

Hardware Assignment

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EE22BTECH11206

Description

Setup

- This circuit uses 5V from microusb.
- This is the Vcc of the circuit.
- The inner buses on both sides are at Vcc.
- The lowest bus is GND.
- The uppermost bus is carrying the Clock signal from the 555 timer.

Circuit Overview

1. The Flipflops take clock from the clock bus and based on their initial state, output a sequence of numbers.
2. The sequence is fixed and if the circuit is operated without concern for the initial state, the output number shown is generated randomly from 1 to 15 (both inclusive), with equal probability of all of them.
3. The decoder is able to show numbers from 0 to 15, and the ABCD formed by the flipflops do not become 0000 at any point of time.
4. The output repeats after all 16 numbers are shown.
5. This circuit is deterministic, hence, the randomness can be decoded out by simply referring to the sequence.
6. Sequence generated by this sequence is 3,7,15,14,13,10,5,11,6,12,9,2,4,8,1,3,7.....

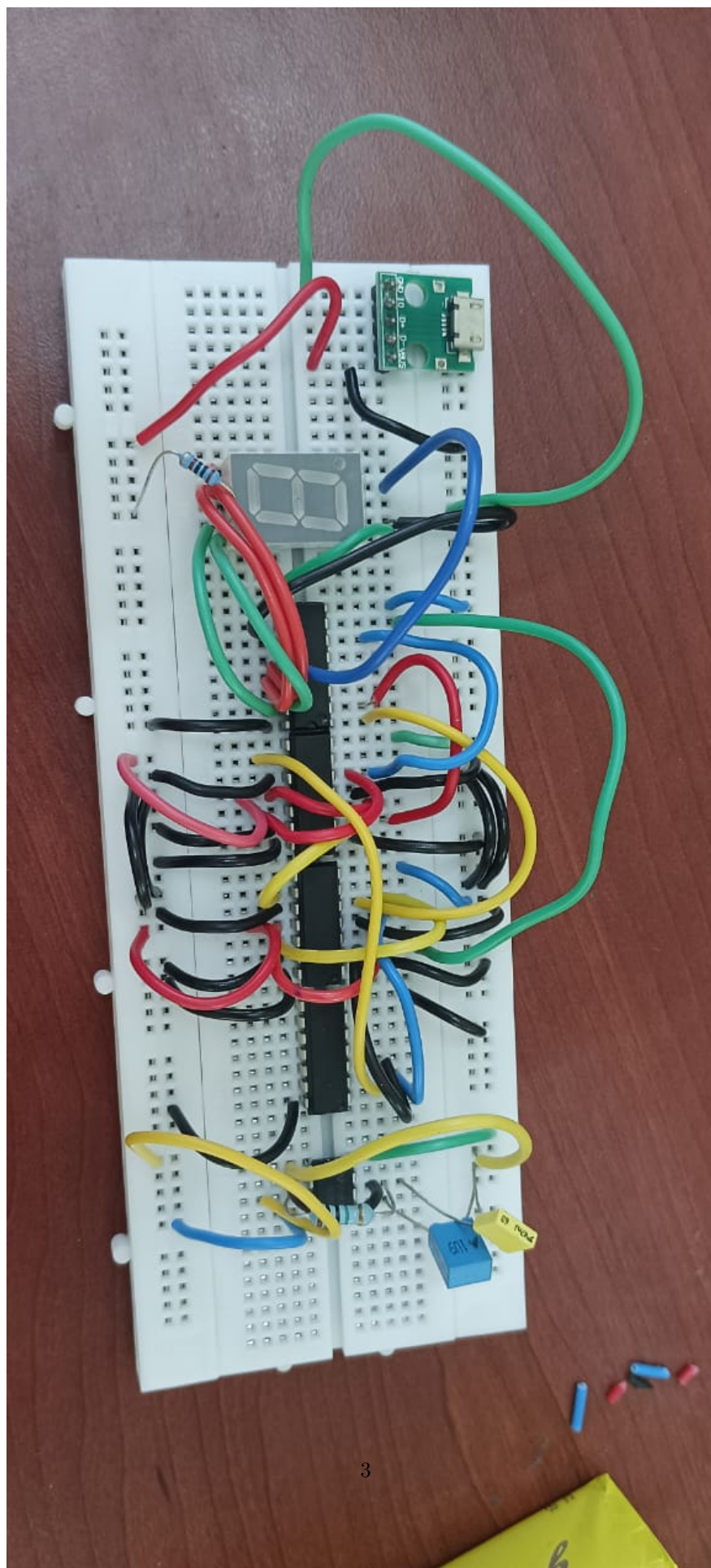
Timer

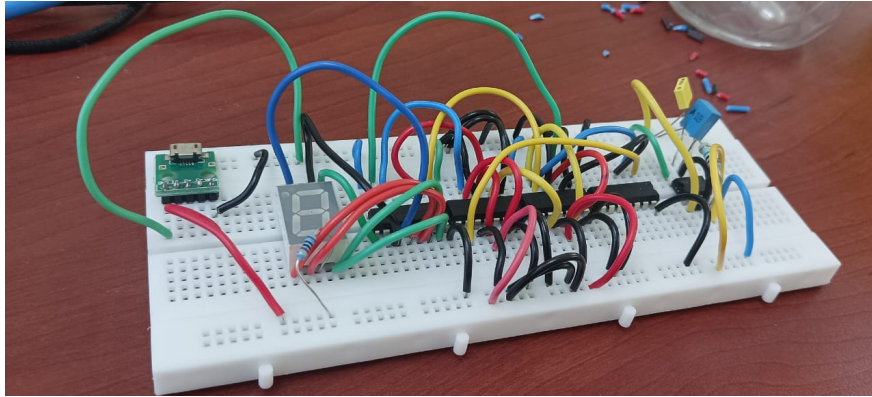
1. The time period can be changed using different values of Resistor and Capacitor.
2. If the capacitors used are 47nF and 470nF, we get a square pulse of 5V every 0.9 seconds approximately. Which is slow enough to allow us to take readings from the resistor.

Components

1. Breadboard
2. Seven Segment Display - Common Anode
3. 7447 Seven Segment Display Decoder

4. 7474 D FlipFlop x2
5. 7486 XOR gate
6. 555 precision timer
7. Resistor $10\text{M}\Omega$
8. Resistor $1\text{K}\Omega$
9. Capacitor 47nF
10. Capacitor 470nF
11. USB micro B breakout board
12. Jumper wires





Block Diagram

