Day - 08

MATLAB Simulation Challenge

Date : 08/07/2025

Duration : 24 Hours

Challenge Brief

Design a MATLAB tool that accepts a noisy 1D signal (provided or generated) and applies suitable filters to remove noise while preserving the essential characteristics of the original signal. The interface should visually compare the noisy and cleaned signal. Participants are encouraged to explore multiple filtering techniques and evaluate their effectiveness.

Objective

In many real-world scenarios such as biomedical signal analysis (ECG/EKG) or environmental sensor readings, raw signals are often contaminated with noise. This noise can obscure important information and lead to incorrect conclusions. Hence, designing

tools that can effectively clean and restore signals is a critical skill in engineering and data science.

Key Features

· Import or generate noisy signals (e.g., sine wave with added white noise).

· Apply at least two filtering techniques (e.g., Low-pass, High-pass, Median).

· Plot the original vs. noisy vs. filtered signals on the same figure for comparison.

· Provide UI elements or menu options to select filter type and parameters (cutoff freq, window size, etc.).

· Optional: Compute Signal-to-Noise Ratio (SNR) before and after filtering.

General Guidelines

· Duration: 24 hour challenge starts from 8AM on 8/07/2025

· Individual participants

· Use only MATLAB (toolboxes allowed: Signal Processing, App Designer, etc.).

· External data or signal generation scripts should be credited or explained clearly.

· Submission Deadline: 8AM on 9/7/2025.

Deliverables

- MATLAB script or function file(s).
- Plots comparing noisy and filtered signals.
- Short PDF report or README explaining your approach and results.
- Optional: GUI interface (App Designer or basic figure controls).

Evaluation Criteria

- Filtering Accuracy / Output Quality: 30%
- Code Simplicity and Comments: 25%
- Visualization and Comparison: 20%
- Innovation / UI (Optional): 15%
- Documentation: 10%

Support

For any queries, reach out to:
Email: System Coding Club

Name & contact: Krishna ,6304862887

WhatsApp Community: https://chat.whatsapp.com/CEjhrp1QolYLs1m4OgslMT

Submission

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