

Computer System Engineering Department

ENEE3309

COMMUNICATION SYSTEMS

-**Project Phase Two-**

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Table of Contents

[**Table of Contents** I](#_Toc156681597)

[**Table of Figures** II](#_Toc156681597)

[**Introduction** 0](#_Toc156681597)

[**Results:** 0](#_Toc156681598)

[**Using Pspice:** 0](#_Toc156681599)

[**Using Tinkercad:** 1](#_Toc156681600)

[**Result's Discussion:** 2](#_Toc156681601)

[**Circuit Design:** 2](#_Toc156681602)

[**Simulation and Breadboard Implementation:** 2](#_Toc156681603)

[***Key Findings:*** 2](#_Toc156681604)

[**Conclusion:** 2](#_Toc156681605)

[Fig.1:modulated signal using PSpice software 0](file:///C:\Users\mrabd\Desktop\ProjectPhaseTwo.docx#_Toc156681609)

[Fig.2: demodulated using PSpice software 0](file:///C:\Users\mrabd\Desktop\ProjectPhaseTwo.docx#_Toc156681610)

[Fig.3 :modulated signal using TinkerCad software 1](#_Toc156681611)

[Fig.4 :demodulated signal using TinkerCad software 1](#_Toc156681612)

# **Introduction**

In this project, amplitude modulation (AM) by designing, simulating, and constructing AM circuits using a switching modulator, a bandpass filter, and an envelope detector.

Executed in two distinct phases—simulation using Pspice, followed by hands-on construction on a breadboard with an oscilloscope using Tinkercad. The project Emphasizing theoretical analysis, practical implementation, and the utilization of modern engineering tools, for skill development in circuit design and experimentation.

# **Results:**

## **Using Pspice:**

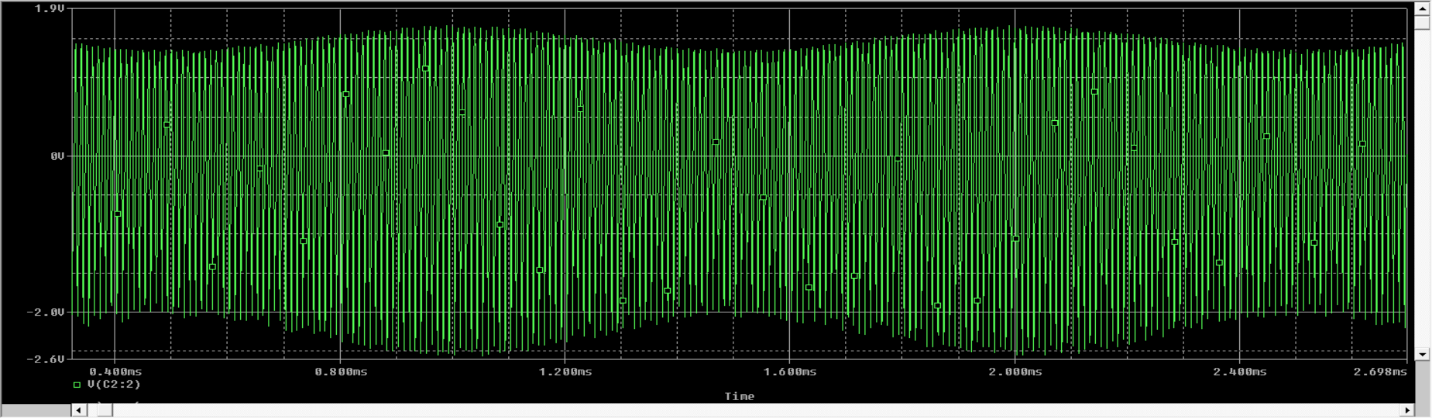
1. **Modulated signal**

Fig.1:modulated signal using PSpice software

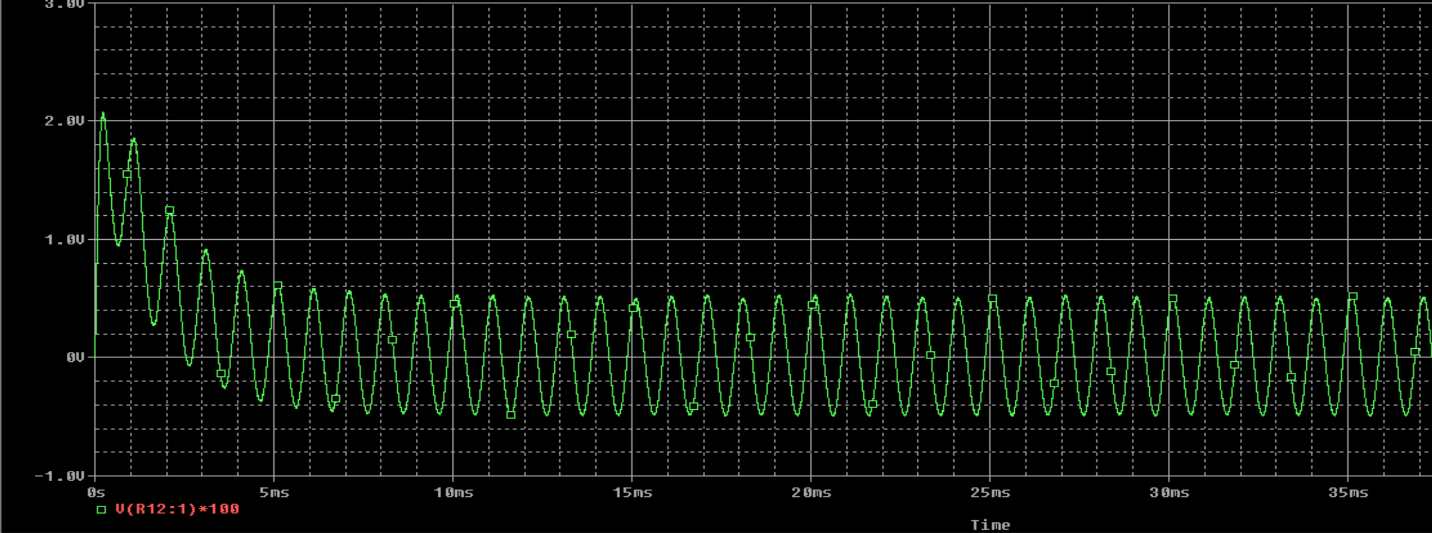
1. **demodulated signal**

Fig.2: demodulated using PSpice software

# **Using Tinkercad:**

1. **First Circuit:**

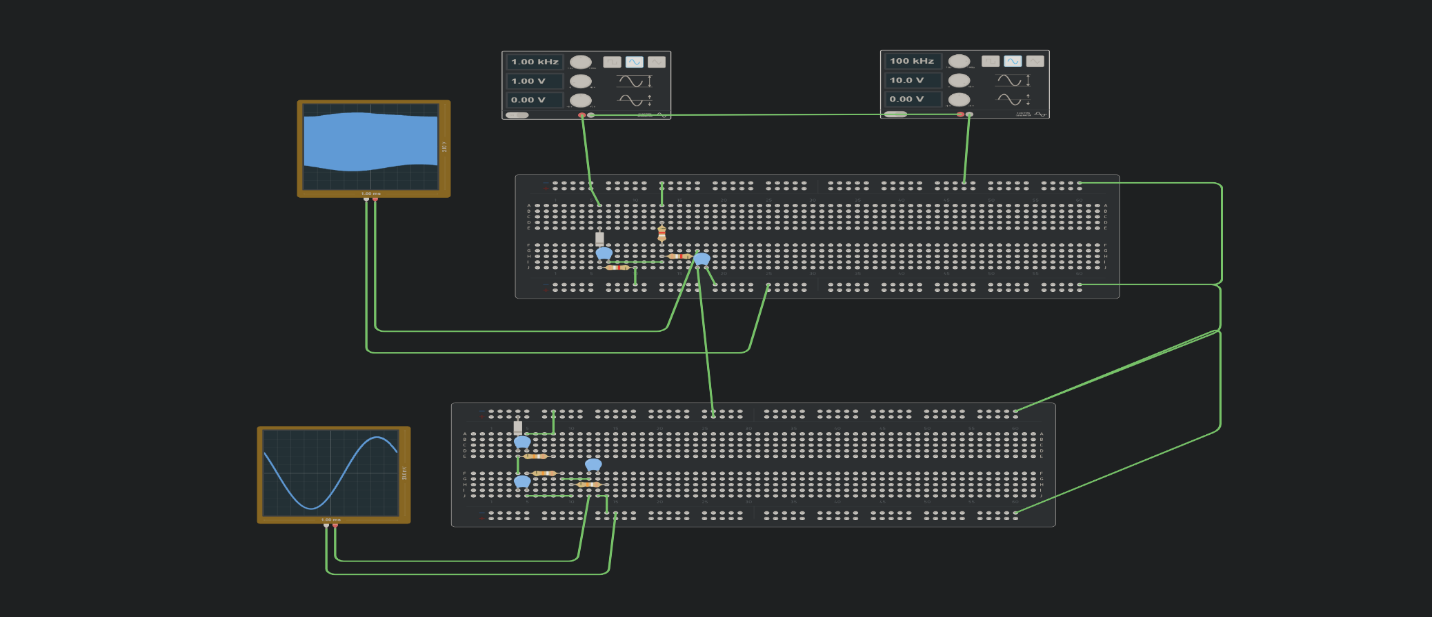


Fig.3 :modulated signal using TinkerCad software

1. **Second Circuit:**

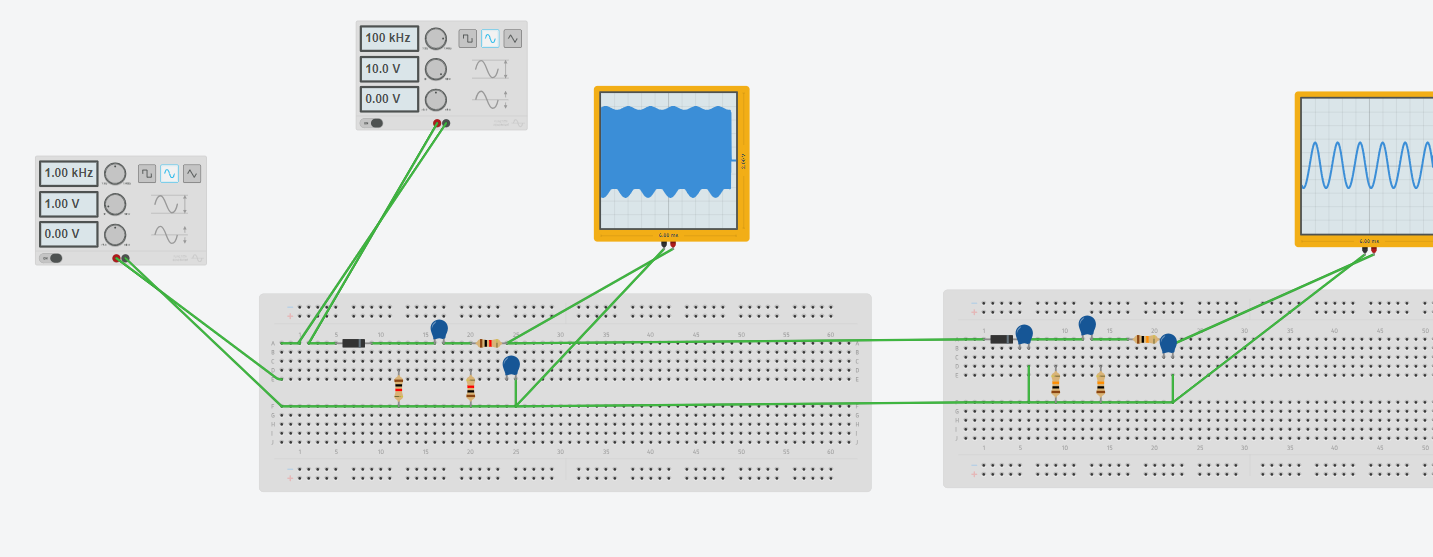


Fig.4 :demodulated signal using TinkerCad software

# **Result's Discussion:**

## **Circuit Design:**

* **Modulator:** We choose a switching circuit due to its simplicity and effectiveness in creating AM signals. To isolate the desired modulated signal and eliminate unwanted frequencies, a bandpass filter was designed.
* **Demodulator:** A good choice we considered, is an envelope detector circuit. due to its ability to efficiently extract the original message signal from the modulated wave.

## **Simulation and Breadboard Implementation:**

* **Tinkercad Breadboard:** We constructed virtual versions of both circuits using Tinkercad's breadboard interface.
* **Oscilloscope Analysis:** We accurately examined the simulated waveforms to visualize the modulation and demodulation processes.

## ***Key Findings:***

* **Verification:** The close agreement that the simulated and the breadboard results validates our circuit designs and understanding of AM principles.
* **Filter Design:** The implementation of additional filtering showcases a practical approach to overcoming non-idealities and enhancing signal quality.

# **Conclusion:**

This project has provided us with a comprehensive understanding of amplitude modulation through a hands-on approach. We have successfully designed, simulated, and implemented AM circuits, addressing real-world challenges and exploring potential solutions. Our findings underscore the importance of practical experimentation and the value of addressing non-idealities in circuit design.