

Hardware Assignment

AI1110: Probability and Random Variables

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Random number generator using Shift Registers

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 KΩ	1
Capacitor	100 nF	1
Capacitor	10 nF	1
Jumper Wires		

TABLE I
COMPONENTS USED

PROCEDURE

- 1) The CLOCK signal is generated using the 555 timer circuit according to the figure 1
- 2) The Clock output obtained is connected to the clock signal of D-Flip flops that is to 3rd , 11th position of each 7474IC
- 3) Each 7474IC contains 2 D-Flip flop gates , these gates are used to build a circuit for shift registers . D_i and Q_i refers to the input and output of i th D-Flip flop gate respectively. Output of each D-Flip flop gate acts input for the next D-Flip flop gate . Hence Q_i is connected to D_{i+1}
- 4) The XOR gate (7486 IC) is conneceted to Q_0 , Q_3 for input at 1st ,2nd position and D_0 as output at 3rd position as shown in the figure 3
- 5) The decoder's (7447 IC) positions labelled as A,B,C,D is connected with output of each D-Flip flop gate that is Q_0,Q_1,Q_2,Q_3 respectively as per the figure 4

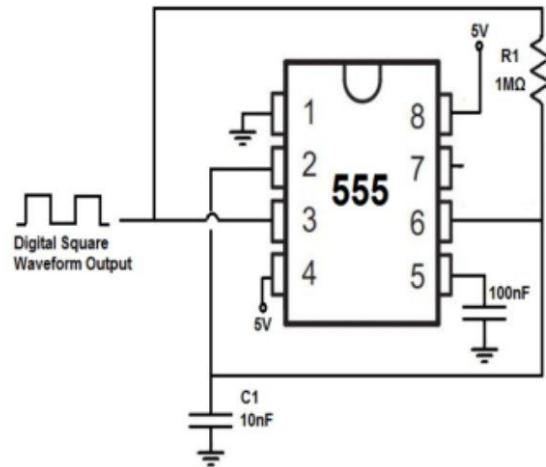


Fig. 1. Connection in 555 timer circuit

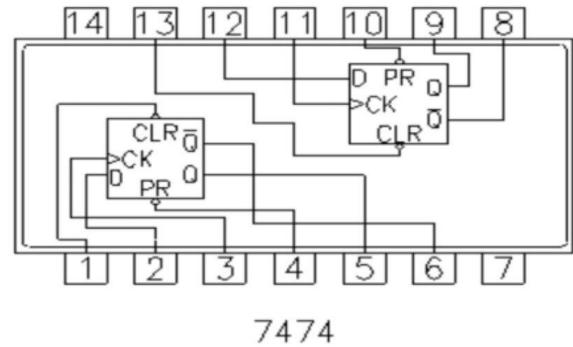


Fig. 2. Connection in 7474 IC

- 6) The seven segmented display is connected with the decoder (7447 IC) according to the table 5 and the figure 6
- 7) The Position labelled as COM is connected to VCC (higher voltage) . Similarly 7474 IC and XOR gate (7486 IC) is connected to VCC using position labelled as 14th while grounded at 7th

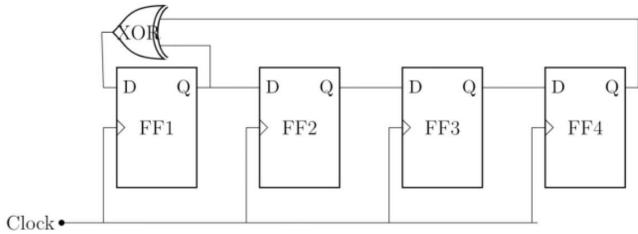


Fig. 3. Connection in XOR gate



Fig. 4. Connection in Decoder gate

position . The decoder (7447 IC) is connected to power source and ground at 16th and 8th position respectively .

OUTPUT

The seven-segmented display displays random Integers as displayed in 7 , 8 , 9 , 10 .

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

Fig. 5. Connection of seven segmented display with decoder

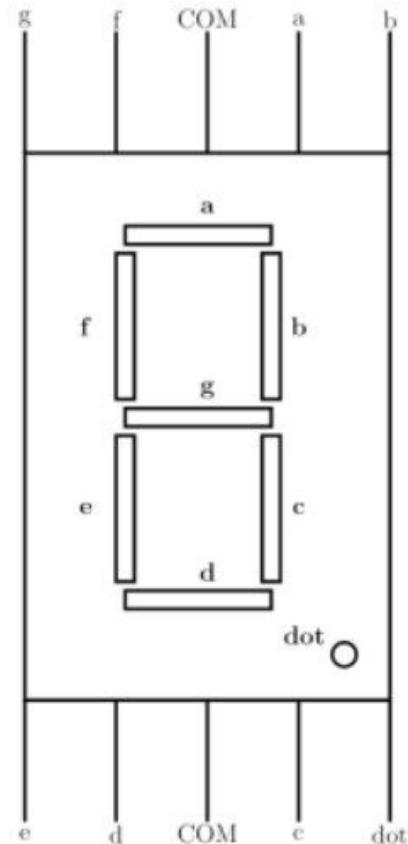


Fig. 6. Seven segmented display

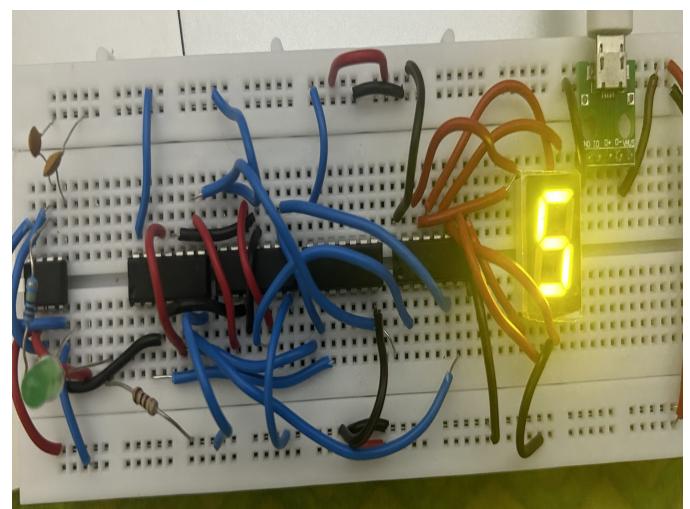


Fig. 7. output1

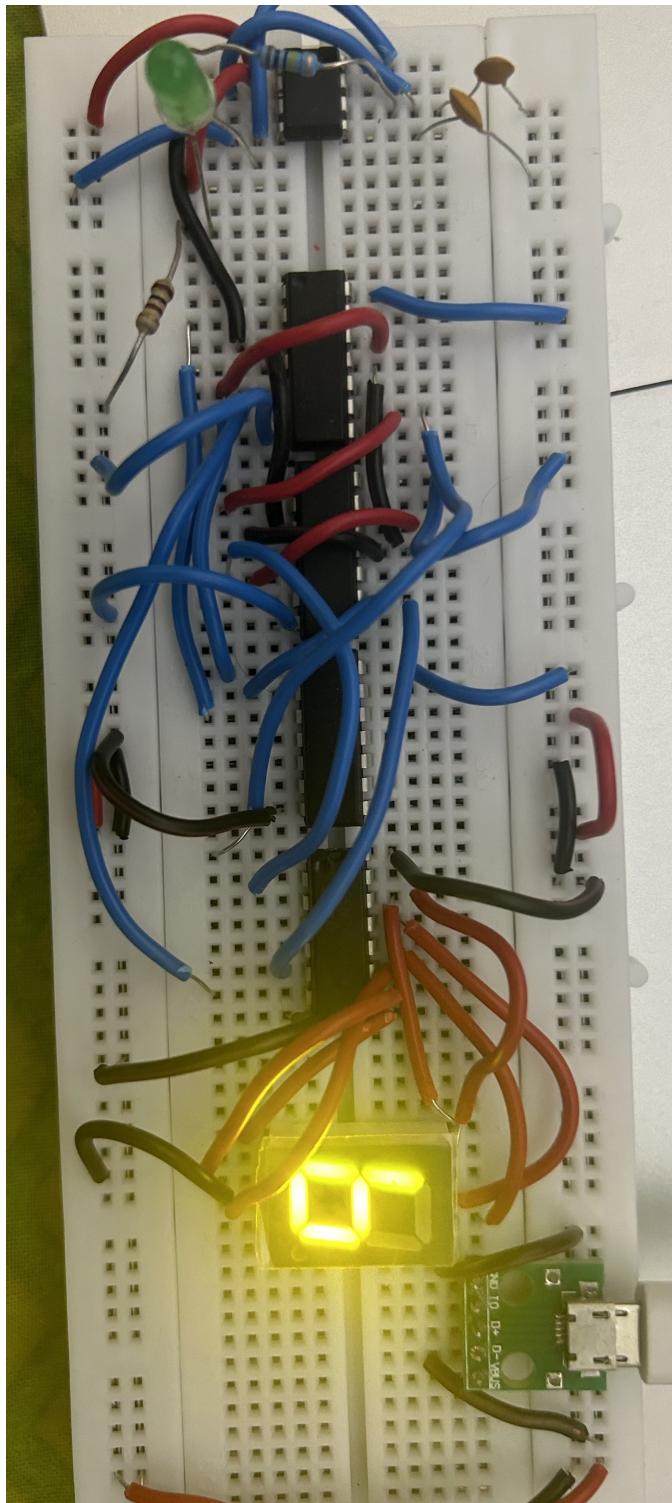


Fig. 8. output2

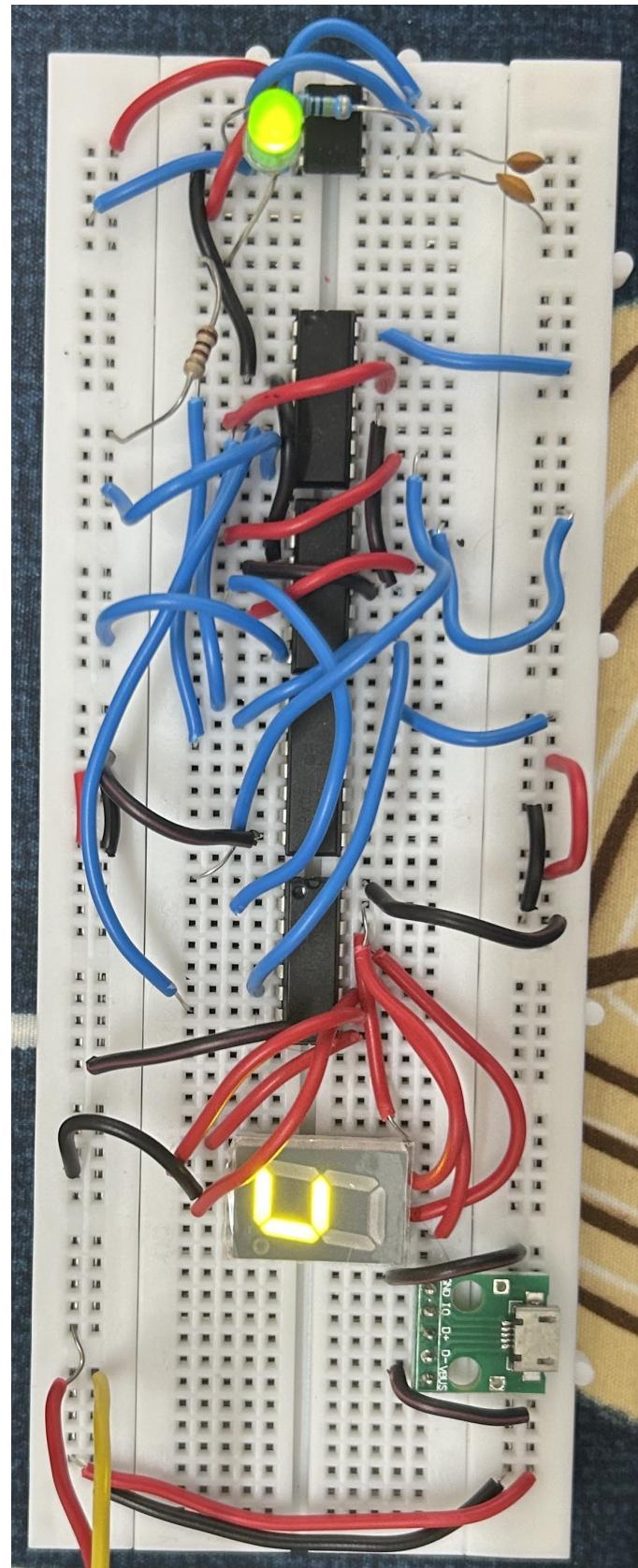


Fig. 9. output3

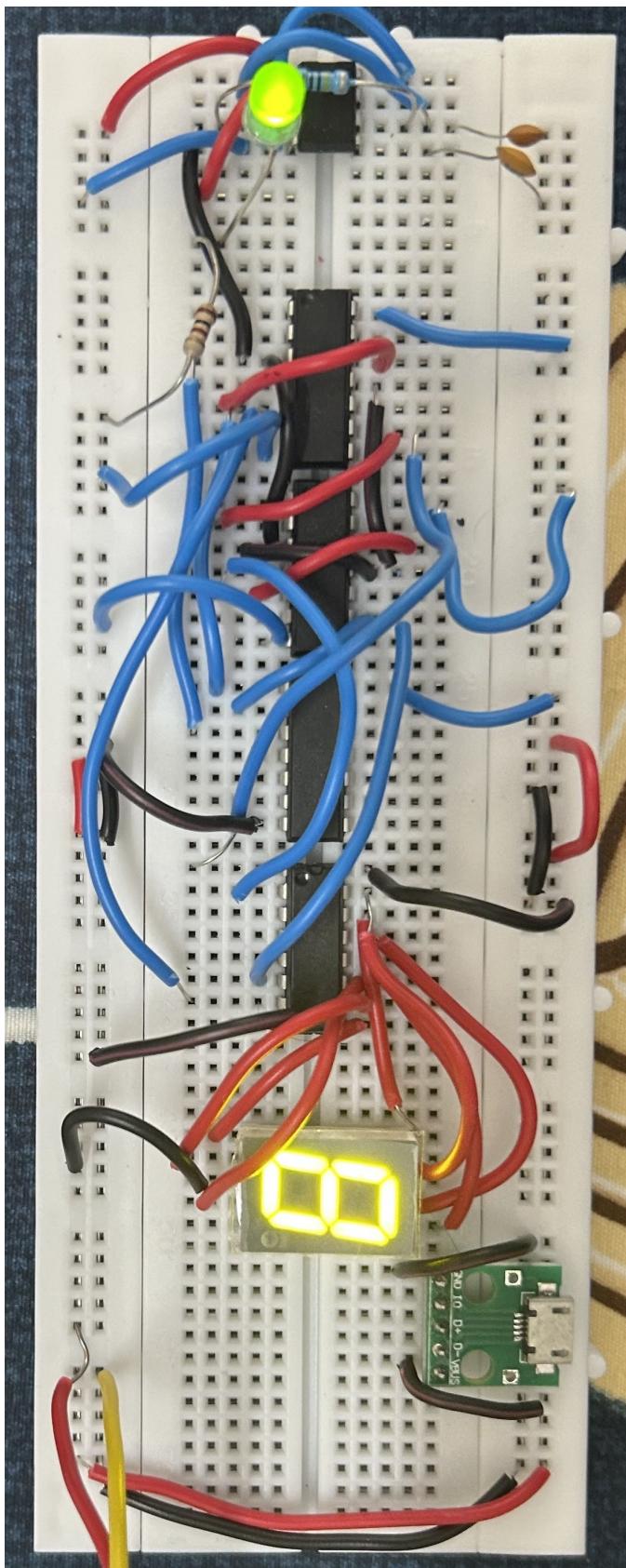


Fig. 10. output4