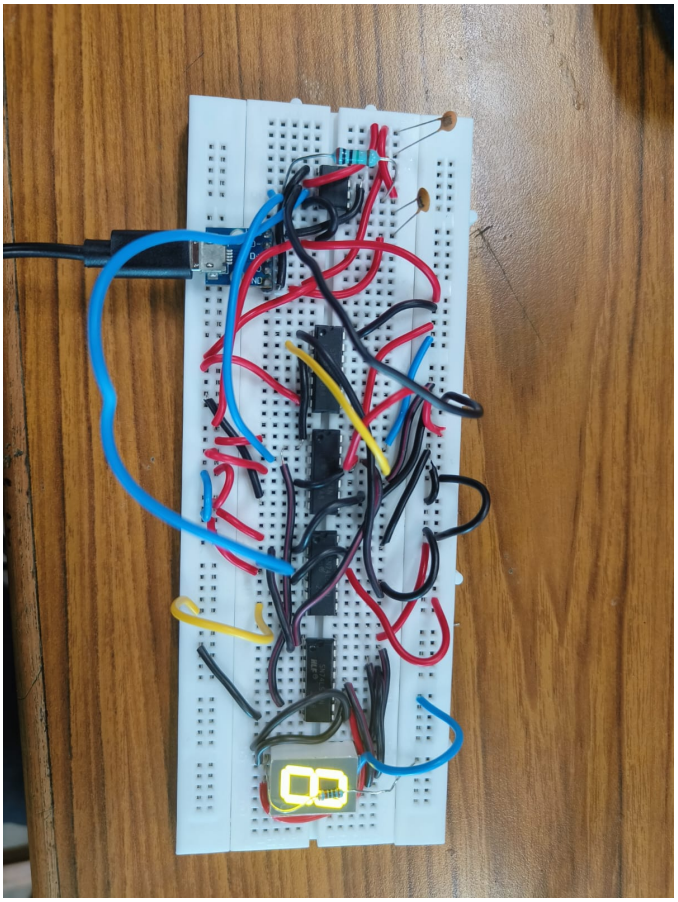

Fig. 7. output

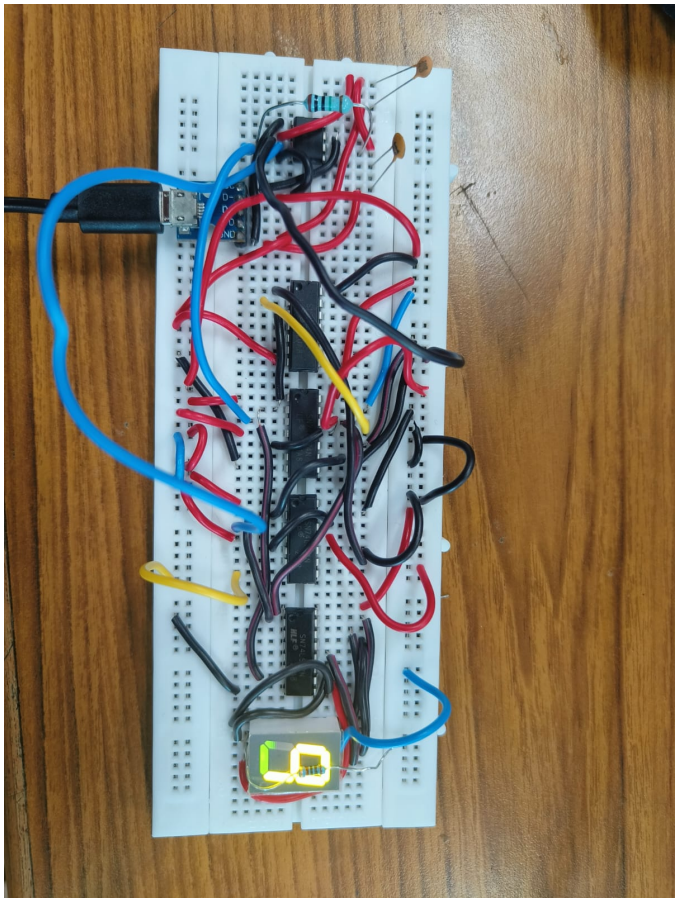

Fig. 7. output