Report on Hardware project

AI1110: Probability and Random Variables
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Experiment Report:

Generating Random Numbers using digital logic components.

Components:

TABLE 0
COMPONENTS

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	1KΩ	1
Resistor	1MΩ	1
Capacitor	100nF	1
Capacitor	10nF	1
Micro USB	-	1

Description:

The breadboard provides a platform for easily connecting electronic circuits without the need for soldering. First we connect the Micro USB as power supply on the breadboard and provide VCC and ground voltages required. Then we assemble the clock cycle.

We use 555 IC ,Resistors , capacitors , connecting wires.

The 555 timer IC is used to generate a clock signal which controls the timing and sequence of the random number generation process.

Resistors are used to limit the current flow and set specific voltage levels, while capacitors are used to store and release electrical energy.

We then check whether clock cycle is working properly using oscilloscope.If it forms a square wave it is working properly.

Then we assemble the remaining circuit for random number generation using Seven Segment Display,Decoder,Flip Flop,X-OR GATE.

The seven-segment display is used to display the generated random numbers. It consists of seven individual segments that make different combinations to represent digits from 0 to 9.

Decoder takes a binary-coded decimal input and decodes it to drive the appropriate segments of the seven-segment display.

The flip-flops store a single binary bit of information and are used to generate and store the random sequences of binary digits.

The X−OR gate helps introduce randomness and unpredictability into the generated binary sequences.

We assemble the XOR gate then flipflops then the Decoder connect them all using wires then connect the decoder to the Seven Segment Display.We then also connect the clock cycle to the assembly.

Now we can see random numbers generating by connecting the Micro USB to the power source.

OUPUT:
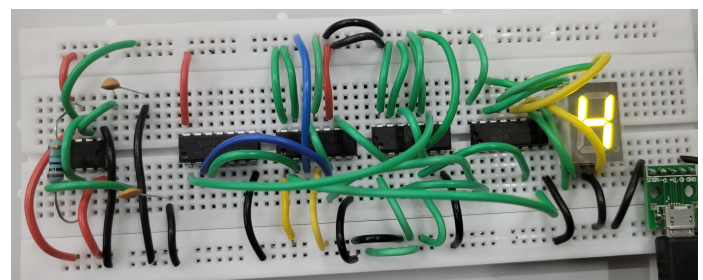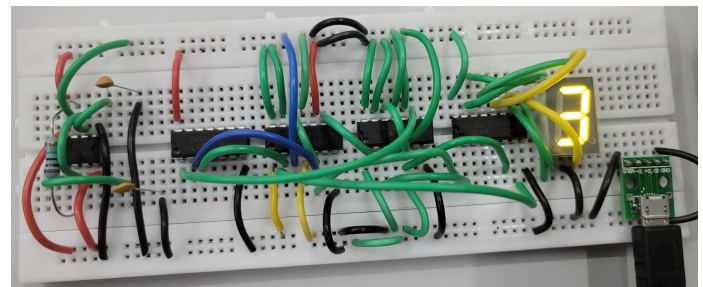
BLOCK DIAGRAM:
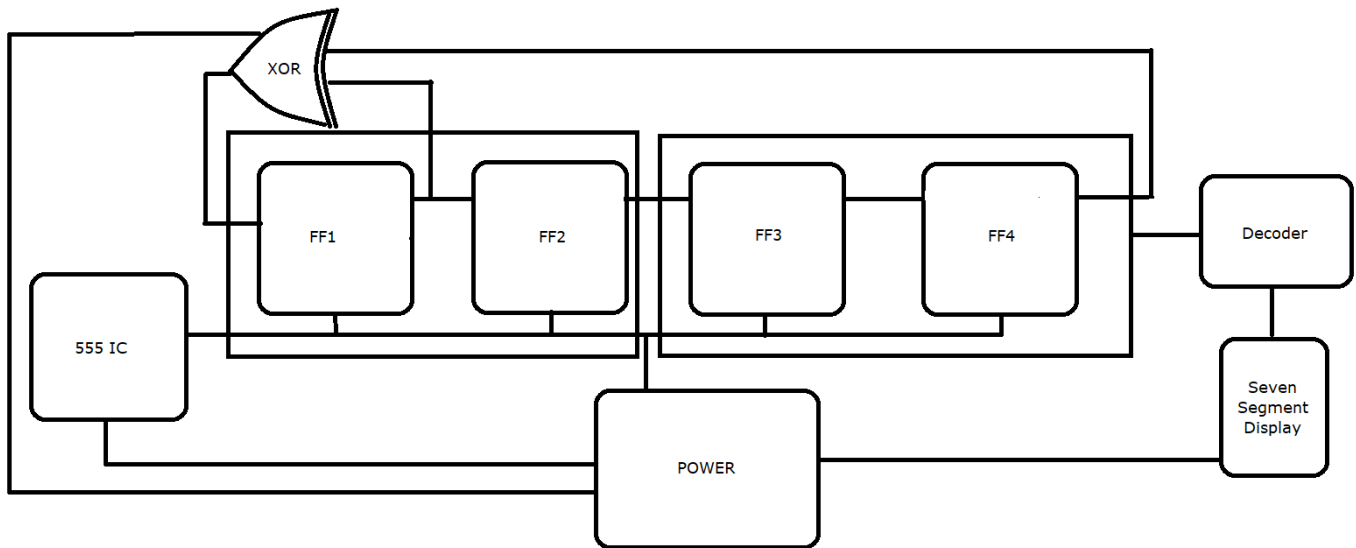
Observation: The produced binary numbers were converted and displayed on a 7-segment display. The 555 timer-based random clock introduced variations and unpredictability in the clock signal, resulting in random numbers generated by circuit.