PTSL APP

REPORT ON PWM SIGNAL GENERATOR APP

1. AIM OF THE APP:

The primary objective of this MATLAB app is to generate a Pulse Width Modulation (PWM) signal based on user-defined carrier and modulating signals. The app provides a graphical user interface (GUI) where users can input these signals and visualize the corresponding PWM output.

2. THEORY

Pulse Width Modulation (PWM)

Pulse Width Modulation (PWM) is a technique used to encode a continuous signal into a pulsing signal. It is widely used in applications such as motor control, signal processing, and power electronics. The principle of PWM is to vary the duty cycle of a square wave in response to a modulating signal.

Key Components of PWM Generation:

1. Carrier Wave:

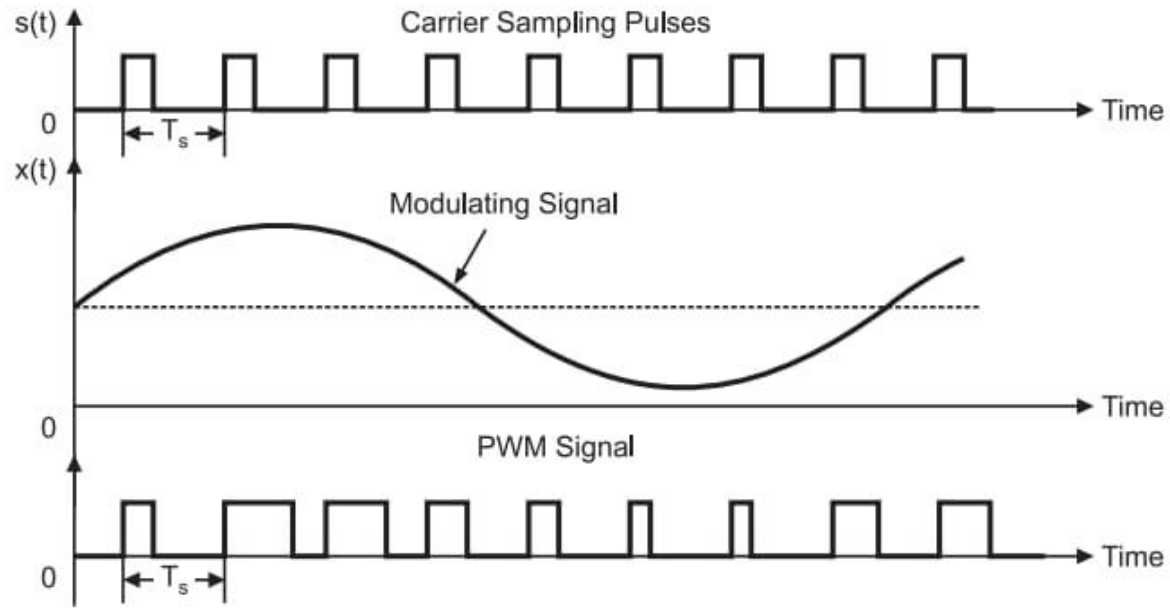
A high-frequency triangular or sawtooth wave that serves as a reference signal.

2. Modulating Signal:

A low-frequency signal (usually sinusoidal) that determines the duty cycle of the PWM output.

3. Comparison Process:

The modulating signal is compared with the carrier wave. When the modulating signal is higher than the carrier wave, the PWM output is high (1); otherwise, it is low (0).



This comparison results in a PWM signal whose duty cycle varies with the amplitude of the modulating signal.

3. INPUTS GIVEN

- Carrier Wave: A high-frequency triangular or sawtooth wave provided by the user.

- Modulating Signal: A user-defined sinusoidal or arbitrary waveform that controls the duty cycle of the PWM signal.

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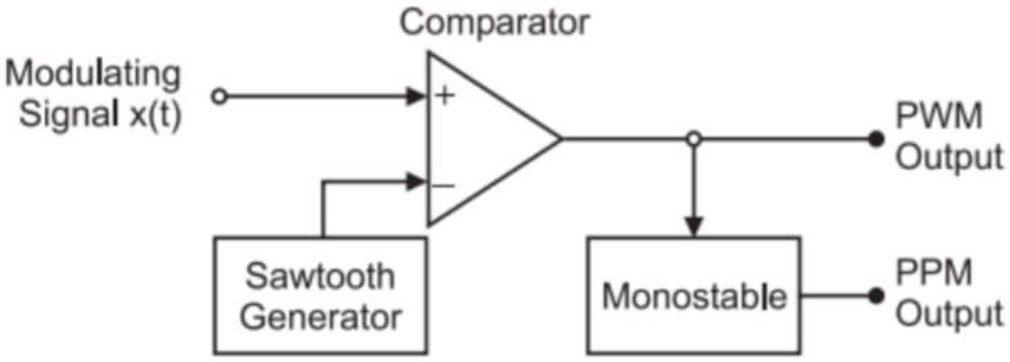


Figure.5.4.3 : PWM Generator

These inputs are entered through the app's interface, and their parameters (frequency, amplitude) can be adjusted.

4. OUTPUT GENERATED

- The PWM Signal is displayed on the UI axes in the app.

- The duty cycle of the PWM signal changes dynamically based on the modulating signal's amplitude.

- The graphical visualization allows users to observe how PWM encoding responds to different input signals.

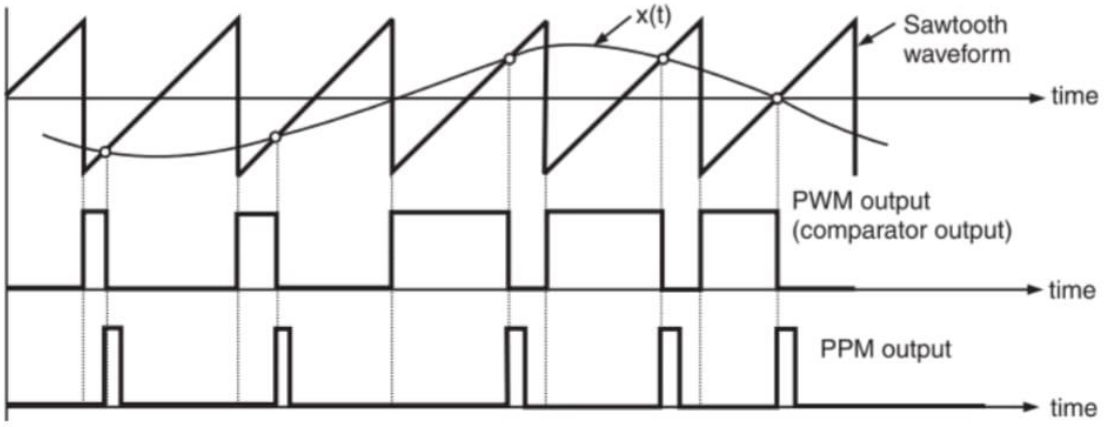
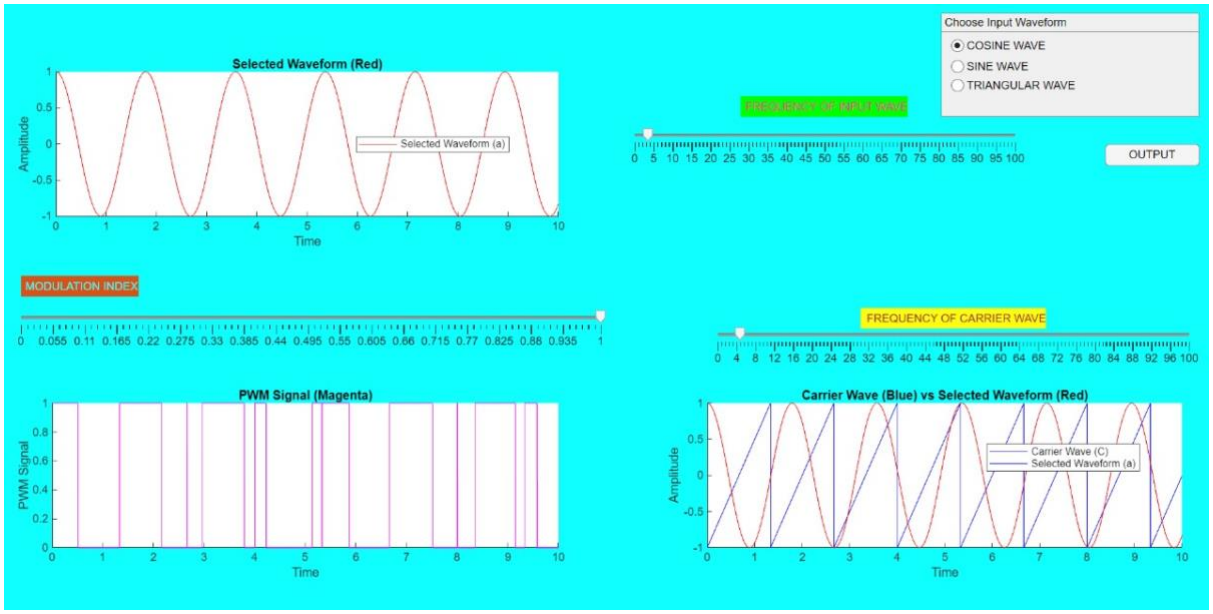
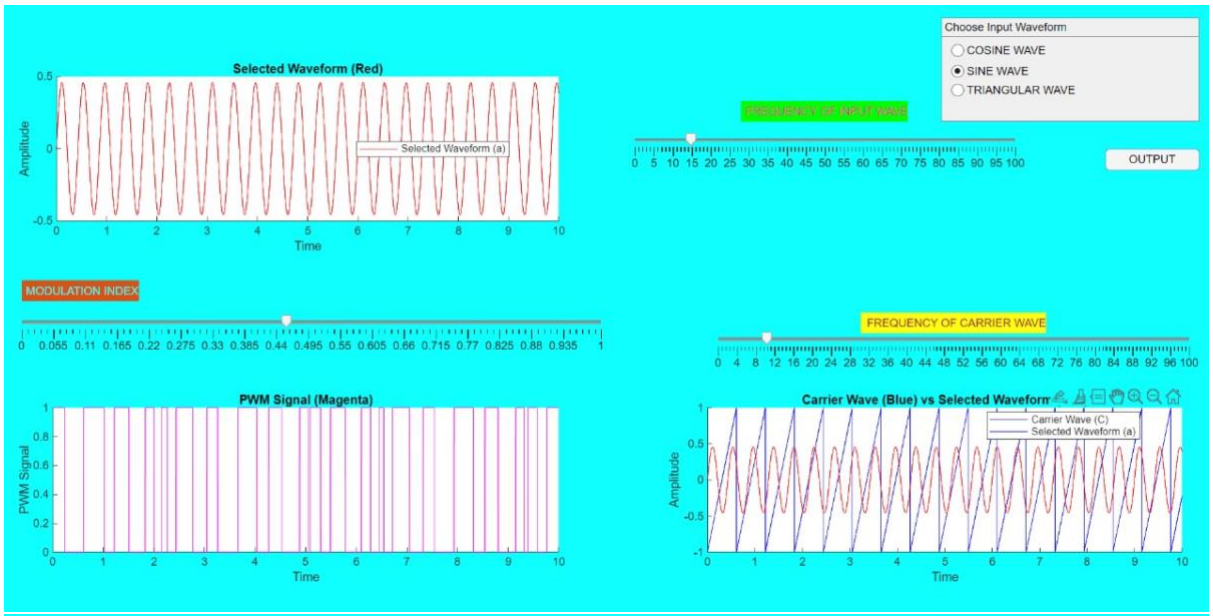


Figure.5.4.4: Waveforms of PWM and PPM

3) Screenshots / Output Images Below are sample screenshots and output graphs from the app to demonstrate its functionality:


Selected Waveform (Red)
Selected Waveform (a)
Amplitude
Time
Choose Input Waveform
COSINE WAVE
SINE WAVE
TRIANGULAR WAVE
FREQUENCY OF INPUT WAVE
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
OUTPUT
MODULATION INDEX
0 0.055 0.11 0.165 0.22 0.275 0.33 0.385 0.44 0.495 0.55 0.605 0.66 0.715 0.77 0.825 0.88 0.935 1
FREQUENCY OF CARRIER WAVE
0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96 100
PWM Signal (Magenta)
PWM Signal
Time
Carrier Wave (Blue) vs Selected Waveform (Red)
Carrier Wave (C)
Selected Waveform (a)
Amplitude
Time


Selected Waveform (Red)
Selected Waveform (a)
Amplitude
Time
Choose Input Waveform
COSINE WAVE
SINE WAVE
TRIANGULAR WAVE
FREQUENCY OF INPUT WAVE
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
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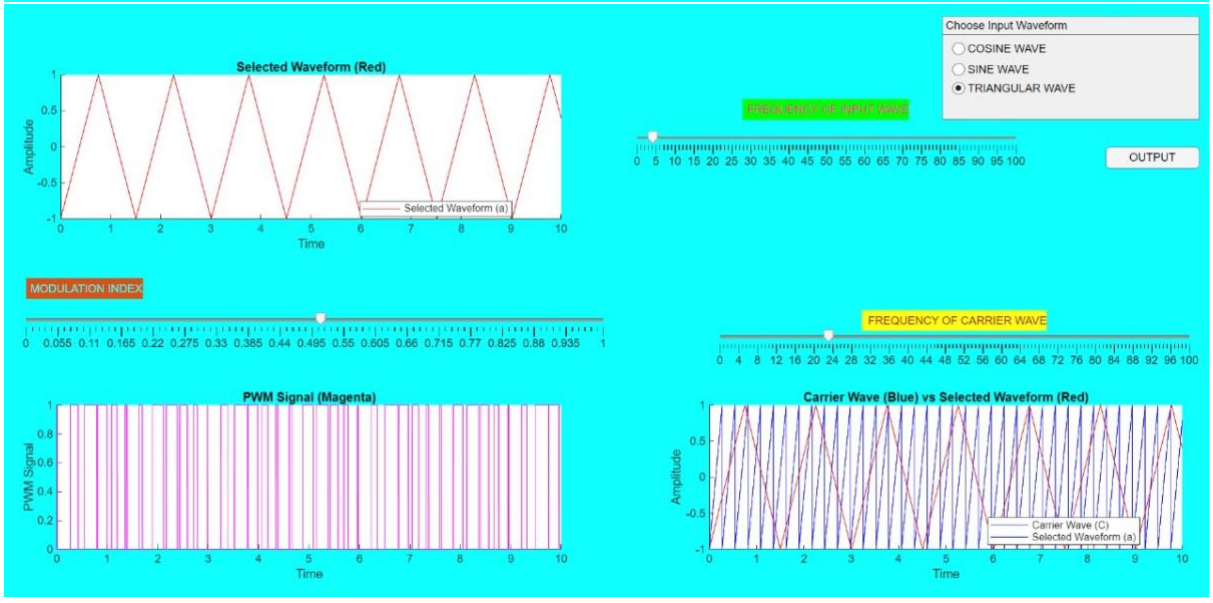
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PWM Signal (Magenta)
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Carrier Wave (Blue) vs Selected Waveform (Red)
Carrier Wave (C)
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5. CONCLUSION

The MATLAB-based PWM Signal Generator app successfully demonstrates the principles of pulse width modulation. By allowing users to input and modify carrier and modulating signals, it provides an interactive and educational platform for understanding PWM. This app can be further extended for practical applications such as motor control, LED dimming, and signal modulation.

THANKYOU