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) We connected the 555 timer circuit like the figure 1

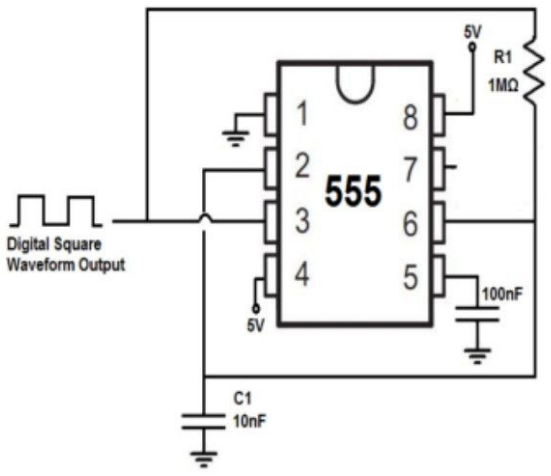

Fig. 1. Connection in 555 timer circuit

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

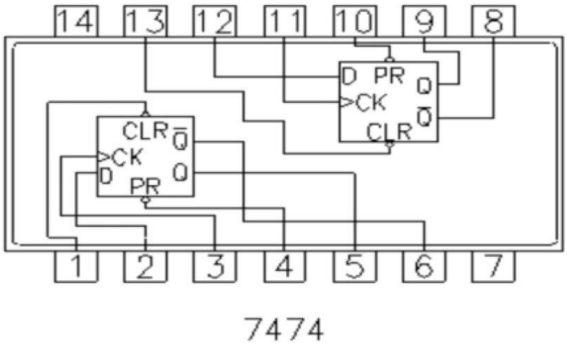

Fig. 3. Connection in 7474 IC

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

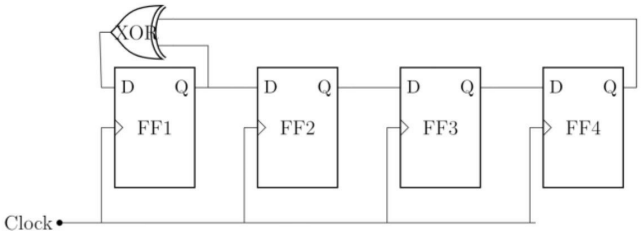

Fig. 4. Connection in XOR gate

5) Then we connected the decoder (7447 IC) and connected its A,B,C,D with Q_0,Q_1,Q_2,Q_3 respectively as per the figure 5
6) Then, in accordance with the table, we connected the seven segmented display and the dceoder (7447 IC) 6 and the figure 6
7) Before connecting the power supply, we linked all of the independent components.

Output

Random numbers are generated on the display.

Fig. 5. Connection in Decoder gate

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

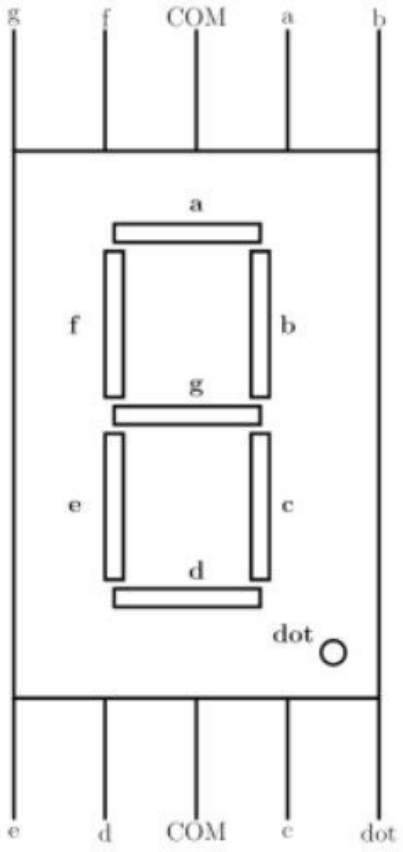

Fig. 6. Seven segmented display

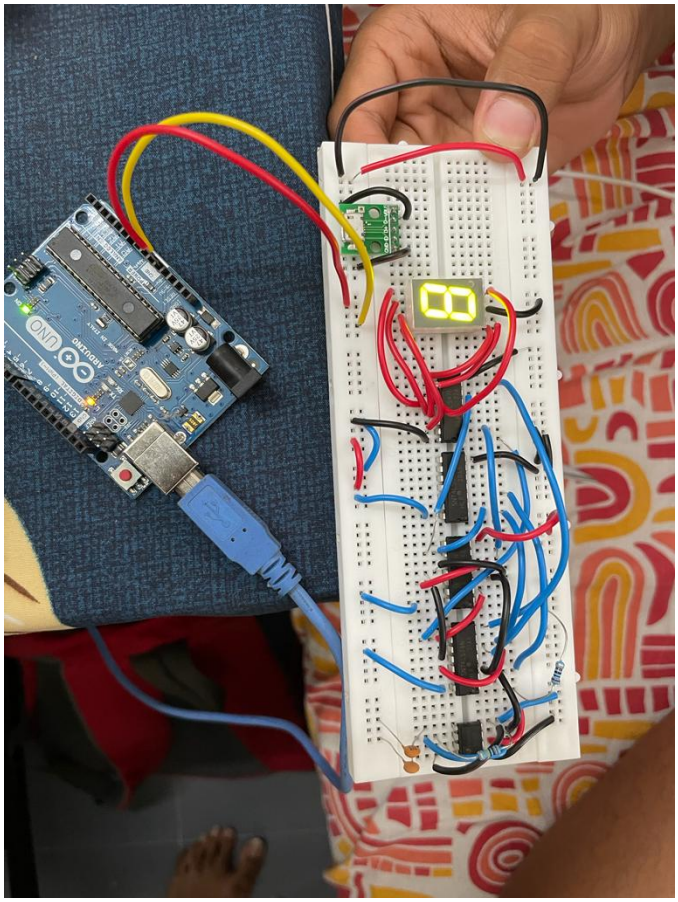

Fig. 7. output