TITLE OF THE EXPERIMENT

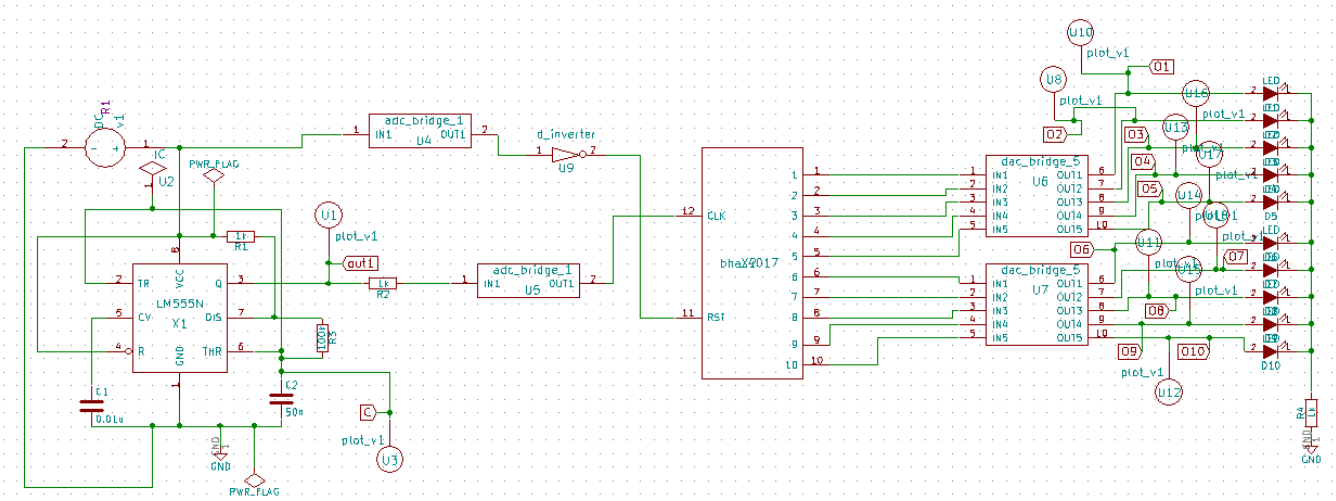
DESIGN OF DIGITAL DECODER COUNTER USING LM555 TIMER AND IC 4017 IN ESIM

THEORY

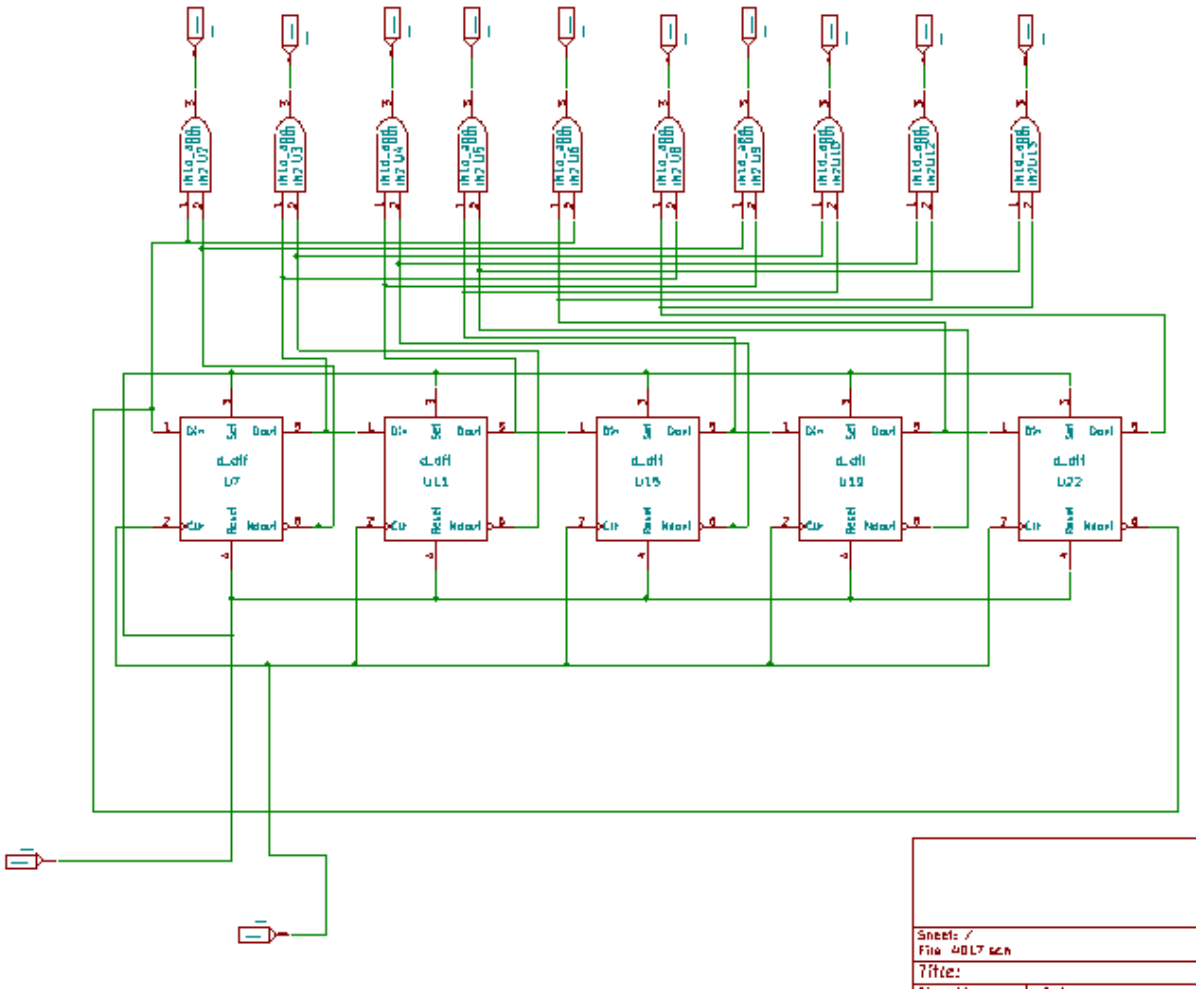
The 555 IC will operate in astable mode. The 555 IC in the circuit is used as a clock pulse generator to provide input clock pulses to the counter IC 4017. Whenever a clock pulse is received at the clock input of IC 4017 counter, the counter increments the count and activates the corresponding output PIN. When count is zero, PIN-1 is HIGH, which means LED-1 will be ON and all the other LEDS are OFF. After the next clock pulse, PIN-2 of IC 4017 is HIGH, which means that LED-2 will glow and all the other LEDs can be turned OFF. This repeats and the LEDs turn ON and OFF successively on each clock pulse thereby producing a circling effect which I have demonstrated in the animation above.

Schematic Diagram

The schematic diagram of digital decoder counter is.

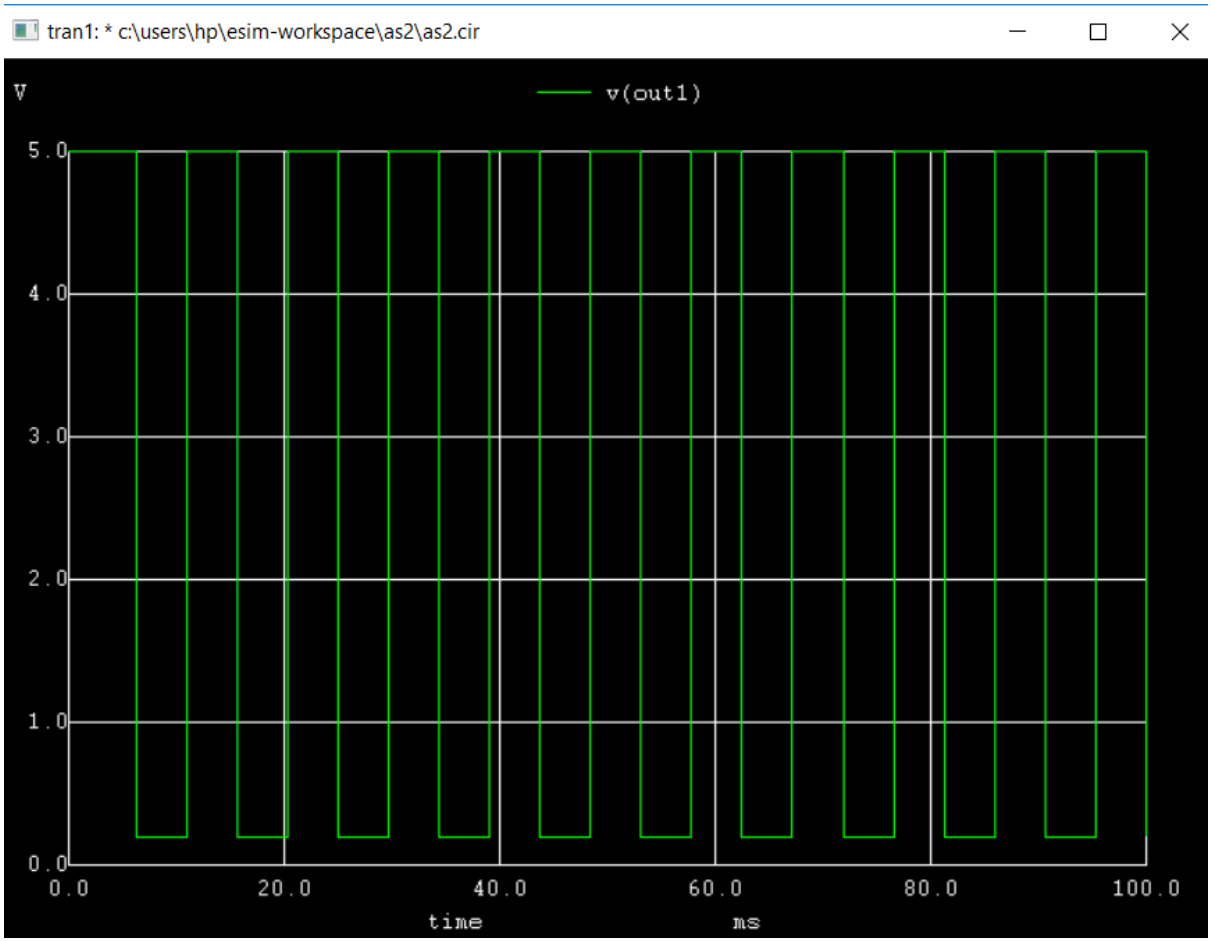


Here I used a subcircuit of LM555 and IC4017.The internal structure of this is shown below.

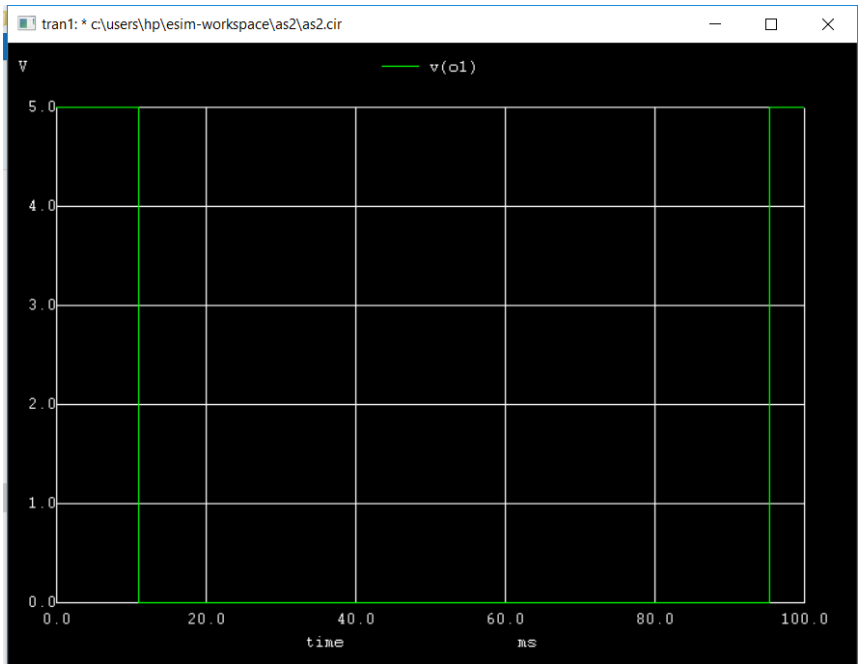


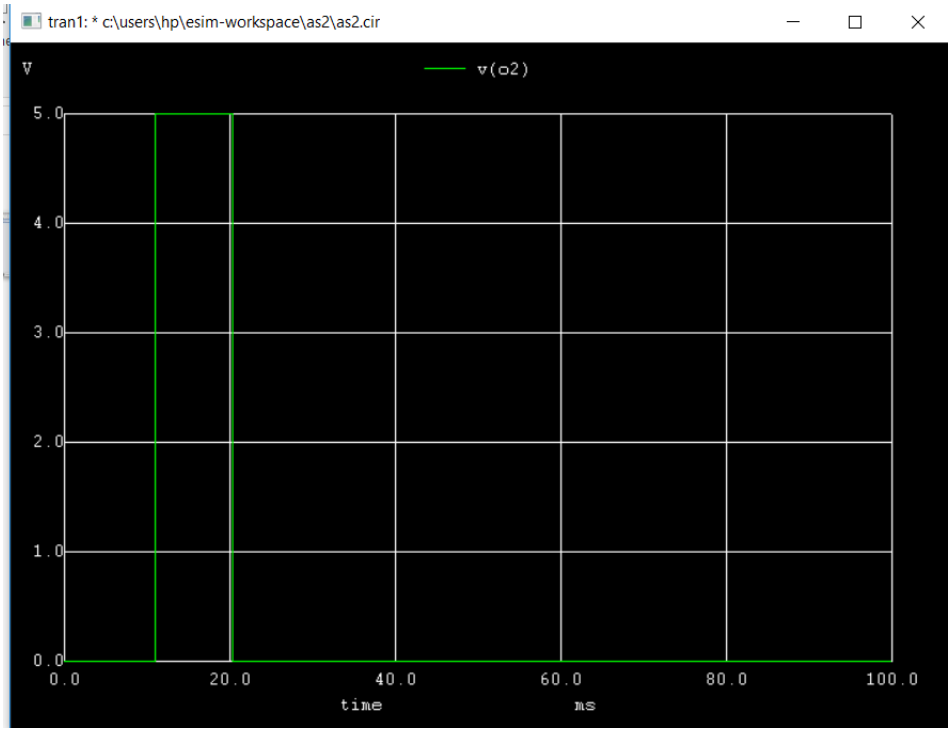
Input Ngspice Plots:

Input clock for 4017IC



Output Ngspice Plots:

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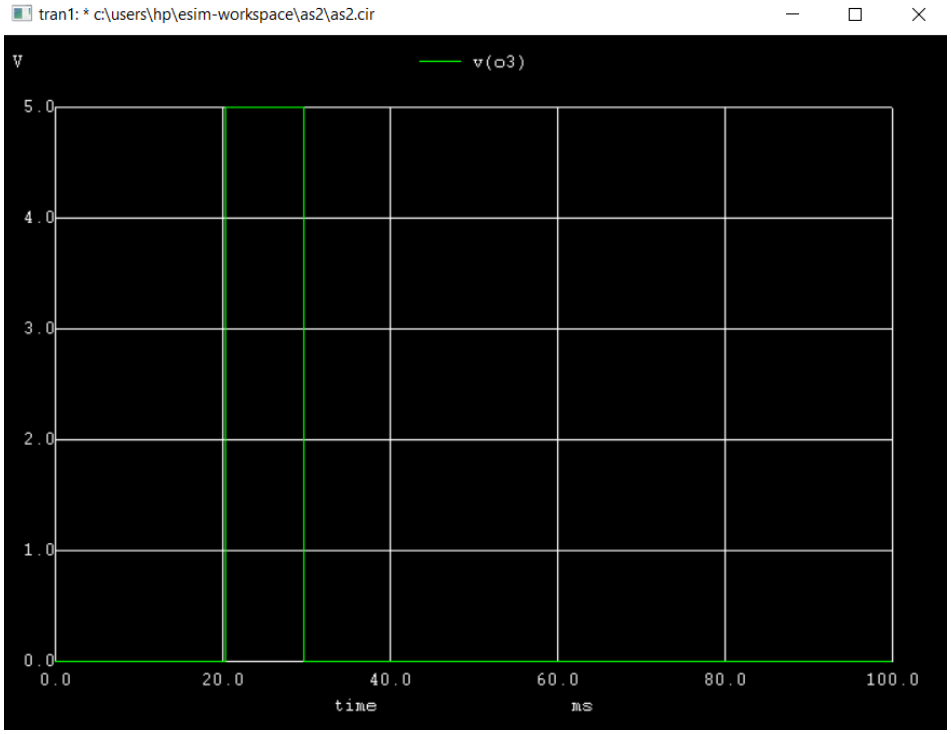
V
v(o2)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
ms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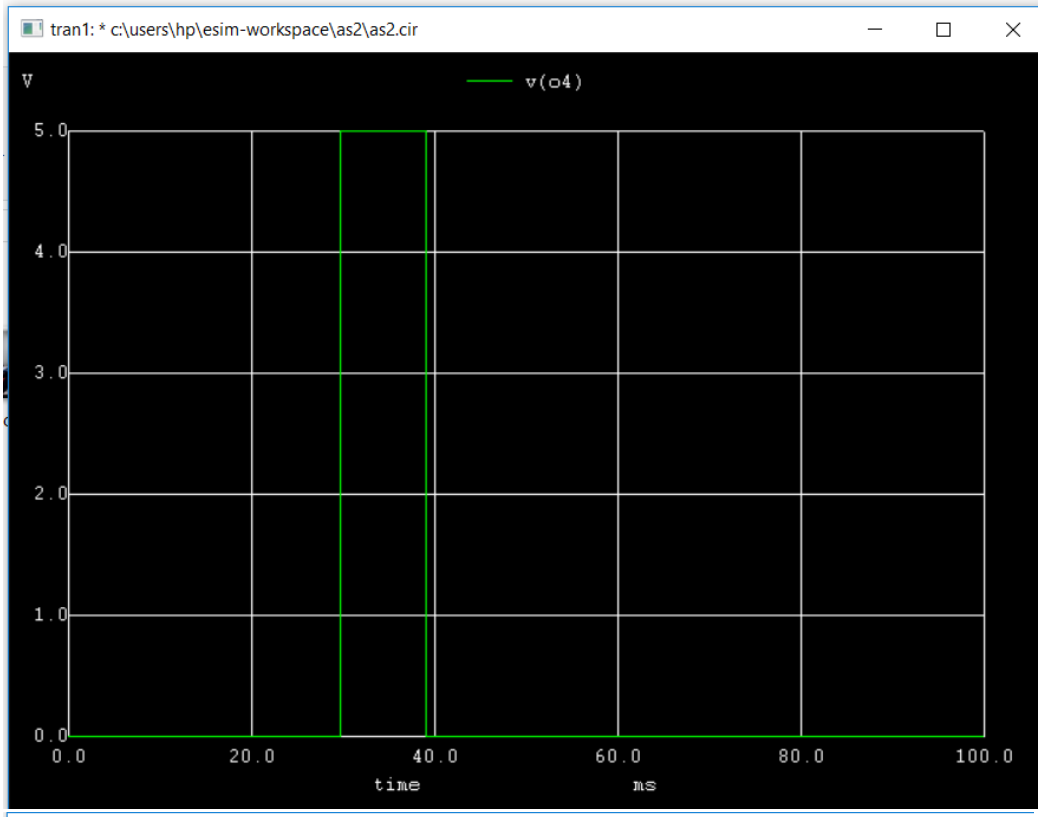
V
v(o3)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
ms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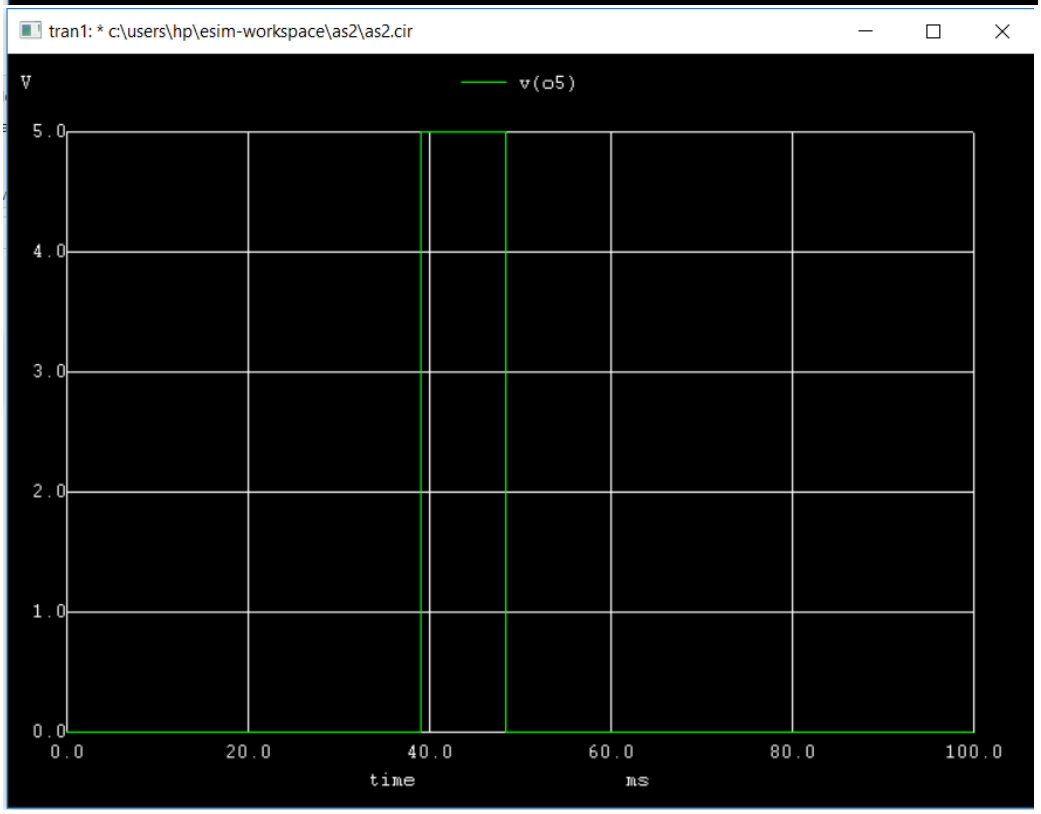
V
v(o4)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
ms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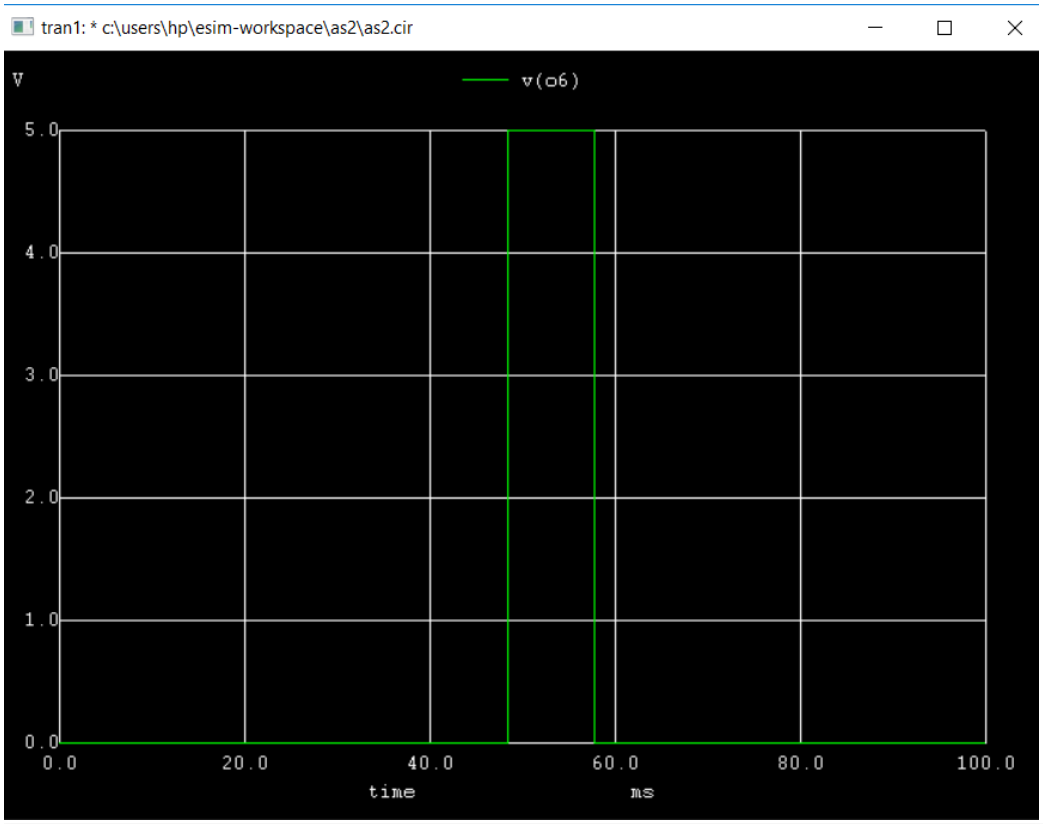
V
v(o5)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
ms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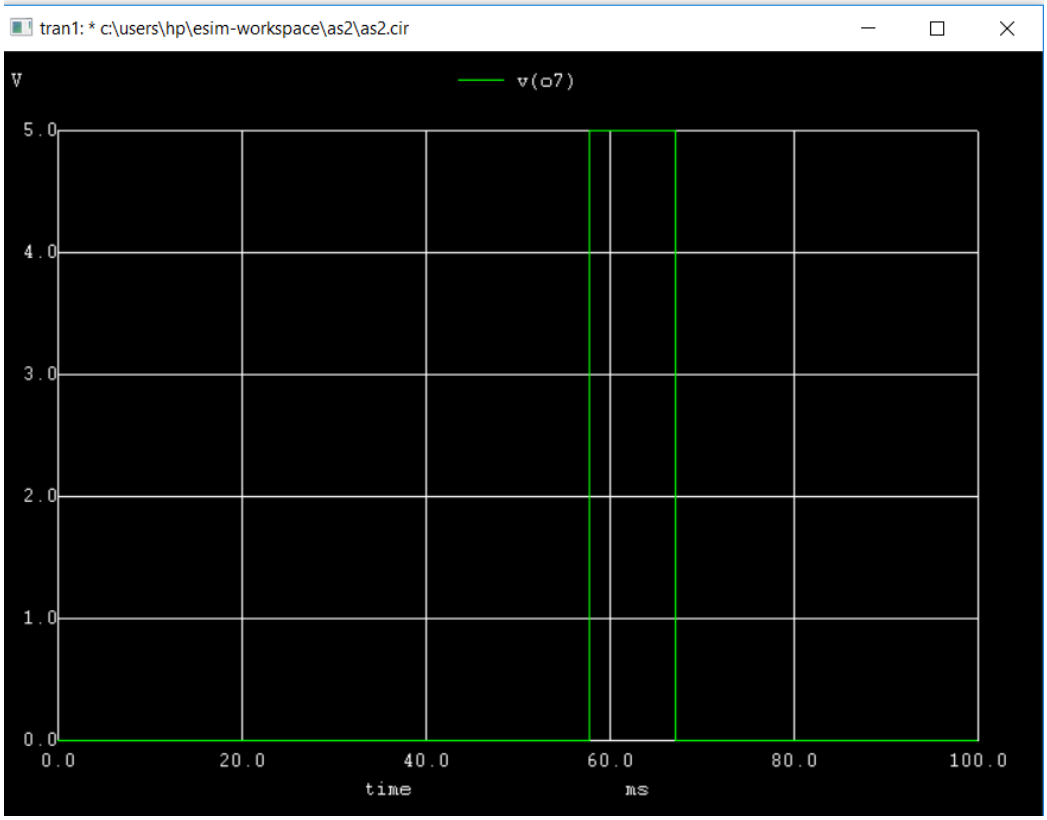
V
v(o6)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
ms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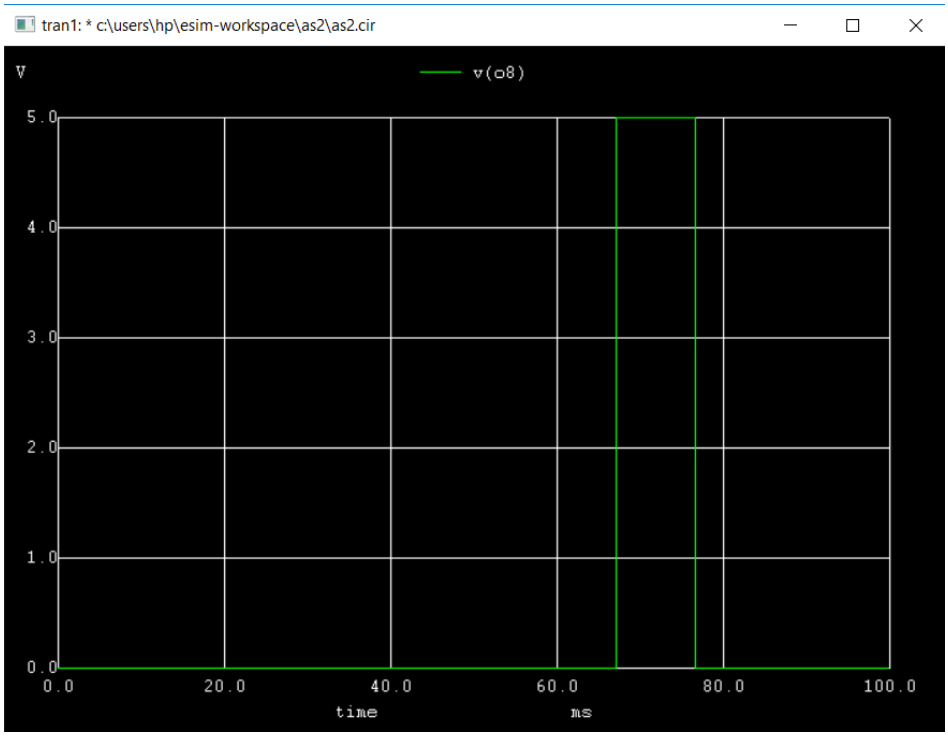
V
v(o7)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
ms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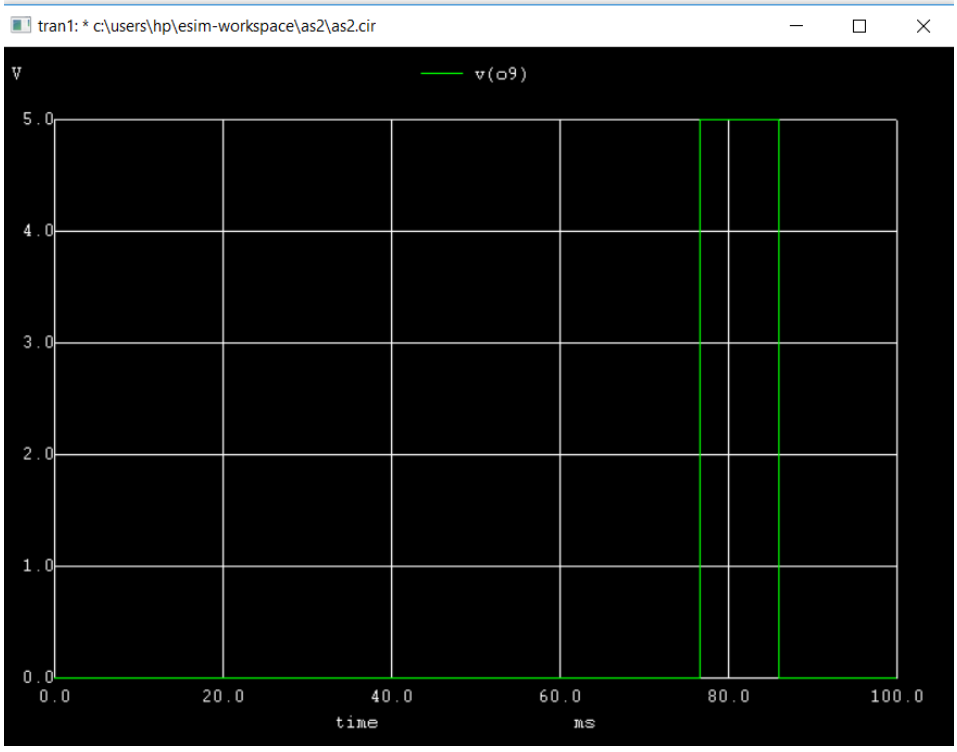
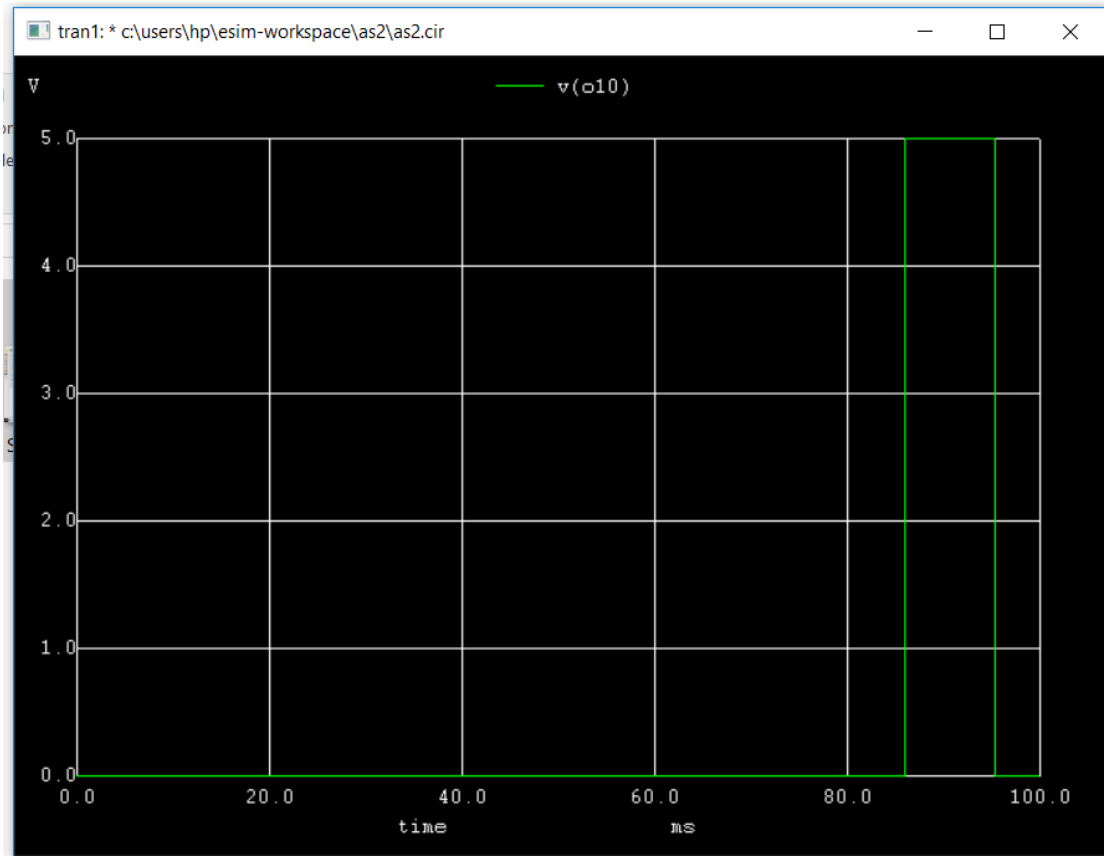
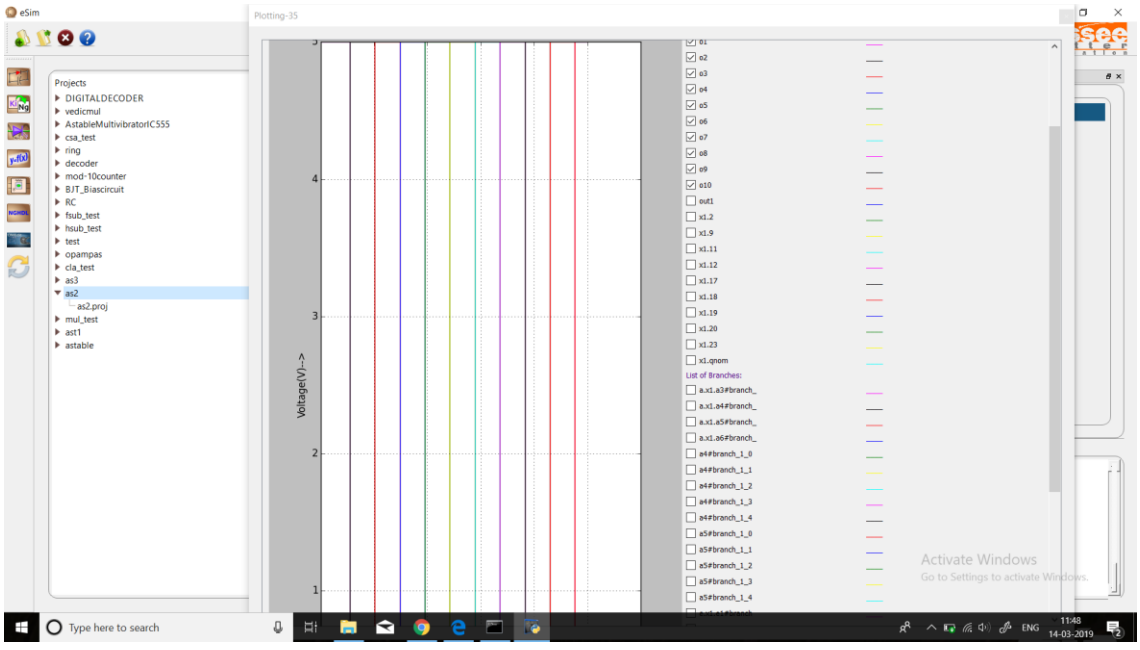
V
v(o8)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
ms


tran1: * c:\users\hp\esim-workspace\as2\as2.cir
V
v(o9)
5.0
4.0
3.0
2.0
1.0
0.0
0.0
20.0
40.0
60.0
80.0
100.0
time
ms



Python Plot:



References:

https://electrosome.com/led-chaser-ic-4017-ic-555/,https://www.elprocus.com/ic-4017-pin-configuration-application/