

# Signal Processing: Noise Removal with Filtering in MATLAB

This project demonstrates how to create a composite signal, add noise, and apply a low-pass filter to clean it using MATLAB.

## Overview

In signal processing, it's important to reduce noise and preserve the main signal components. This mini-project walks through the following steps:

- Generate a clean signal with multiple frequencies

- Add white Gaussian noise

- Analyze the frequency spectrum using FFT

- Apply a Butterworth low-pass filter

- Compare signals in both time and frequency domains

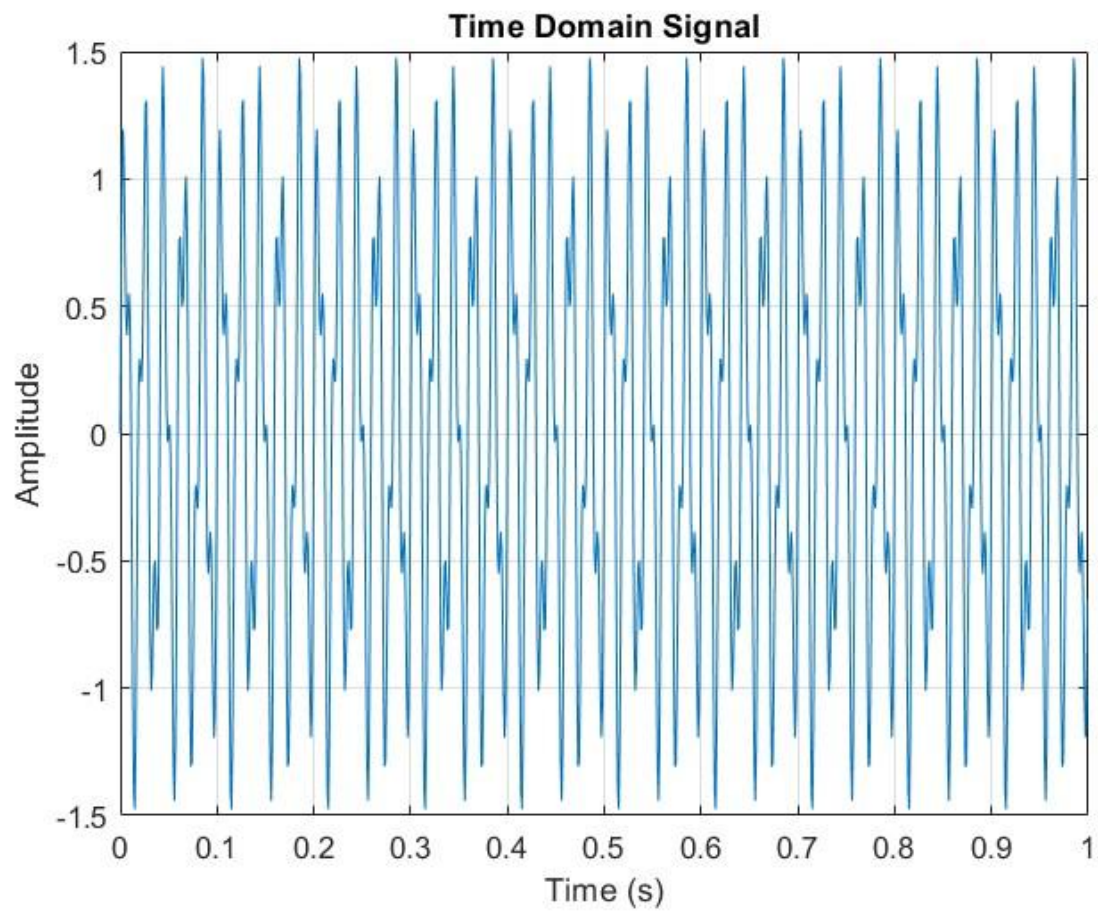
## Tools & Environment

- MATLAB R2023a

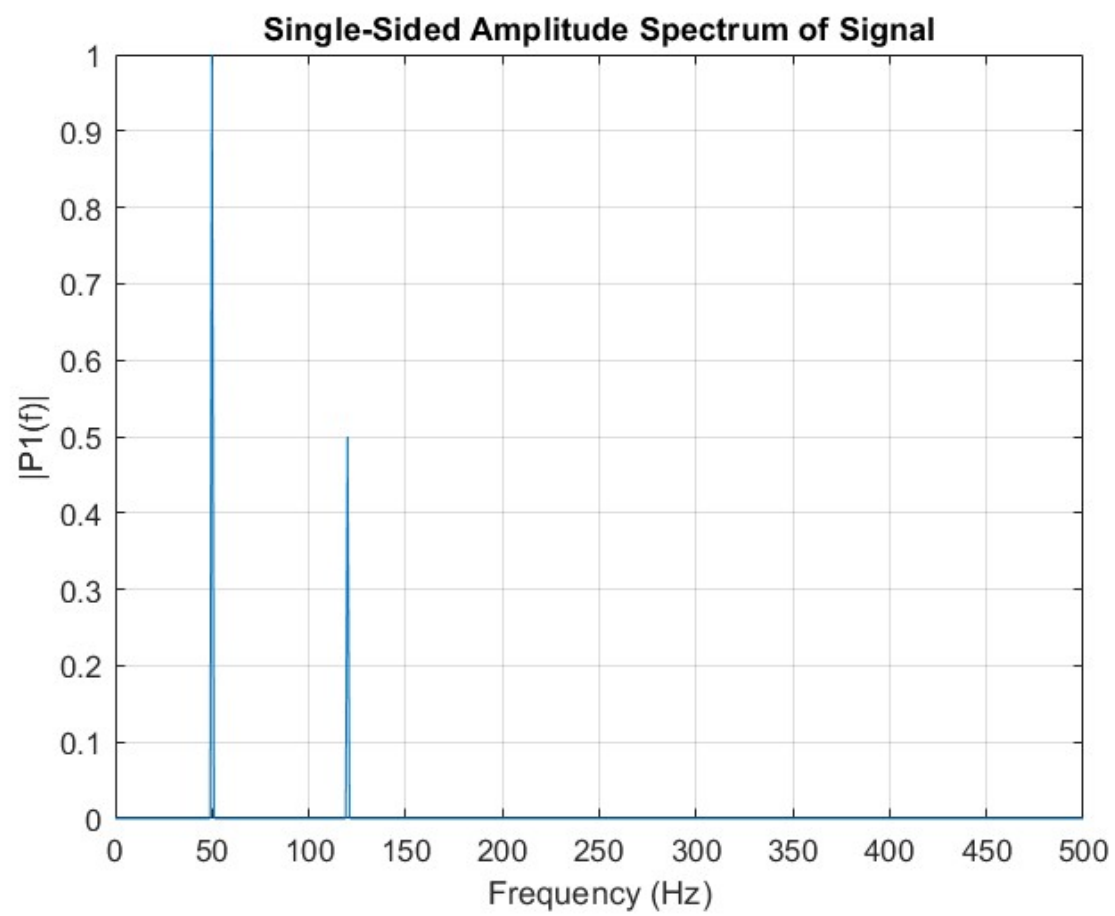
- Signal Processing Toolbox

# Output Samples

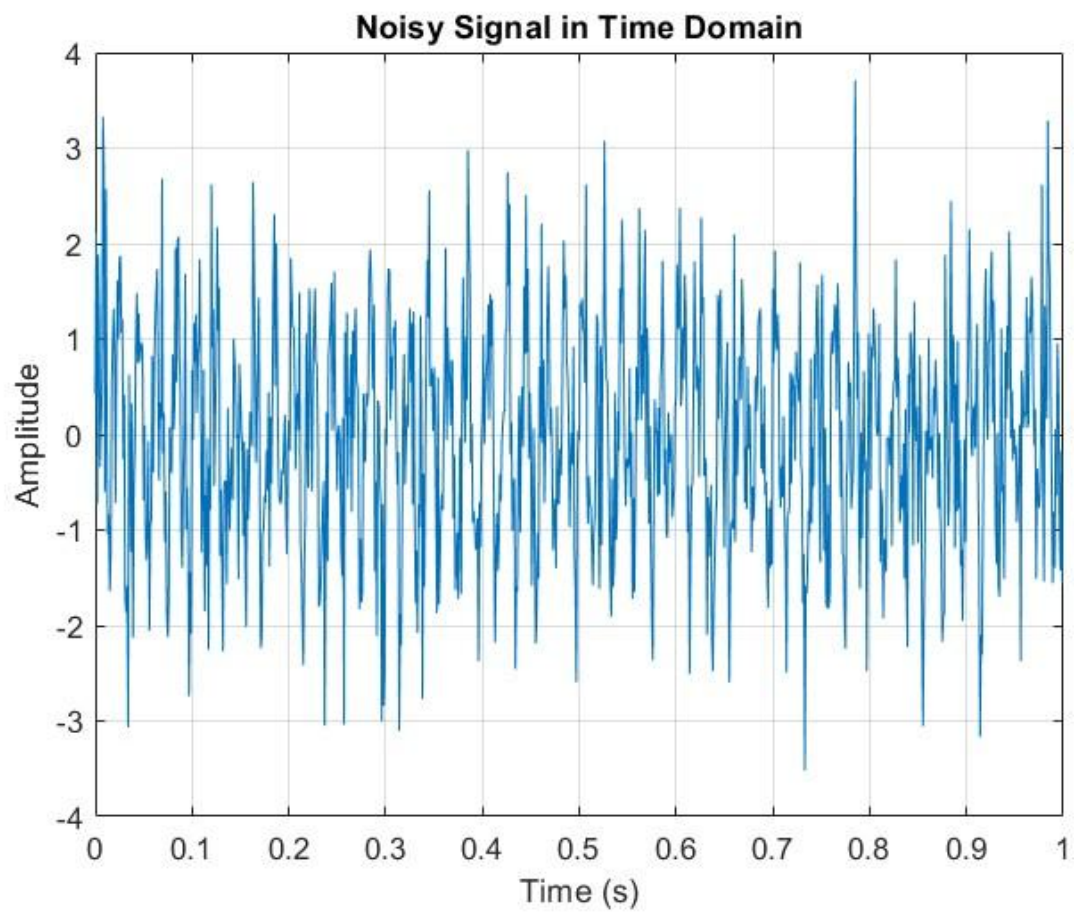
## 1. Original Signal (Time Domain)



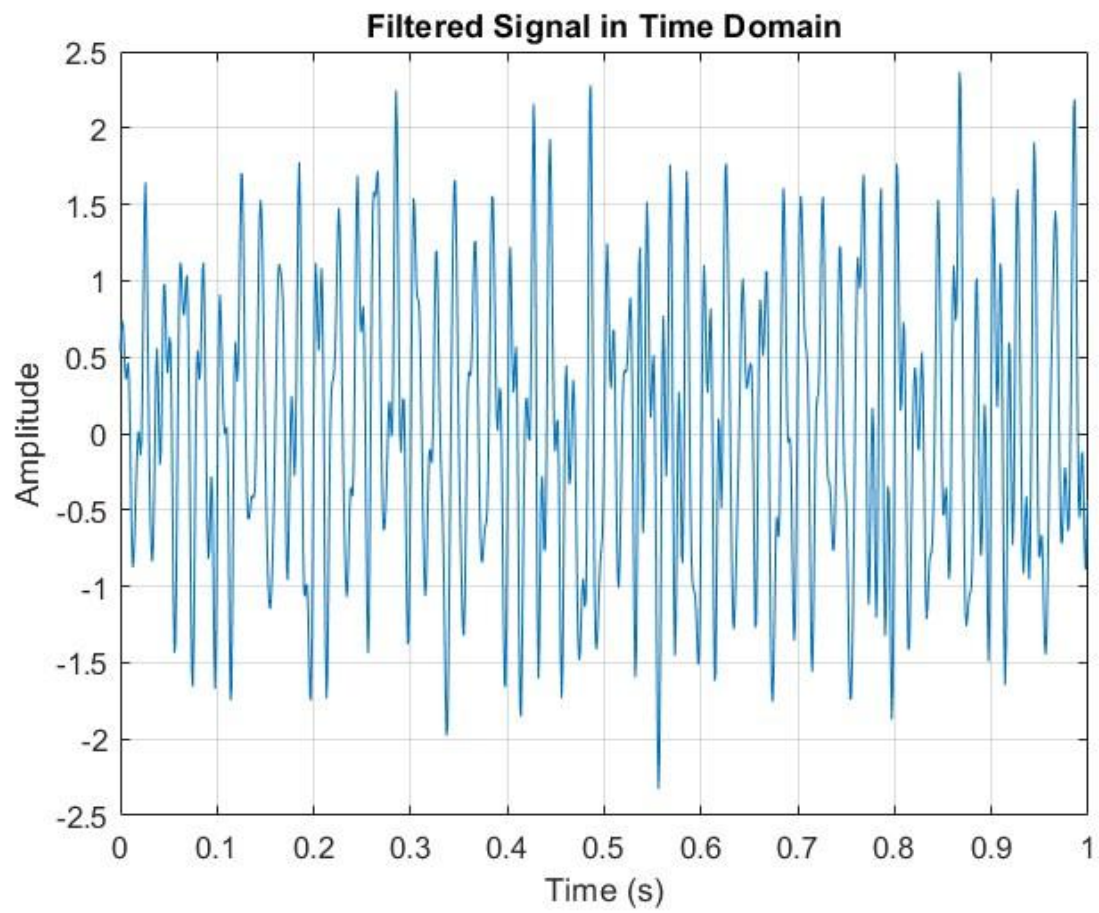
## 2. Frequency Spectrum (Clean Signal)



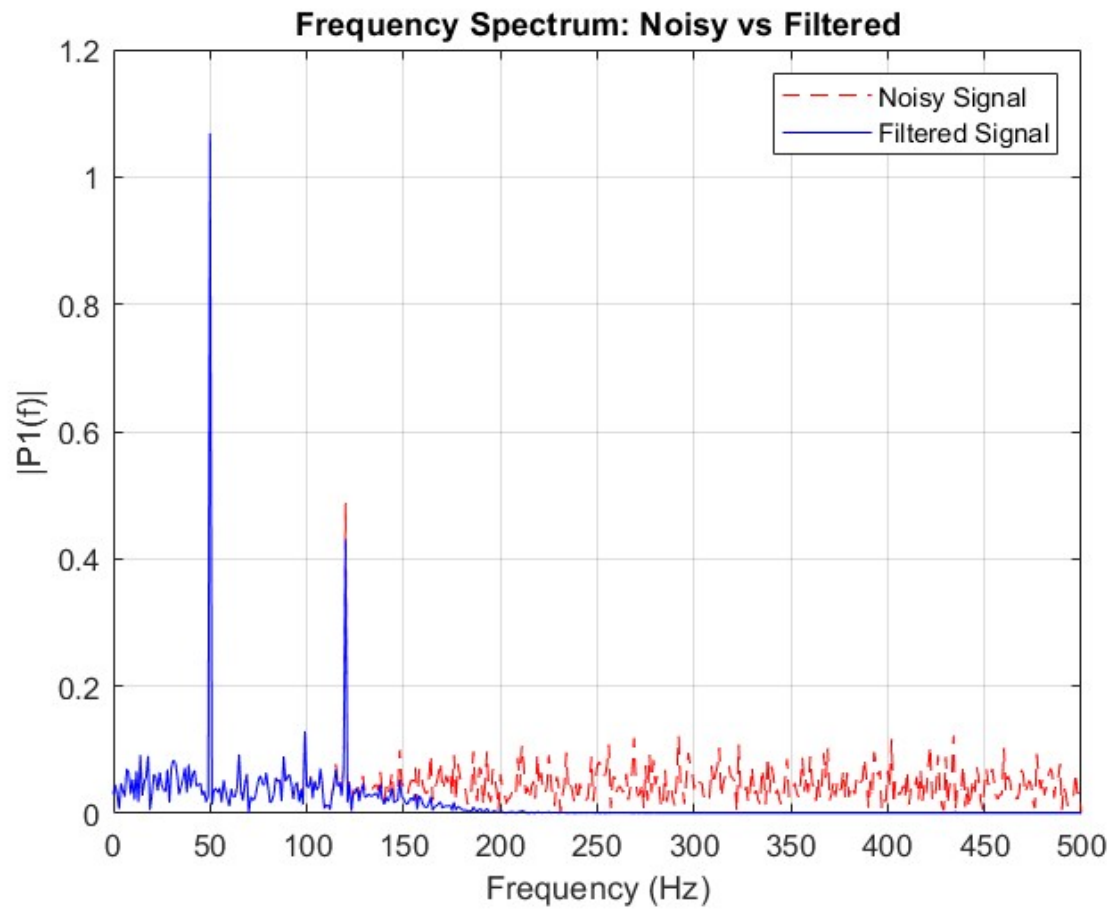
### 3. Noisy Signal (Time Domain)



#### 4. Filtered Signal (Time Domain)



## 5. FFT Comparison: Noisy vs Filtered



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