Report of Hardware Assignment
Random Number Generation using Shift Registers
AI1110: Probability and Random Variables

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1 COMPONENTS

TABLE 0
COMPONENTS LIST

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	1Kilo Ohm	1
Resistor	1Mega Ohm	1
Capacitor	100nF	1
Capacitor	10nF	1
Wires		6
Micro USB		1

2 DESCRIPTION

The Aim of this experiment is to generate Random Numbers using Shift Registers.
Shift Register: A Shift Register is a designed by connecting a set of Flip Flops where each flip flop stores a single bit of data. It is used to store and transfer data.
We are using the above mentioned components in the experiment.

2.1 *Use of the Components*

1) **Breadboard**
   It is used to build the circuit for the experiment.
2) **Seven Segment Display**
   It is used to display the generated random Number.
3) **Decoder**
   It is a 7447 IC which coverts a Binary Coded Decimal inputs into output suitable for 7-Segment Display.

4) **Flip Flop**
   Each 7474 IC has two flip flops which can store a single bit of data each.
5) **X-OR Gate**
   It is a 7486 IC.This logic gate is used to generate the random sequence.
6) **555 IC**
   This IC generates the clock pulses for the shift registers
7) **Resistors, Capacitors**
   These are used to construct the clock circuit. Changing them changes the frequency of clock circuit and intern changes the speed in which the numbers are displayed.
8) **Wires**
   To make the connections betwwen the components
9) **MicroUSB**
   To provide the power supply for the circuit

2.2 *Construction of Circuit*

Firstly, place a Micro USB to get power supply.And give connections for VCC and ground.Then create a clock circuit by using a 555 IC,two capacitors and a resistor.This clock circuit converts the power supply into a square pulse.The frequency of this can be adjusted. Then place the other ICs in the order(7486,7474,7474).Give connections in between these components such that output of clock is given to the two 7474 ICs.These two ICs along with the X-OR gate(7486 IC) produce the Binary Coded Decimal(with one bit from each flip flop) as output. This output is given to the Decoder(7447 IC). The output of this Decoder is given to the 7 Segment Display.The sequence of Random Numbers is displayed on the 7 Segment Display.

3 CIRCUIT IMAGE

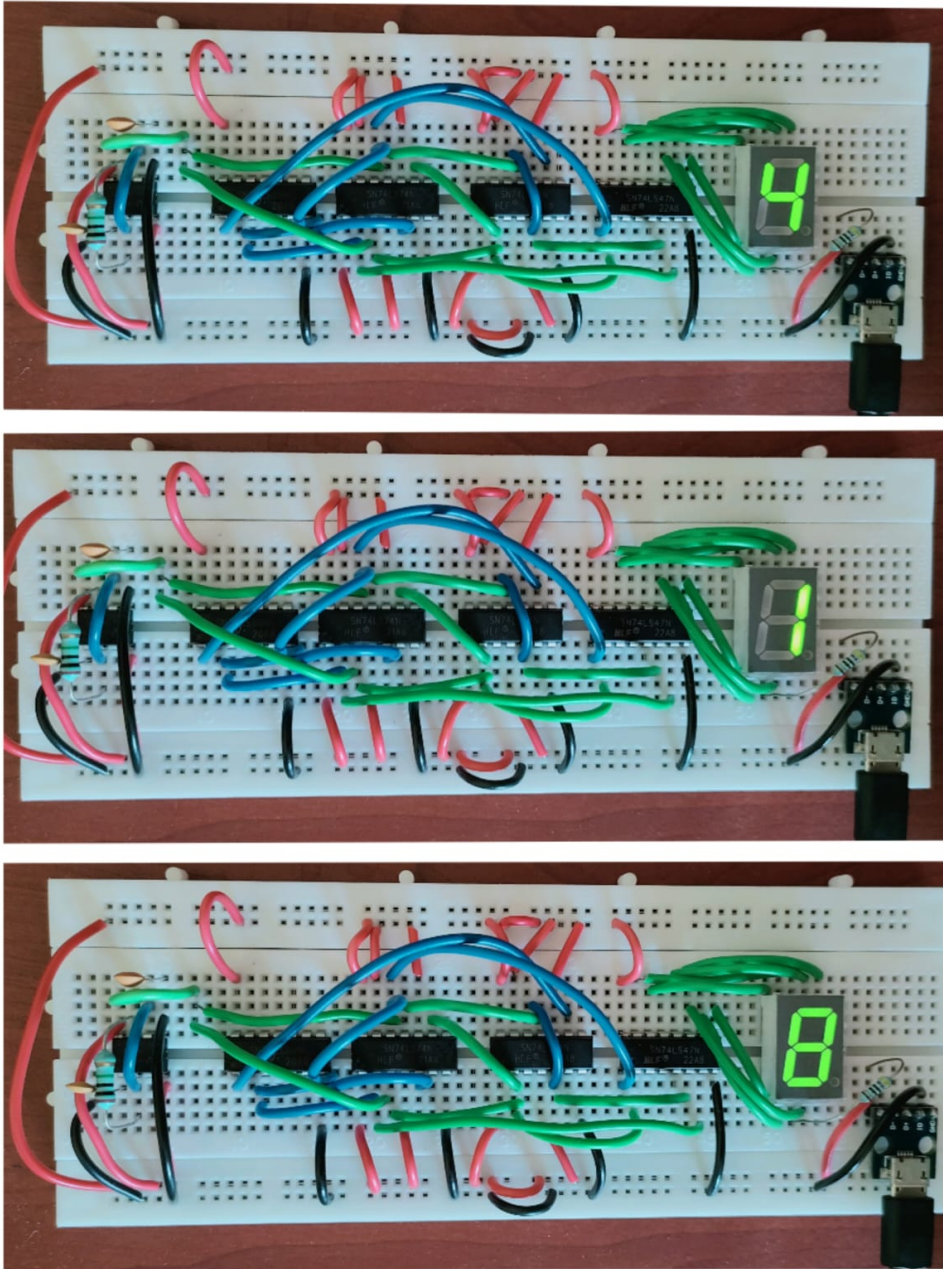The below is the image of output from the circuit.

Fig. 9. Circuit Image

4 BLOCK DIAGRAM
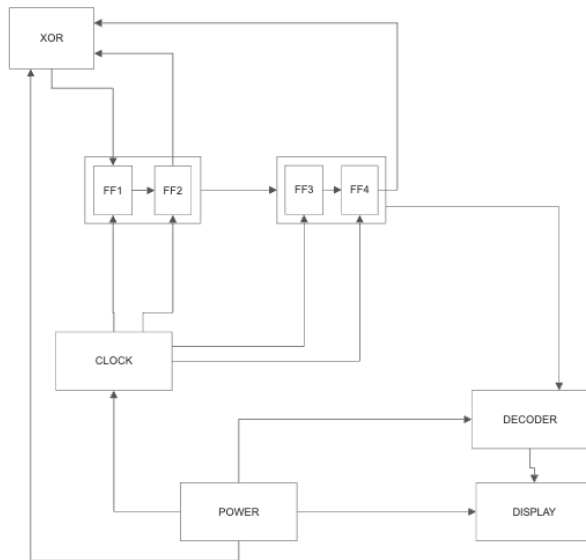
The below is the block diagram for the circuit.

Fig. 9. Block Diagram