

Probability Hardware Project

Random Number Generator

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1 INTRODUCTION

In this report, we will discuss the implementation of a random number generator using shift registers. The generator will utilize a 555 timer to generate the clock signal, which will be connected to D flip-flops to create the shift register. The output of the shift register will be connected to a decoder, and the resulting numbers will be displayed using a 7-segment display.

2 EXPERIMENTAL SETUP

2.1 Materials

The following materials are required for the experiment:

- 555 timer IC
- Two 7474 D flip-flop ICs
- One 7486 XOR gate IC
- 7447 decoder IC
- 7-segment display
- Resistors
- Capacitors
- Breadboard
- Jumper wires
- Power supply

2.2 Procedure

Follow these steps to set up the experiment:

1. Set up the breadboard and connect the power supply to the VCC (positive supply) and GND (ground) rails.
2. Place the 555 timer IC on the breadboard and connect its VCC pin (pin 8) to the VCC rail and the GND pin (pin 1) to the GND rail.
3. Connect a resistor (R1) between the discharge pin (pin 7) of the 555 timer and the junction point of the resistor and capacitor connections.
4. Connect a capacitor (C1) between the discharge pin (pin 7) and the GND rail.

5. Connect the output pin (pin 3) of the 555 timer to the clock signal input of the D flip-flops.

6. Place the two 7474 D flip-flop ICs on the breadboard and connect their VCC pins (pin 14) to the VCC rail and their GND pins (pin 7) to the GND rail.

7. Connect the clock (CLK) pin of each D flip-flop to the output pin (pin 3) of the 555 timer.

8. Connect the Q output pin (pin 1) of the first D flip-flop to the D input pin (pin 2) of the second D flip-flop.

9. Place the 7486 XOR gate IC on the breadboard and connect its VCC pin (pin 14) to the VCC rail and its GND pin (pin 7) to the GND rail.

10. Connect the XOR gate output pin (pin 3) to the D input pin (pin 2) of the first D flip-flop.

11. Connect the outputs of the shift register (Q3, Q2, Q1, Q0) to the inputs of the decoder (pins 4, 2, 1, 7).

12. Connect the corresponding outputs (a-g) of the decoder to the segments of the 7-segment display using appropriate resistors.

13. Connect the VCC and GND pins of each IC to the VCC and GND rails on the breadboard.

14. Provide power to the circuit by connecting the power supply.

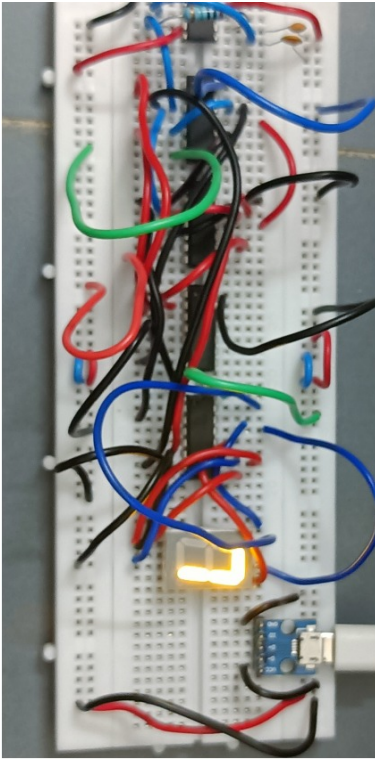
15. Observe the output on the 7-segment display.

3 CONCLUSION

In this experiment, we successfully implemented a random number generator using shift registers. The circuit utilized a 555 timer to generate the clock signal, which was connected to D flip-flops to create the shift register. The output of the shift register was connected to a decoder, which drove a 7-segment display to display the generated random numbers.

4 OBSERVATION1

we can see that random number generated is 7.



5 OBSERVATION2

here we can see square signal generated by clock.

