

# Report on Hardwire Assignment

## Random Number Generation using Shift Registers

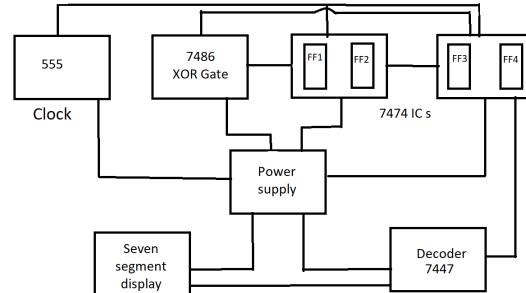
### AI1110 : Probability and Random Variables

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#### 1 COMPONENTS

Component	Value	Quantity
Breadboard		1
Micro USB		1
555 timer IC		1
Resistor	1KΩ	1
Resistor	1MΩ	1
Resistor	10MΩ	1
Capacitor	10nF	1
Capacitor	100nF	1
555 IC		1
XOR gate	7486	1
D Flip Flop	7474	2
Decoder	7447	1
Seven Segment Display		1
Wires		3

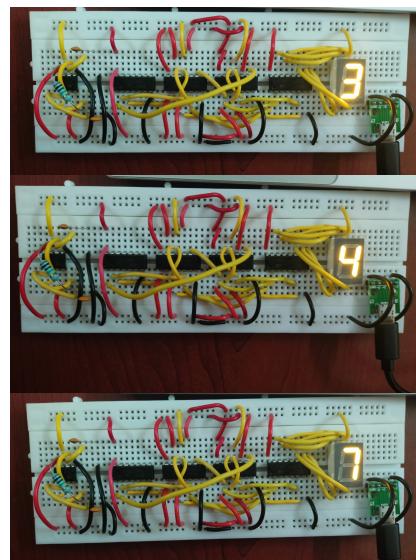
#### 3 BLOCK DIAGRAM



#### 2 DESCRIPTION

- Micro USB is used to get power supply and contains nodes such as Vbus and Gnd which refer to higher and lower voltage respectively.
- Clock circuit is made using 555 timer IC, capacitors and resistor(higher one is chosen inorder to decrease the rate of change of the output ). It generates time delay in the circuit. It generates a square pulse which is checked using oscilloscope.
- D Flipflops are connected to XOR gate each of 7474 IC contains two flipflops and hence total there are 4 flipflops. These overall create a binary output (output from each flip flop is either 0 or 1). XOR gate produces the randomness into the system .
- Finally, the 4-bit output produced is decoded by the decoder ,7447 IC.
- This decoder is connected to Seven Segment Display to get display of the random number produced. Decoder transforms output such that the appropriate segments on Seven Segment Display are illuminated in the range of 0 to 9.

#### 4 OBSERVATION



Random numbers are generated through the circuit where the time delay and frequency of change in numbers in display are influenced by the clock i.e capacitors and resistor in the circuit. Hence, the

produced binary number by flipflops is decoded and displayed on the seven segment display as digits.