Digital Electronics

Assignment

Title: Digital Voting System with Countdown Timer and Real-Time Vote Tally	
Batch Number: CSNE Y2S1 (WE)	Group Number: IT23184176

Declaration:

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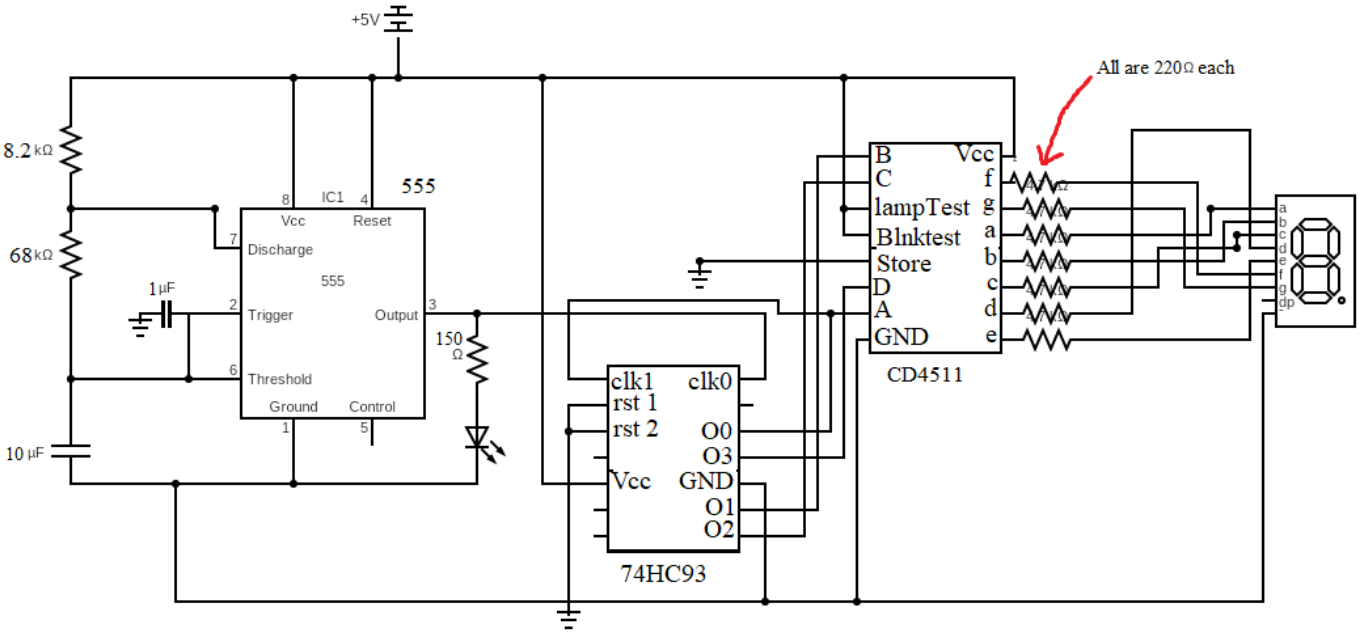
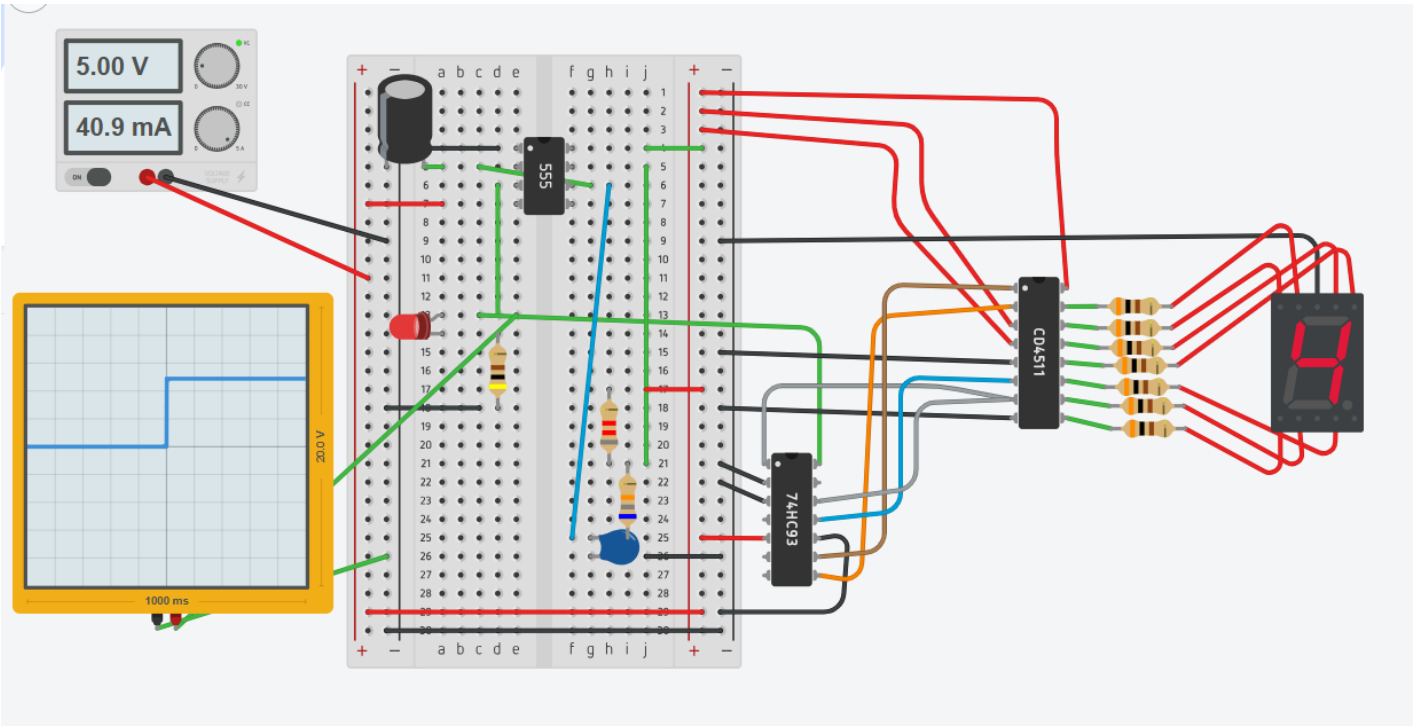
Group Members:

IT23184176	Wanniarachchi C P	..... signature 
IT21258176	Fernando W.W.S.M	..... signature 

Submitted on: <25/10/2024>

1. <u>Countdown Timer (0 to 9 Seconds)</u>





The 555 timer is configured in astable mode to generate a clock signal (square wave) that drives the 74HC93 counter.

Components:

1. Resistors 8.2k and 68k : These resistors, along with the 1µF capacitor, determine the frequency of the clock signal.

2. Capacitors 1uF and 10uF: The 1uF capacitor is part of the timing network for the 555, while the 10uF capacitor stabilizes the power supply (filtering).

3 .150ohm resistor and LED: The LED indicates when the 555 timer is outputting a high signal, showing the pulse generated by the clock.

Operation:

555 timer:

The output of the 555 timer (pin 3) generates a periodic square wave that toggles between high (5V) and low (0V) states.

This acts as the clock input for the 74HC93 counter.

The frequency of the clock signal is determined by the resistor-capacitor combination.

Calculation:

$$f = \frac{1.44}{(R_1 + 2R_2)C}$$

$$= \frac{1.44}{(8200+2X68000)X1X10^{-6}}$$

$$= \frac{1.44}{0.1442} = 9.986Hz$$

74HC93 4-bit Binary Counter:

The 74HC93 counts from 0 to 9 (in binary form), then resets back to 0. Its binary output is give into the CD4511.

Then converts it to a BCD format to display on the 7-segment display.

CD4511 BCD to 7-Segment Decoder:

The CD4511 decodes the 4-bit binary value from the 74HC93 into the correspondin signals to illuminate the corresponding segments of the 7-segment display.

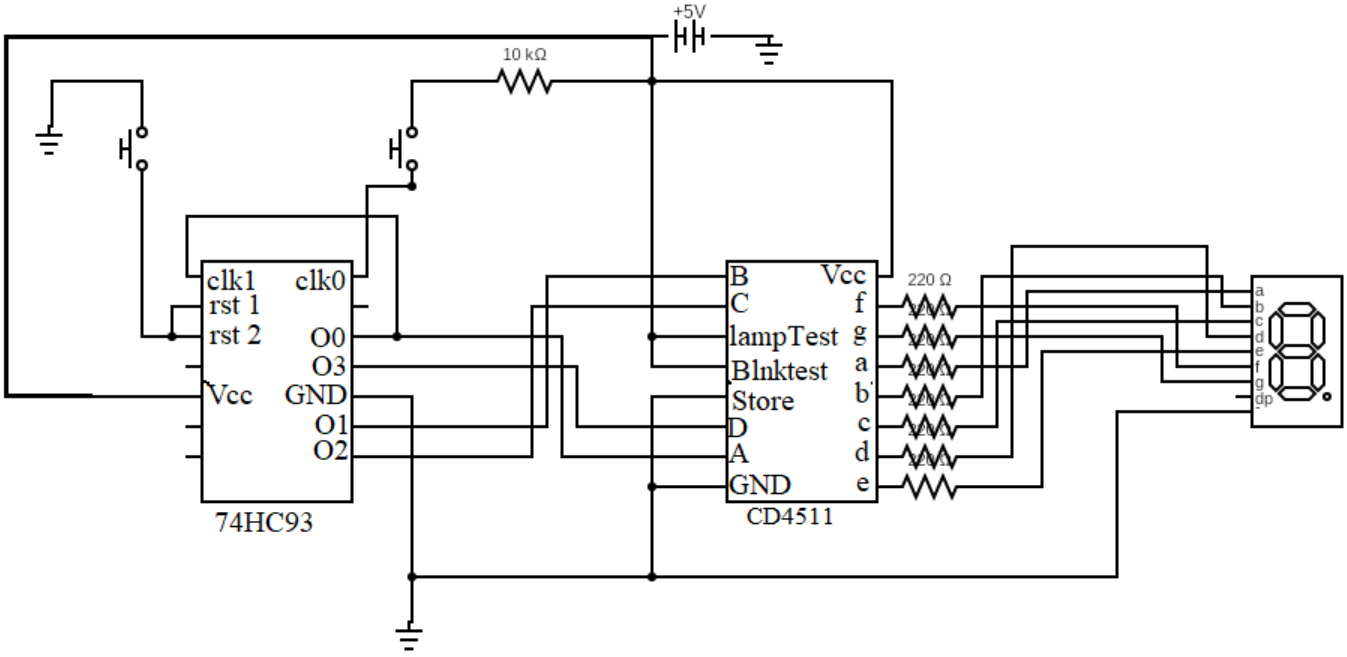
7-Segment Display:

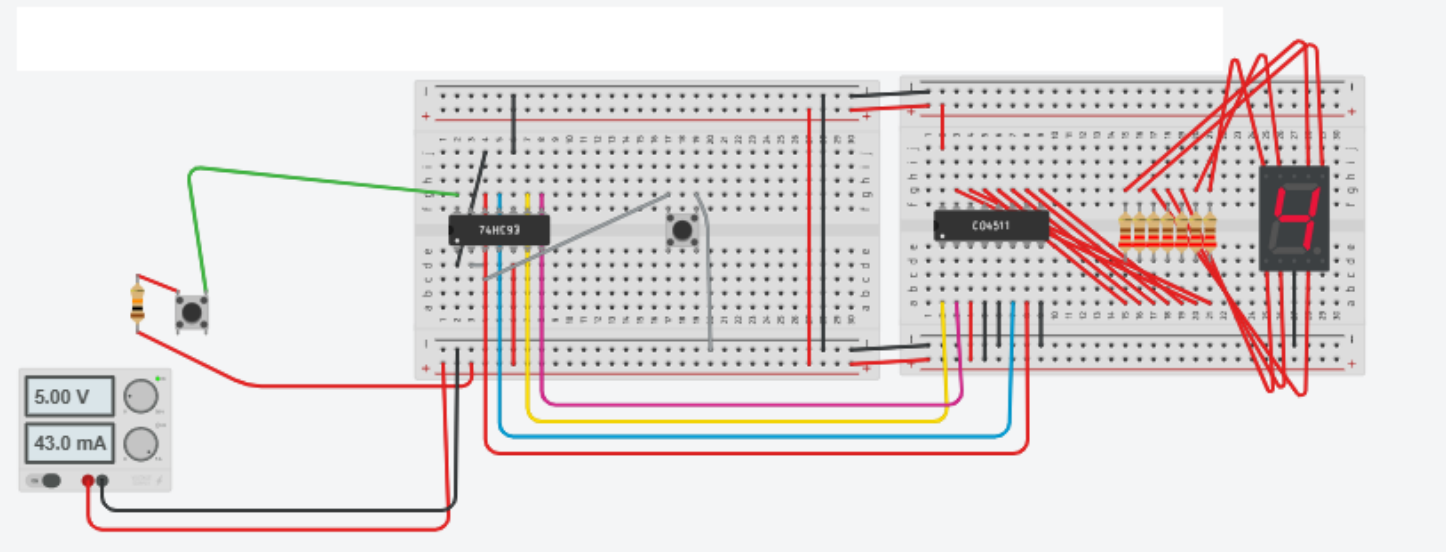
Each segment of the 7-segment display has a 220Ω resistor in series to limit the current.

Full Circuit Operation:

1. The 555 timer generates a clock signal with a frequency of nearly 1 Hz by the resistors and capacitors.
2. This clock signal drives the 74HC93 counter then increments its count on each clock pulse.
3. The binary outputs of the 74HC93 are decoded by the CD4511 into signals which are correspond to 7-segment display.

2. Vote Casting and Real-Time Vote Tally Display:





Components:

3. 74HC93: A 4-bit binary counter.
4. CD4511: A BCD to 7-segment decoder.
5. Push buttons: Used to control the counter's increment (clock) and reset functionalities.
6. 7-segment display: To show the count value.
7. Resistors (220Ω): Current limiting resistors for each segment of the display.

74HC93 Counter:

1. The 74HC93 is a 4-bit binary counter with multiple clock inputs (clk0 and clk1).
2. The clock pulses from a push button are given into the clk0 input of the 74HC93 to increment the counter.
3. rst1 and rst2 are connected to another push button, allowing manual resetting of the counter. When both rst1 and rst2 are pulled high, the counter resets to zero.
4. The outputs O0, O1, O2, and O3 provide the binary count, which will be processed by the next stage.

CD4511 Decoder:

1. The BCD outputs from the 74HC93 counter are given into the A, B, C, and D inputs of the CD4511. These correspond to the least significant bits of the binary count.
2. The CD4511 converts the binary number into a 7-segment display output by lighting the appropriate segments of the display.

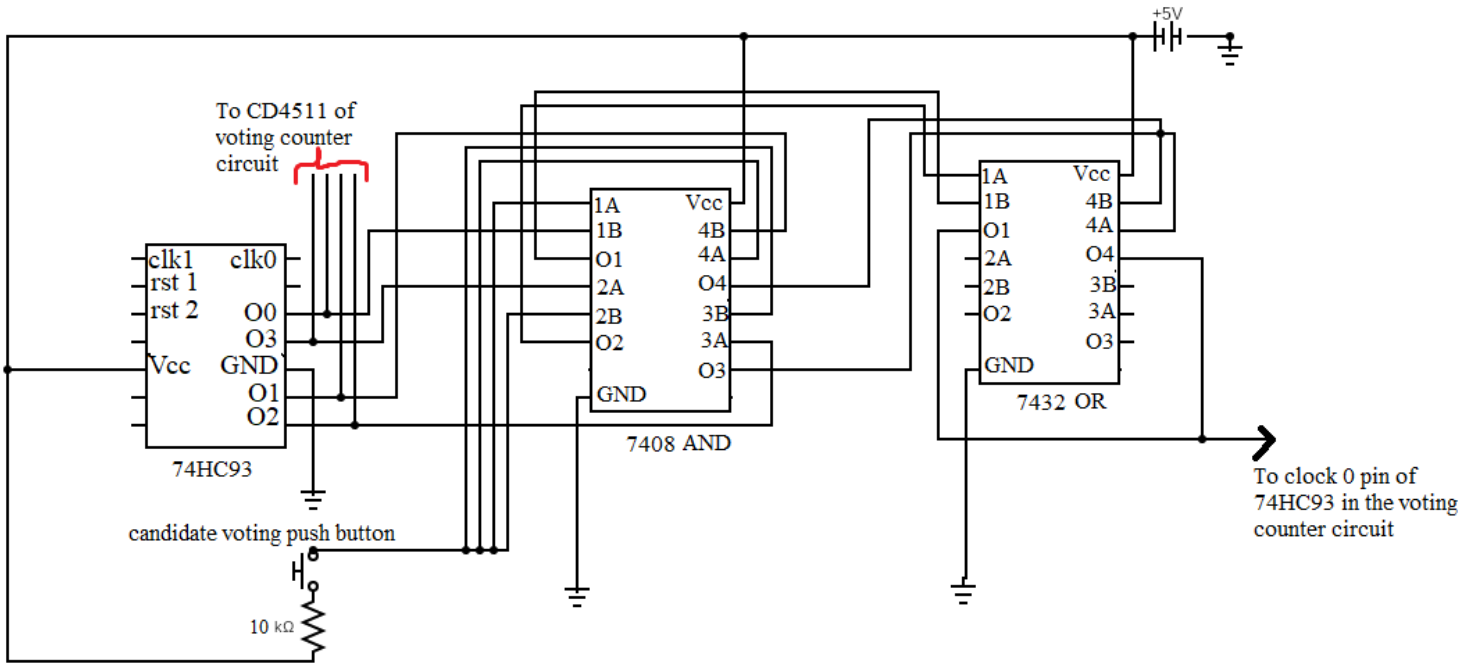
Push Buttons:

The circuit has two key push buttons. One is used to manually trigger the clock (increments the counter), and the other is for resetting the counter back to zero.

Circuit Operation:

1. When powered on, the counter will display "0" on the 7-segment display.
2. Each press of the clock button sends a pulse to clk0 on the 74HC93, incrementing the binary count. The binary output is decoded by the CD4511 and displayed on the 7-segment display.
3. Pressing the reset button sends a high signal to rst1 and rst2 of the 74HC93, resetting the counter to zero, and the display reflects this change.

3. Connecting countdown timer with vote counter (using AND logic)



7408 (Quad 2-input AND Gate):

This AND gate ensures that a vote is only counted if both conditions are true:

1. The countdown timer is active.
2. A voter presses the voting push button.

One set of inputs comes from the binary counter's output, representing the vote count.
The other inputs of the AND gates will receive signals from the countdown timer, meaning that voting is allowed only within the valid time frame.

Logic:

The output of each AND gate will only be high if both the vote button is pressed and the countdown timer allows voting (i.e., the timer hasn't reached zero).
This prevents voters from casting votes outside of the designated voting period.

7432 (Quad 2-input OR Gate):

The 7432 OR gate is used to combine the outputs from the AND gates and send a clock pulse to the voting counter's 74HC93.

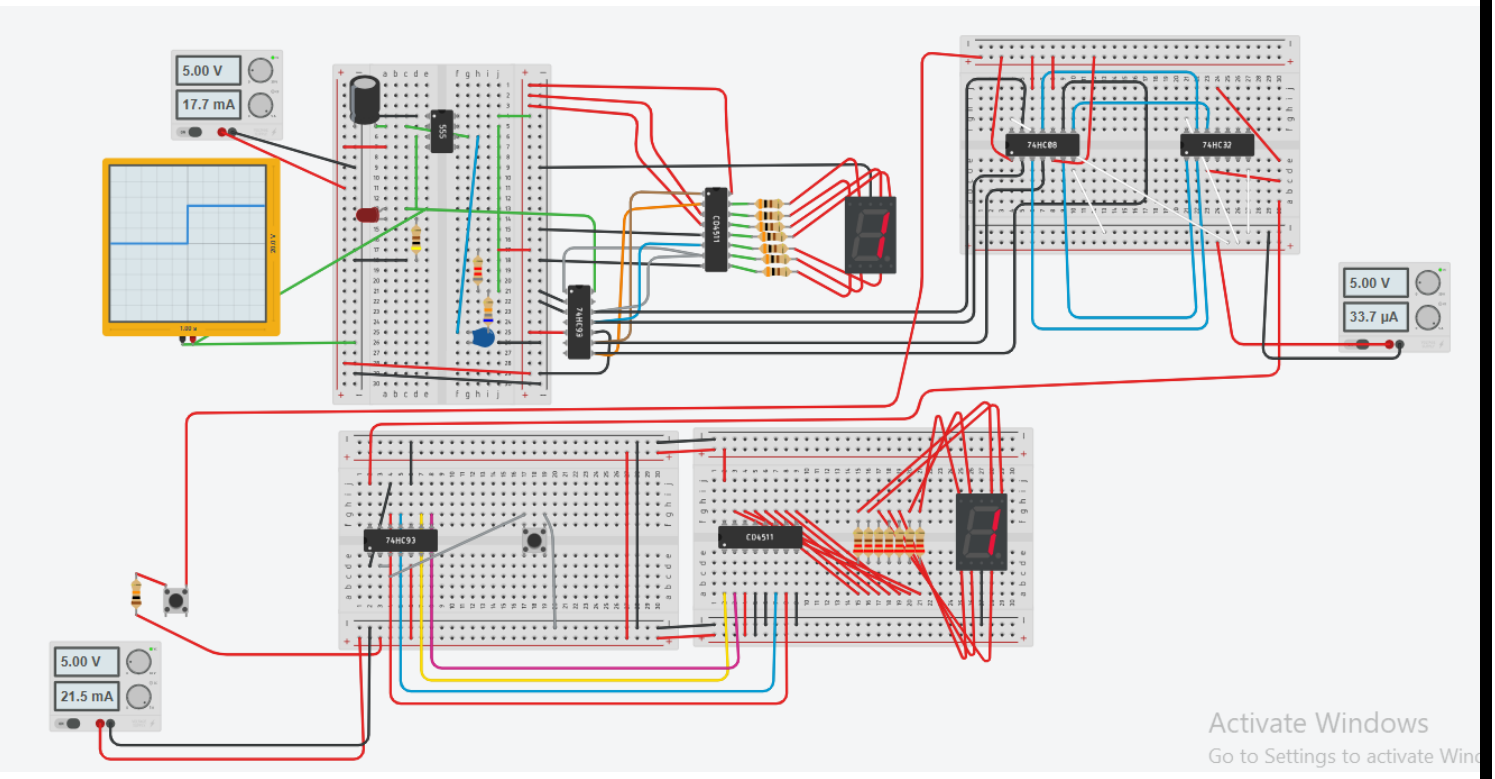
The outputs from the 7408 AND gates are given into the inputs of the 7432 OR gate.

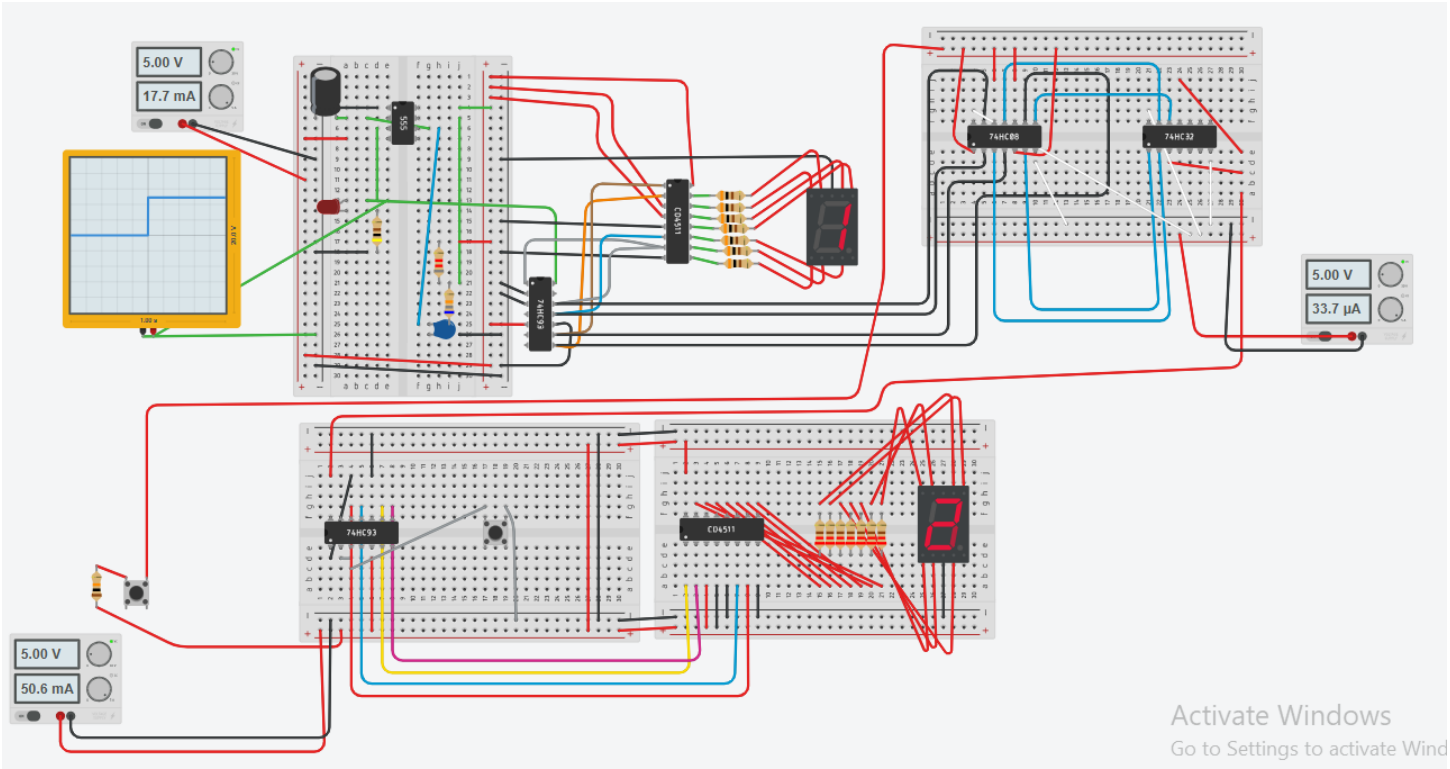
The final output of the OR gate is connected to the clock input (clk0) of the voting counter's 74HC93.

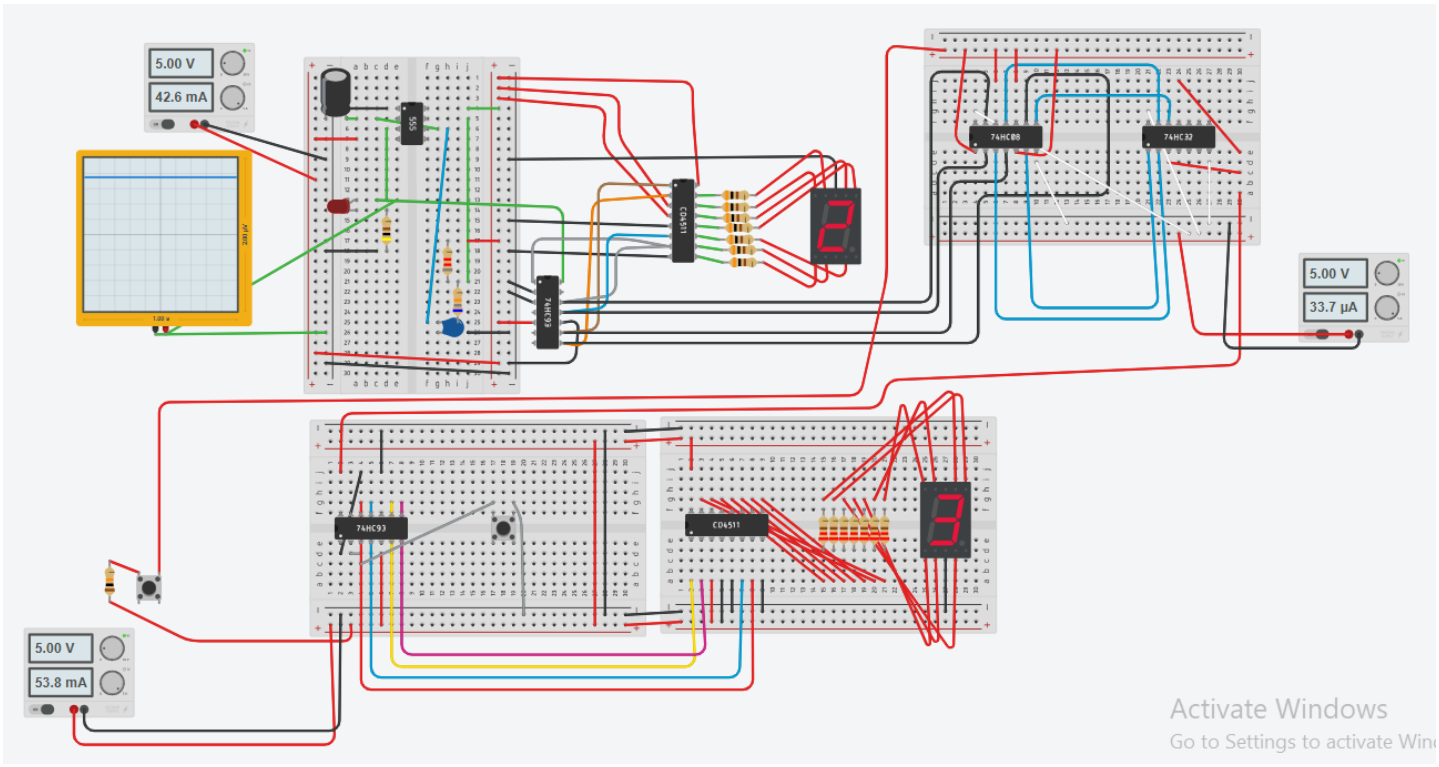
Logic:

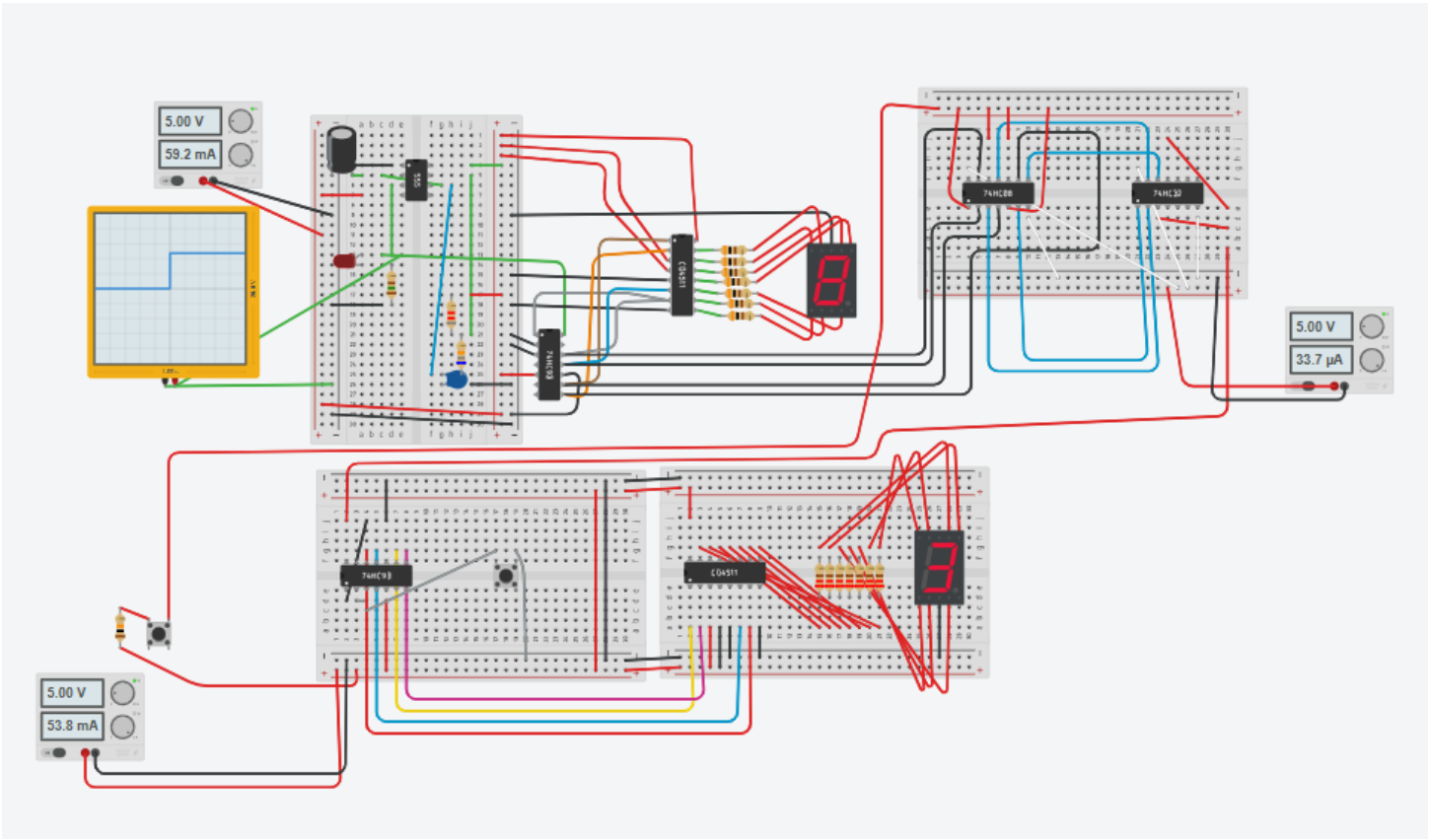
If any of the AND gates output a high signal (indicating a valid vote within the time frame), the OR gate will send a clock pulse to the voting counter, incrementing the vote count.

4. Full Circuit for a 1 candidate

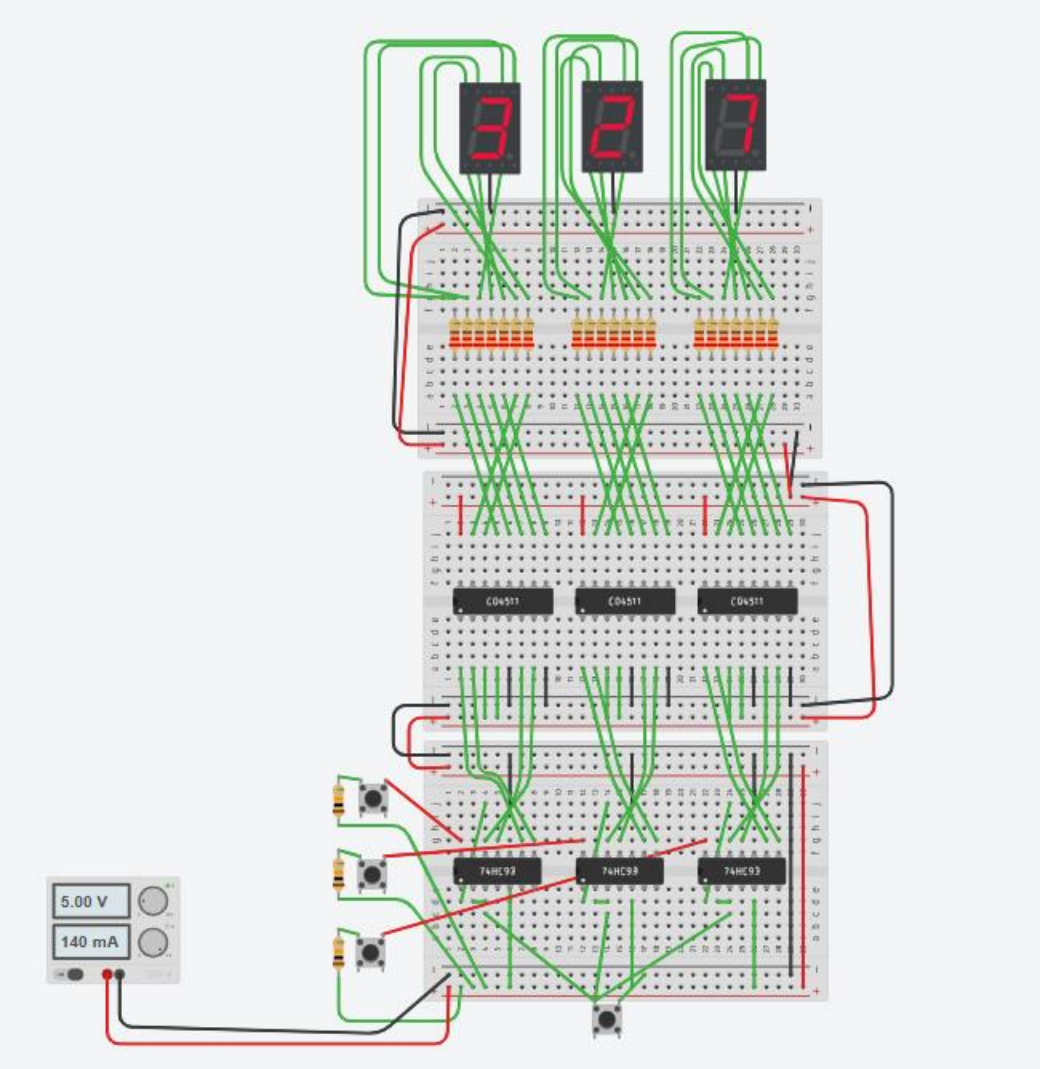




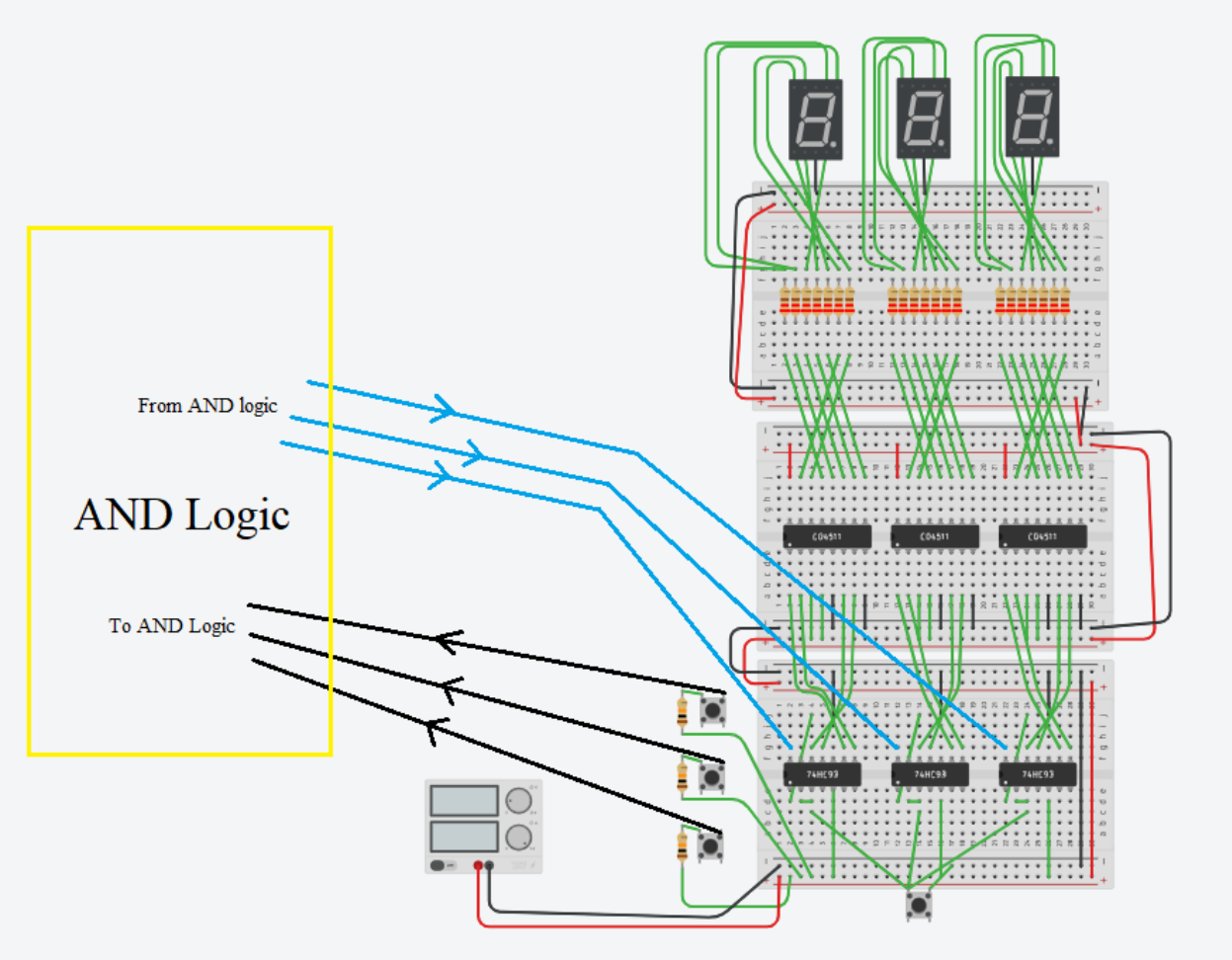

5.00 V
42.6 mA
555
74HC08
74HC32
CD4511
74HC93
5.00 V
33.7 µA
74HC93
CD4511
5.00 V
53.8 mA
Activate Windows
Go to Settings to activate Win


5.00 V
59.2 mA
555
74HC08
74HC32
CD4511
74HC93
5.00 V
33.7 µA
74HC93
CD4511
5.00 V
53.8 mA

5. **Full circuit for all 3 candidates(without countdown timer)**



6. Full circuit for all 3 candidates(with countdown timer)



Thank you! (for all who supported)