

Hardware Assignment - AI1110

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Description:-

In my assignment I've made a Random number generator using decoder, flip flops, XOR gate, 555IC

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1 COMPONENTS USED

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

TABLE 0: Components used

2 SETUP

- 1) This circuit uses 5V from microusb.
- 2) This acts as the Vcc of the circuit.
- 3) The inner buses on both sides are at Vcc.
- 4) The lowest bus is GND.
- 5) The uppermost bus is carrying the Clock signal from the 555 timer.

3 PROCEDURE

- 1) I assembled the 555 timer circuit based on the configuration shown in fig 1

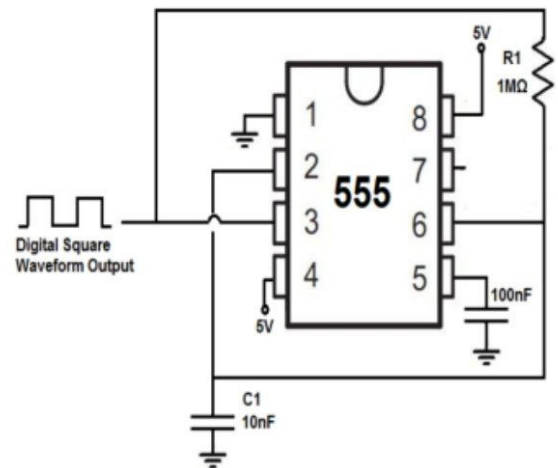


Fig. 1: Connection in 555 timer circuit

- 2) Next, I linked the Clock output of the 555 timer circuit to the clock signal input of the D-Flip flops.
- 3) To create the shift registers, I utilized two 7474 ICs, each containing four D-Flip flops, following the circuit arrangement depicted in Figure 3.

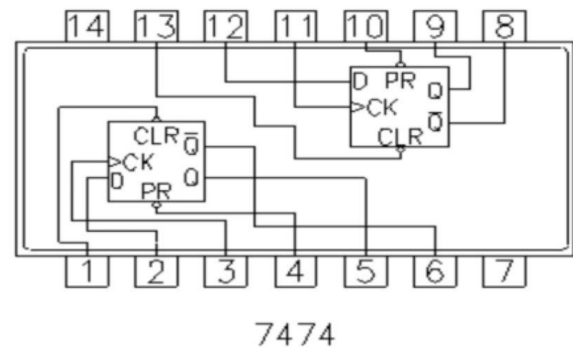


Fig. 3: Connection in 7474 IC

- 4) Afterward, I established the connection for the XOR gate using a 7486 IC, as illustrated in Figure 4

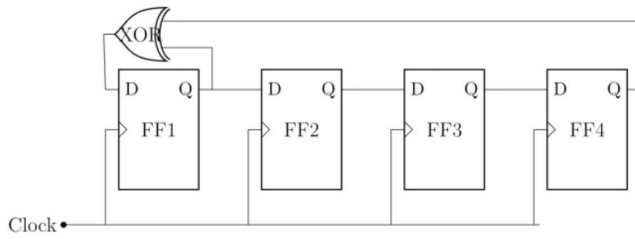


Fig. 4: Connection in XOR gate

- 5) To connect the decoder (7447 IC), I associated its inputs labeled A, B, C, and D with the outputs Q_0 , Q_1 , Q_2 , and Q_3 of the D-Flip flops, respectively, as depicted in Figure 5



Fig. 5: Connection in Decoder gate

- 6) According to Figure 6, I connected the decoder (7447 IC) to the seven-segmented display, establishing the appropriate connections.

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

- 7) Finally, I interlinked all the individual components and connected the power source to complete the circuit assembly.

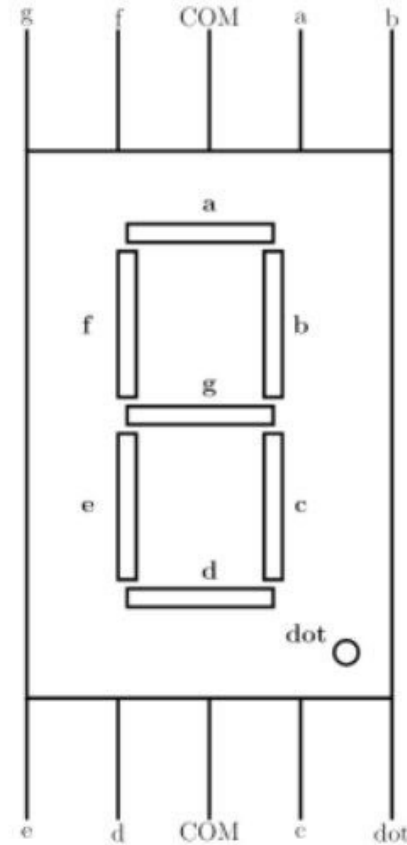


Fig. 6: Seven segmented display

4 TIMER

- The time period can be changed using different values of Resistor and Capacitor.
- As the capacitor advised (10nF and 100nF or 100nF and 100nF) of these the clock speed was too fast and was unable to take the readings, the capacitor used in their place are 47nF and 470nF.
- This allows us to get a square pulse of 5V every 0.9 seconds approximately. Which is slow enough to allow us to take readings from the resistor

5 OUTPUT

The circuit generates random numbers on the seven segment display. The output is shown in figure 7

6 BLOCK DIAGRAM

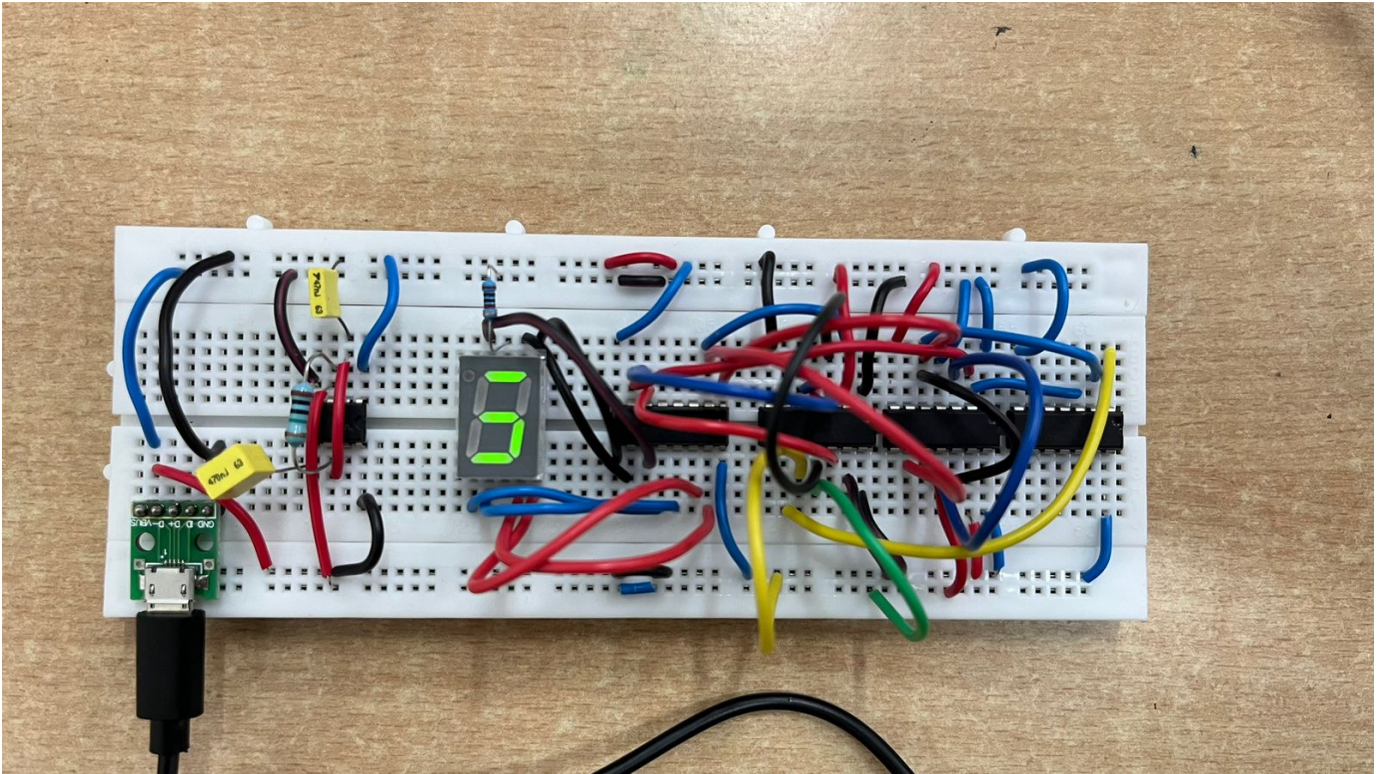


Fig. 7: output

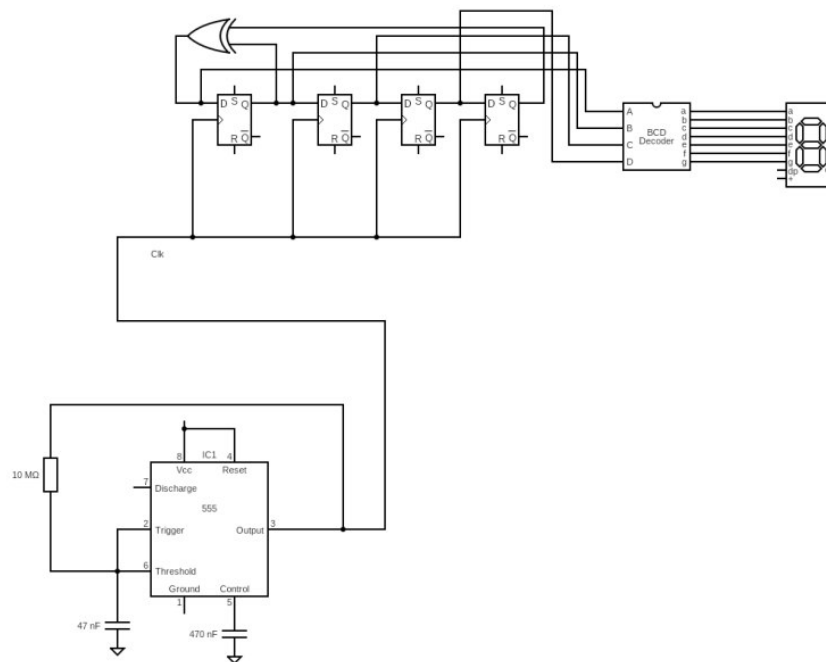


Fig. 7: Block Diagram