Title Of The Experiment:
PULSE WIDTH MODULATOR

THEORY:

Pulse Width Modulation (PWM) is a digital signal which is most commonly used in control circuitry. This signal is set high (5v) and low (0v) in a predefined time and speed. The time during which the signal stays high is called the “on time” and the time during which the signal stays low is called the “off-time”. There are two important parameters for a PWM as discussed below:

The percentage of time in which the PWM signal remains HIGH (on time) is called a duty cycle. If the signal is always ON it is in 100% duty cycle and if it is always of it is 0% duty cycle.

Duty Cycle =Turn ON time/ (Turn ON time + Turn OFF time)

The frequency of a PWM signal determines how fast a PWM completes one period. One Period is complete ON and OFF of a PWM signal as shown in the above figure. In our tutorial, we will set a frequency of 5KHz.

We can notice if LED being OFF for half second and LED being ON for another half-second. But if Frequency of ON and OFF times increased from ‘1 per second’ to ’50 per second’. The human eye cannot capture this frequency. For a normal eye, the LED will be seen, as glowing with half of the brightness. So with the further reduction of ON time, the LED appears much lighter.

CIRCUIT DIAGRAM:

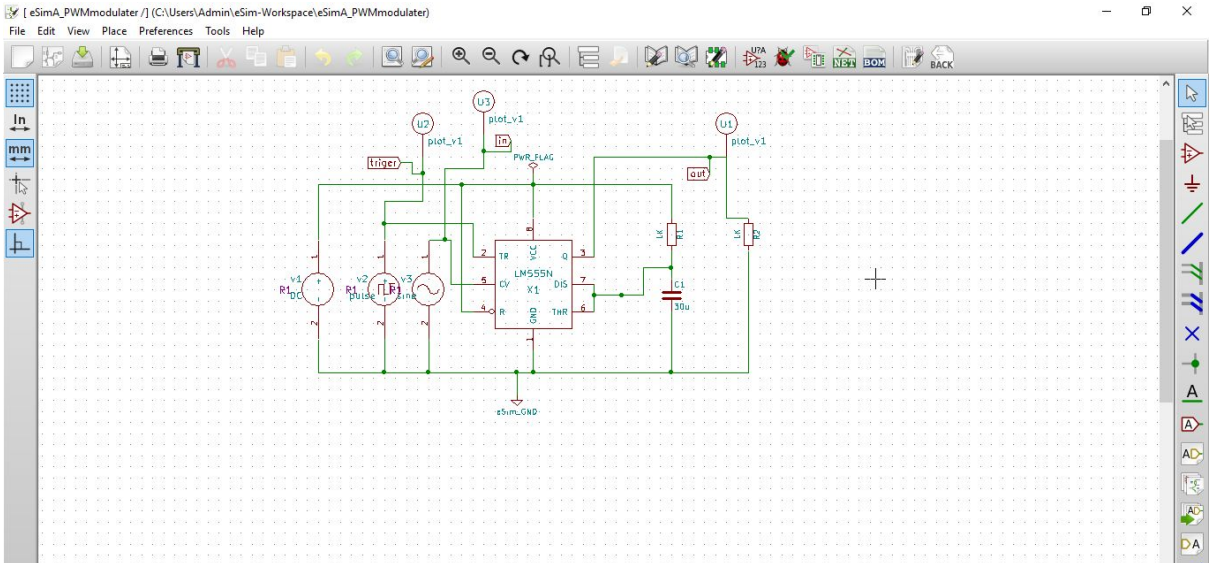

Fig1: Schematic Of Pulse Width Modulator Using IC555

SIMULATION RESULTS:
Ngspice Plots:

1.)Input Waveform:

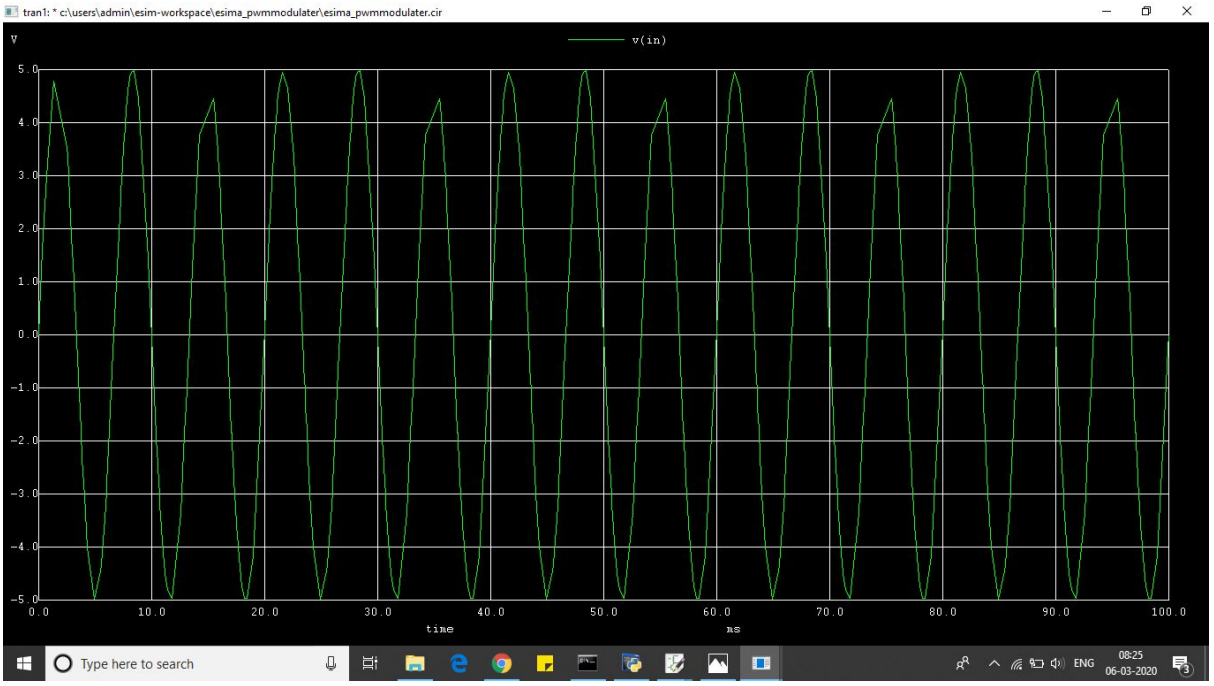

Fig2: Input Sine wave to Pulse Width Modulator

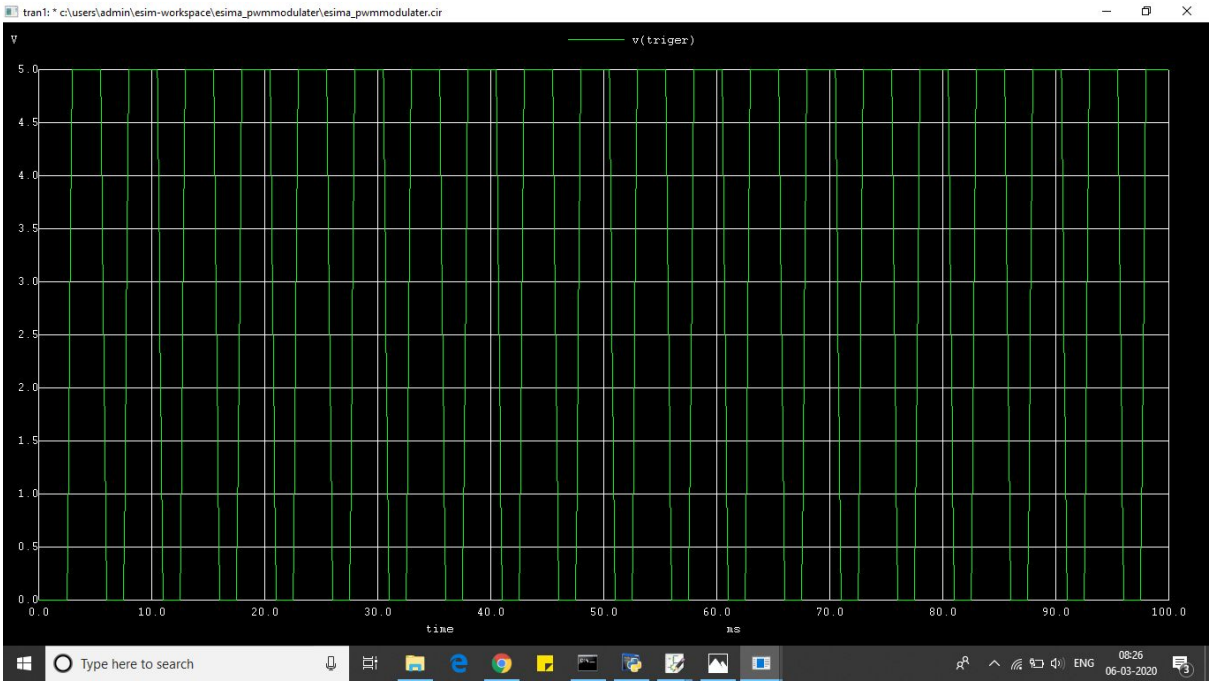

Fig3: Trigger Pulse to Pulse Width Modulator

2.)Output Waveform:

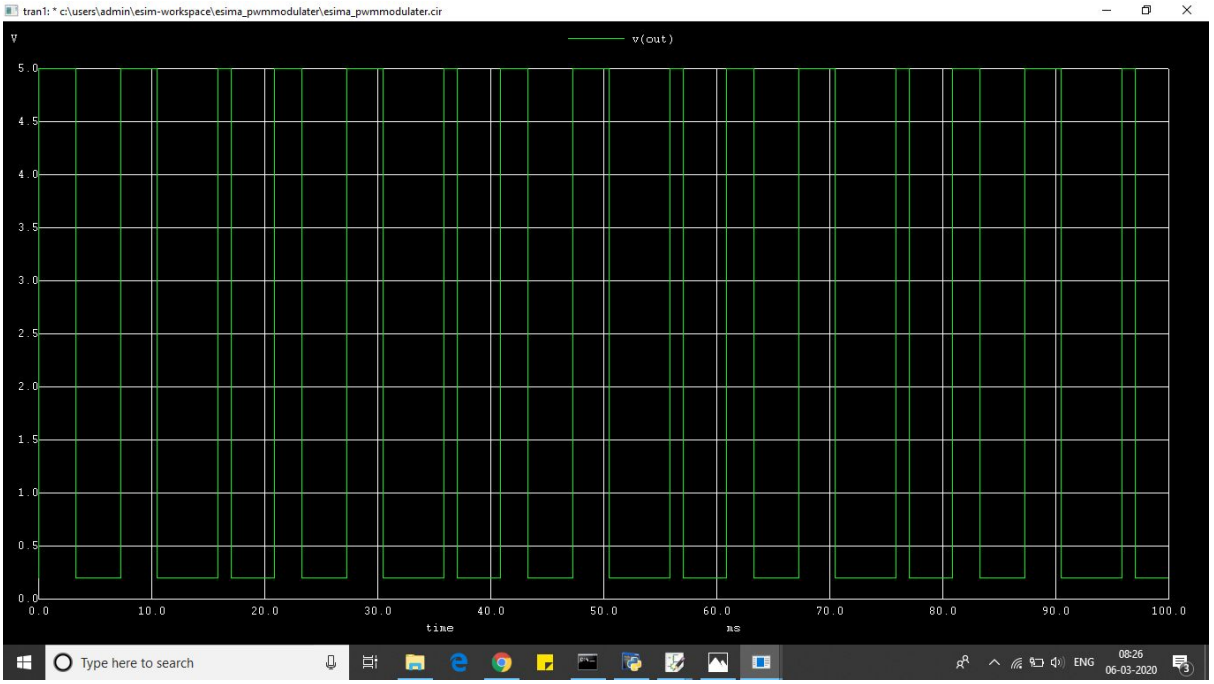

Fig4: Output from Pulse Width Modulator

Python Plots:

1.)Input Waveform

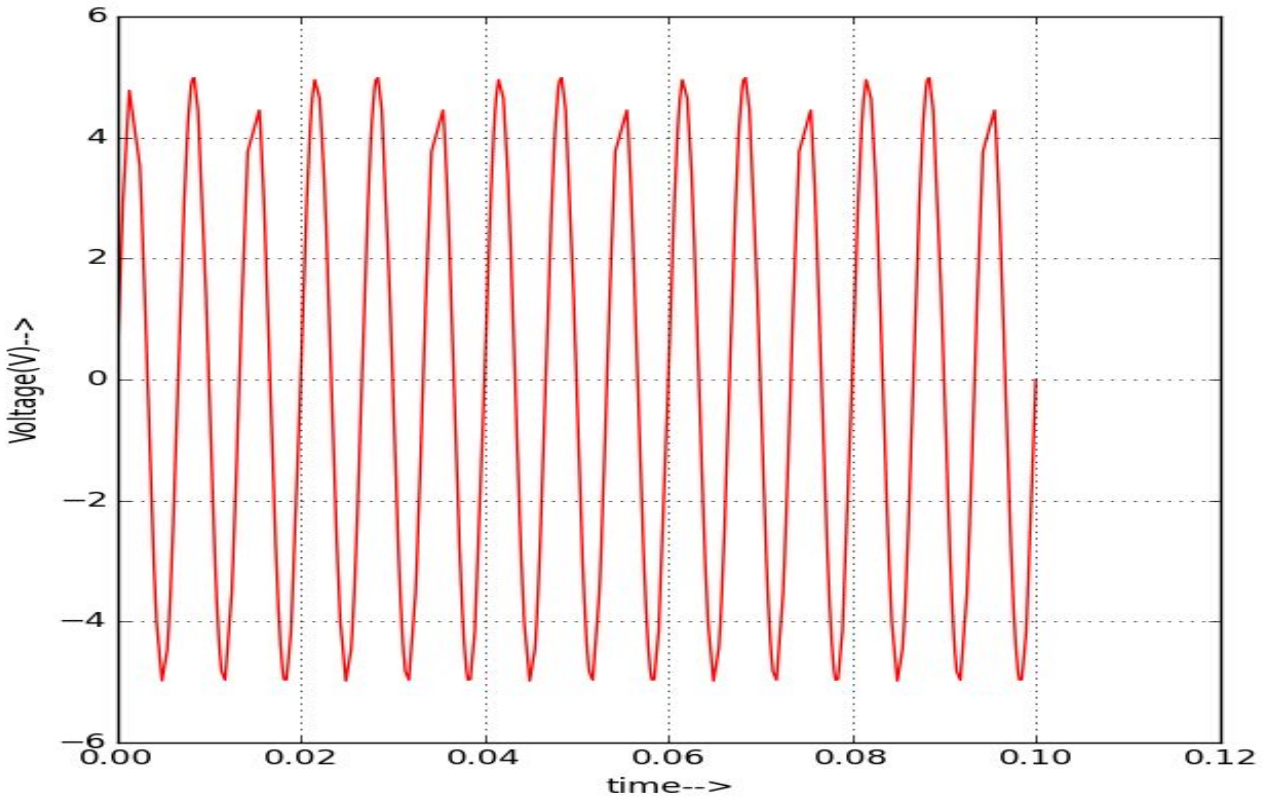

Fig5: Input Sine wave to Pulse Width Modulator

2.)Output Waveform

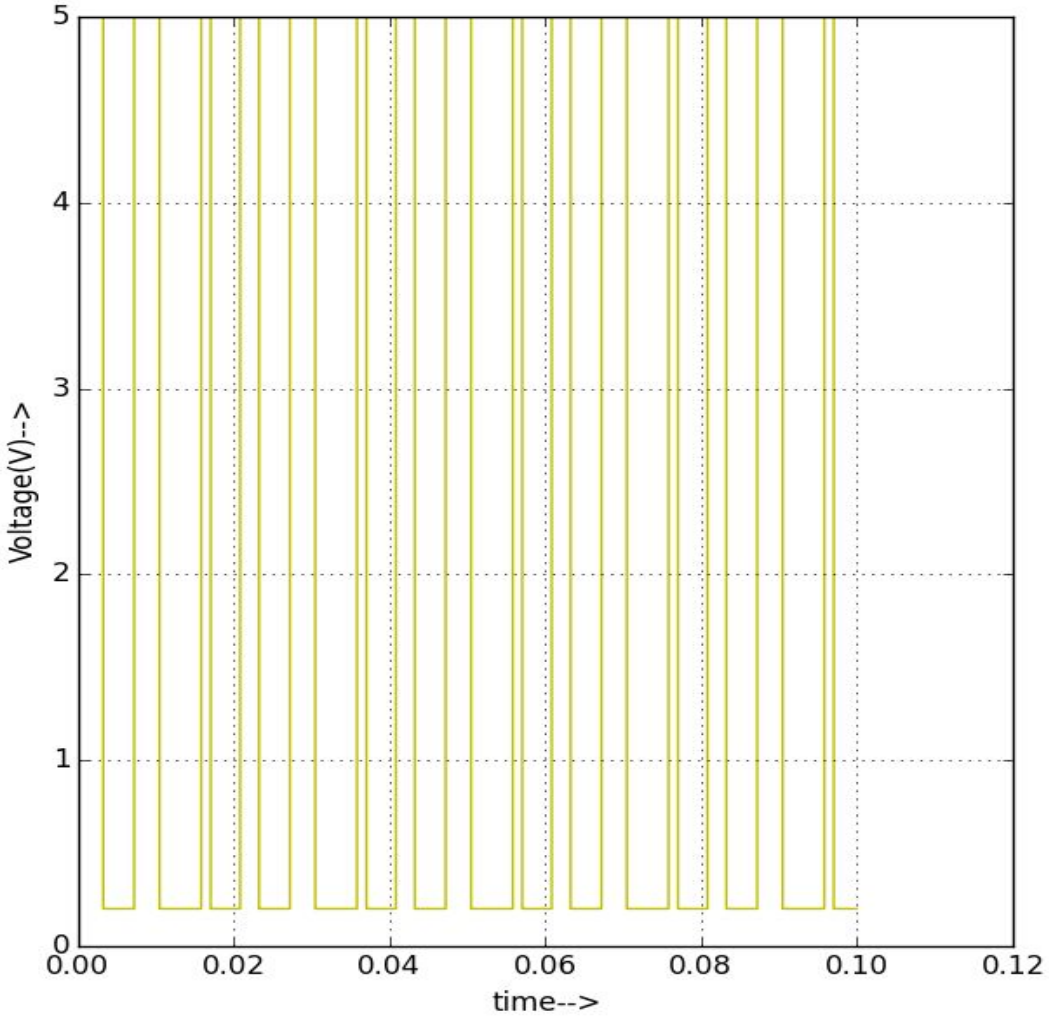

Fig6: Output from Pulse Width Modulator

CONCLUSION:

Pulse Width Modulator is being studied and simulated in eSim by obtaining Ngspice and Python plots successfully.

REFERENCES:

https://www.elprocus.com/fsk-modulation-demodulation-circuit-diagram/.