

# Random Numbers Hardware Assignment

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CS22BTECH11043

## 1. Components:

Components	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	1K Ohm	1
Resistor	1M Ohm	1
Capacitor	100nF	1
Capacitor	10nF	1
Connecting wires		20

## 2. Description:

- 1) First, a micro USB is used to generate a VCC and GND bus.
- 2) A clock signal is generated by forming a circuit using a 555 timer IC, a 10 $\Omega$  resistor, 100nF and 10nF capacitors with a certain frequency, which increases with the resistance to introduce a time delay for the random numbers to be generated.
- 3) The clock output of the 555 timer circuit is connected to the clock signal of D flip-flops.
- 4) A circuit for shift registers is created using 4 D flip-flops (two 7474 ICs) and an XOR gate (7486 IC). Each output of the D flip-flop is connected to a decoder IC (7447 IC).
- 5) The connections are made for the seven-segment display to display the random numbers.

### 3. Block Diagram:

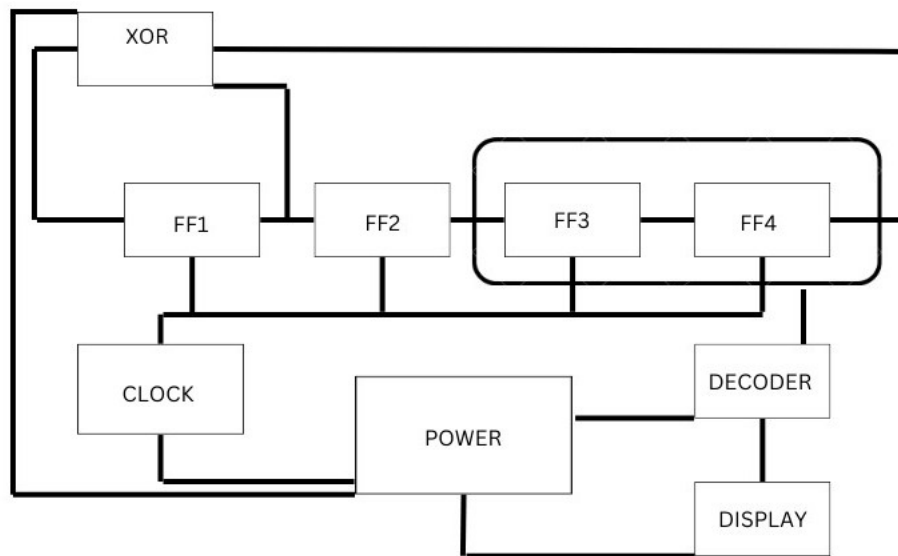


Fig. 1: Block Diagram

### 4. Observation:

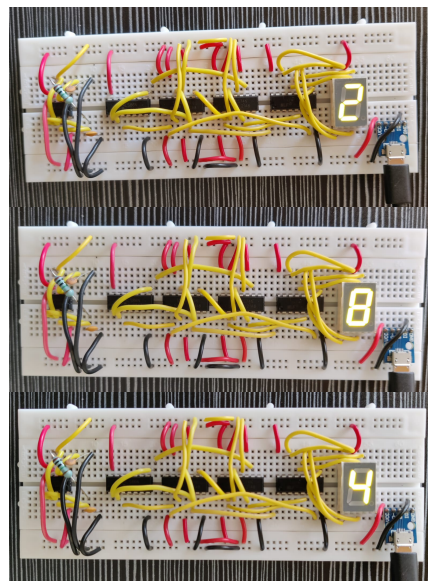


Fig. 2: Observed output

I have observed that random numbers that are generated are displayed on the seven-segment display with a frequency that increases as we increase the resistance connected to the 555 timer IC.