

Abstract

Title: Implementation of Bistable Multivibrator (using 555 Timer)

Theory/Description : A Bistable Multivibrator doesn't require a capacitor as the RC charging unit is not responsible for the generation of the output. The generation of high and low outputs is not dependent on the charging and discharging of the capacitor in the RC unit but rather it is controlled by the external trigger and reset signals.

Explanation: 1. The trigger and reset pins (pins 2 and 4 respectively) are connected to the supply through two resistors R1 and R2 so that they are always high.

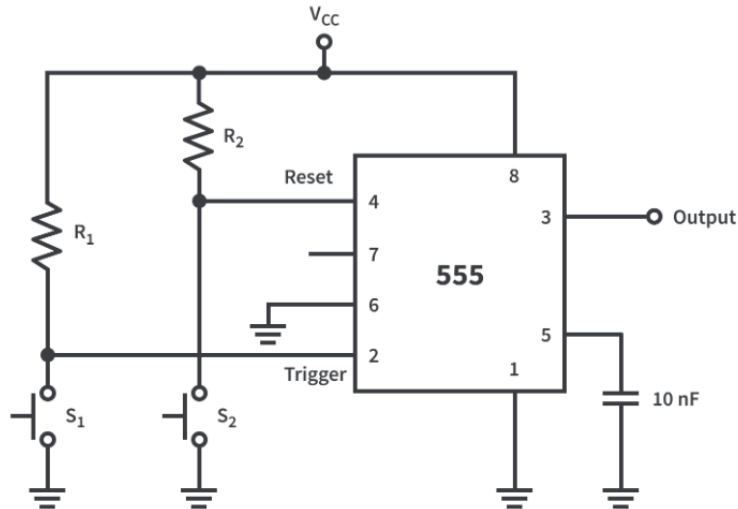
2. Two switches are connected between these pins and ground in order to make them go low momentarily. The switch at the trigger input will act as S (SET) input for the internal flip-flop. The switch at the reset input will act as reset for the internal flip-flop.

3. When the switch S1 is pressed, the voltage from VCC will bypass the trigger terminal and is shorted to ground through the resistor R1. Hence, the trigger pulse will momentarily go low and the output of the timer at pin 3 will become HIGH. The output stays HIGH because there is no input from the threshold pin (pin 6 is left open or better if connected to ground) and the output of the internal comparator (comparator 1) will not go high.

4. When the switch S2 is pressed, the voltage from VCC will bypass the reset terminal and is shorted to ground through the resistor R2. This pin is internally connected to the RESET terminal of the flip-flop. When this signal goes low for a moment, the flip-flop receives the reset signal and RESETs the flip-flop.

5. Hence, the output will become LOW and stays there until the trigger is applied.

Sample diagram circuit diagram:



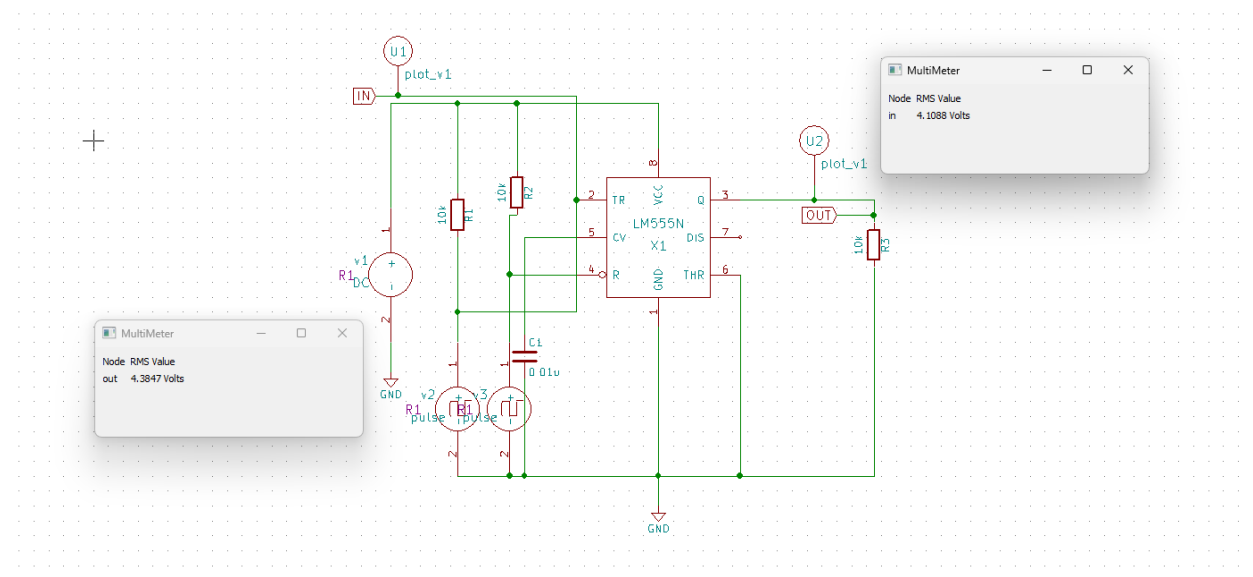
Applications:

1.The 555 timer in bistable mode i.e. as a flip-flop can be used in low speed, non-computer applications like robotics. A simple application is a robot which moves forward and backward every time it hits an object.

2.Memory is an important unit in digital electronics. Flip-flops are the basic 1 – bit storage elements. A 555 timer, when used as a flip-flop, can act as a memory cell to store 1 – bit data.

Circuit Diagram(s):

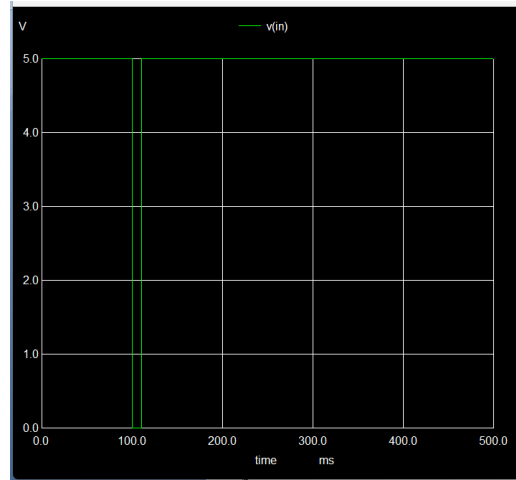
The below circuit diagram also includes the multimeter readings.



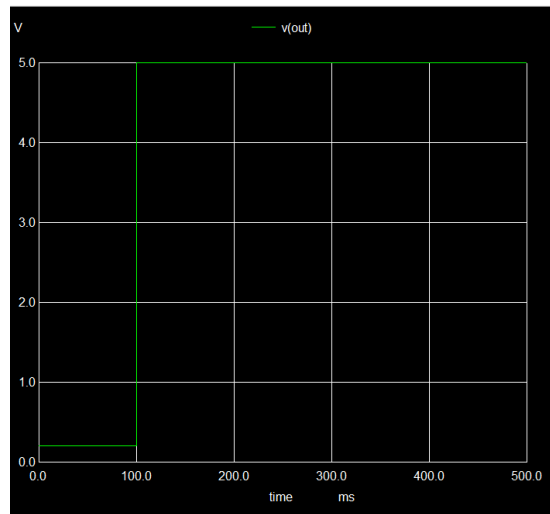
Results/ Output (ngspice and/or Python plots):

The input output plots in ngspice are as follows:

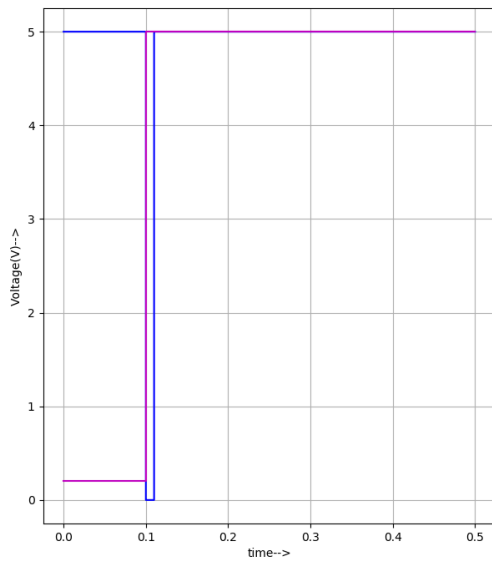
Input :



Output:



The python plots are as follows(Between in and out):



References:

1. Links:

<https://www.electronicshub.org/2-way-switch-wiring/>

<https://www.electronicshub.org/bistable-multivibrator-using-555-timer/>

<https://www.circuitbread.com/tutorials/555-timer-3-bistable-multivibrator-configuration>

2. **Title of the paper:** Design and Implementation of Bistable Multivibrator using 555 Timer

Name of the journal/publication: IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE)

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