Hardware Assignment - Report

AI1110: Probability and Random Variables

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Random number generation using Shift Registers

Components

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		

Procedure

1) The CLOCK signal is generated using the 555 timer circuit according to the figure 1.

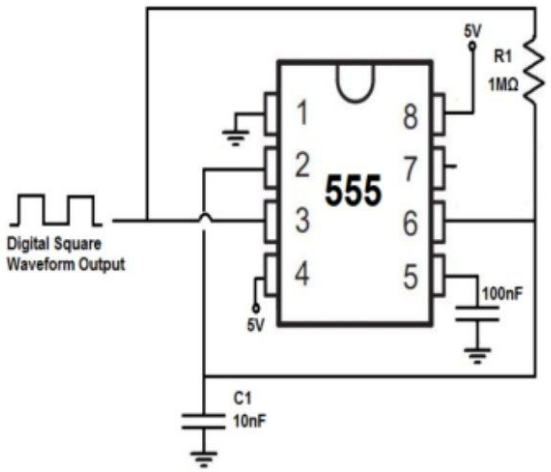

Fig. 1. 555 timer circuit diagram

2) The CLOCK output obtained from 555 timer is connected to the clock signal of D-Flip flops that is to each 7474IC.
3) Each 7474IC contains 2 D-Flip flop gates. These 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 i.e, Q_i is connected to D_{i+1}
4) The XOR gate (7486 IC) is connecetd to Q_0 ,Q_3 for input at 1st ,2nd position and D_0 as output at 3rd position.
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 shown in figure 2.

Fig. 2. Connection in Decoder gate

6) Now, the seven segmented display is connected to the the decoder (7447 IC) according to the table 3.
7) The Position labelled as COM in seven segmented display 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 position

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

Fig. 3. Connection of seven segmented display with decoder

. 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 4, 5 and 6.

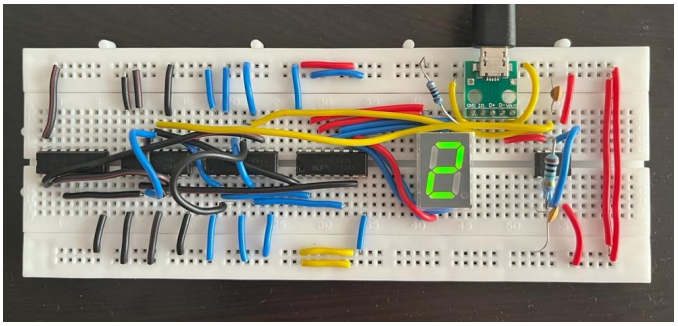

Fig. 4. Image 1 of seven segment display showing number

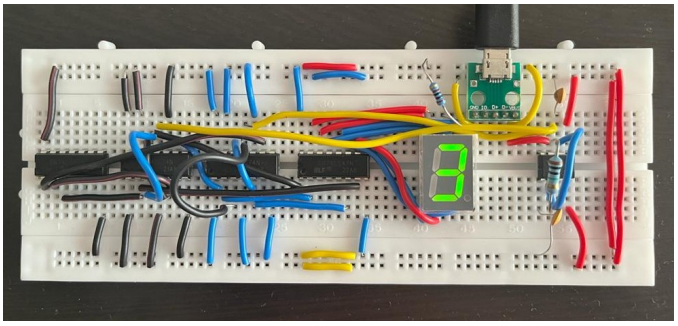

Fig. 5. Image 2 of seven segment display showing number

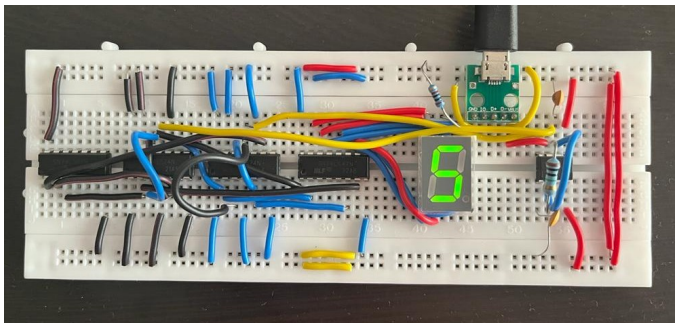

Fig. 6. Image 3 of seven segment display showing number