

Name of the Participant : Bindu Sri Bhukya

Title of the Circuit : Wien Bridge Oscillator Using OP-Amp

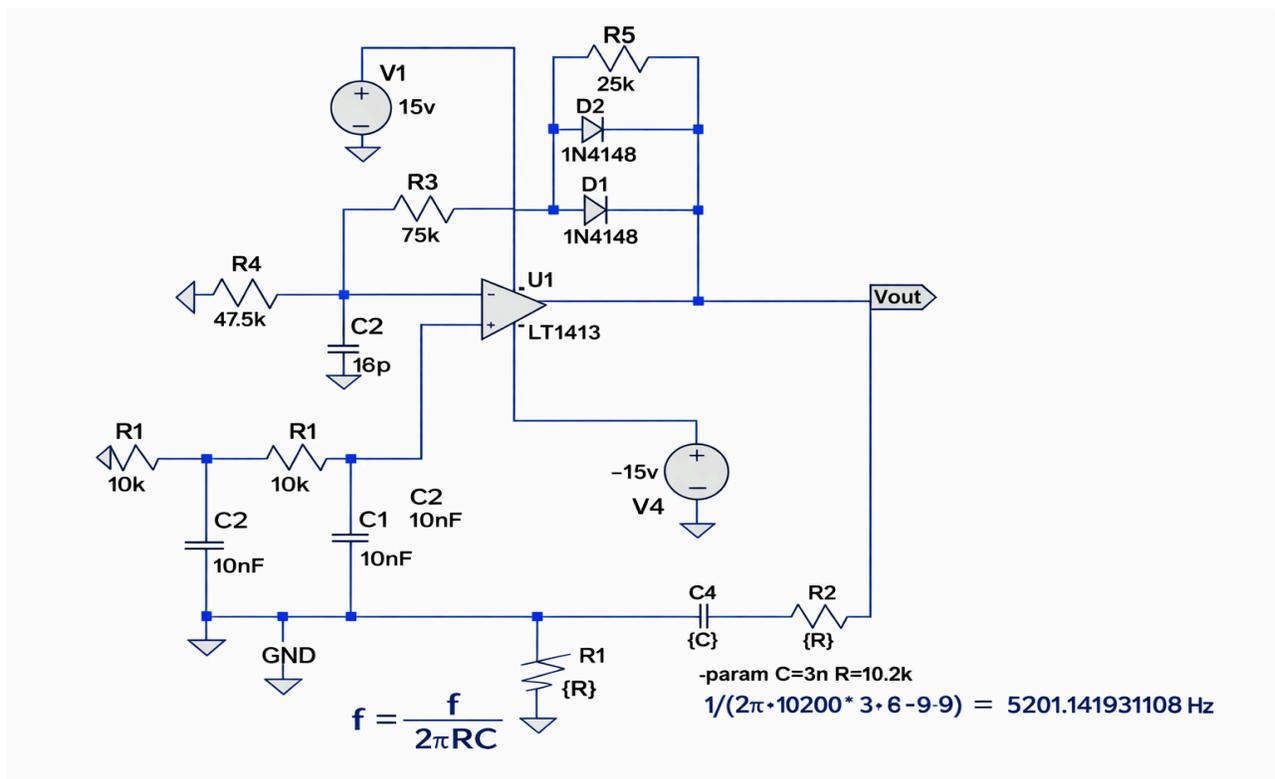
Theory / Description :

The Wien Bridge Oscillator is a sinusoidal oscillator used to generate low-distortion sine waves.

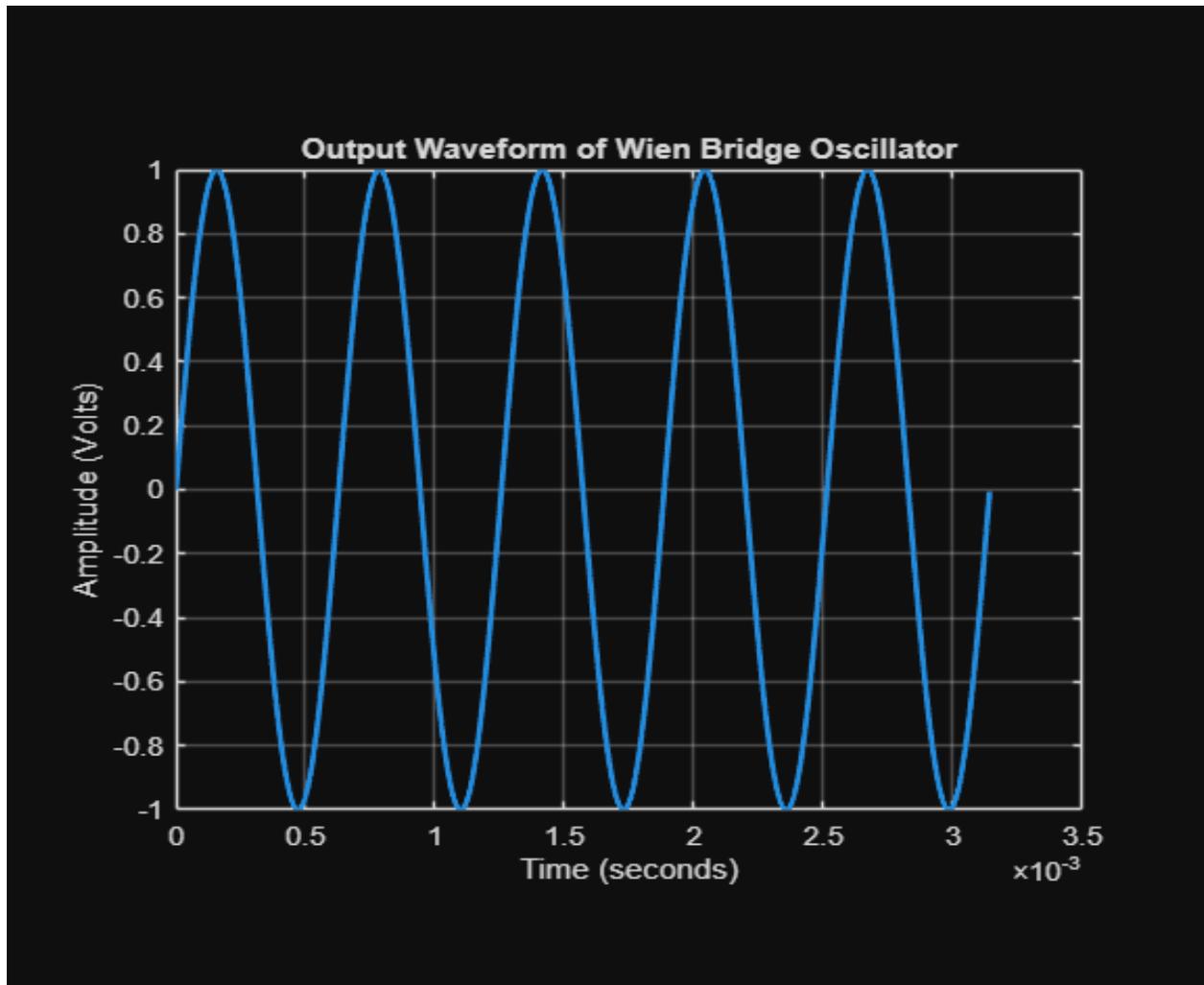
It employs an operational amplifier along with a frequency-selective RC bridge network. The RC network consists of a series RC combination and a parallel RC combination which provides zero phase shift at the resonant frequency. At this frequency, the network attenuates the signal by a factor of one-third. To satisfy the Barkhausen criterion, the amplifier gain is maintained slightly greater than three. Diodes are used in the feedback path to provide automatic gain control and stabilize the amplitude of the output waveform. The frequency of oscillation is given by $f = 1/(2\pi RC)$.

In this project, the Wien Bridge Oscillator is designed and simulated using eSim, and a stable sinusoidal output waveform is obtained.

Circuit Diagram :



Results : The output waveform obtained from the simulation is a stable sinusoidal signal. The frequency of oscillation closely matches the theoretical value calculated using the Wien bridge formula. The amplitude remains constant due to diode-based gain control.



Source / Reference(s) :

1. "Wien Bridge Oscillator – Theory & Design", Electronics Tutorials, 2025.
https://www.electronics-tutorials.ws/oscillator/wien_bridge.html
2. E. Lindberg, "The Wien Bridge Oscillator Family,"
https://www.researchgate.net/publication/233860816_The_wien_bridge_oscillator_family
3. J. Punčochář, "Wien-Bridge Oscillator with Real Op-Amp," ResearchGate, 2015.
<https://openurl.ebsco.com/contentitem/doi%3A10.31489/2025n3/127-137?id=ebsco%3Adoi%3A10.31489%2F2025n3%2F127-137>

