THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF TECHNOLOGY HONOURS IN ENGINEERING
LEVEL 4
ACADEMIC YEAR 2022/2023
Mini Project
DMX4411 - SIGNAL PROCESSING

Noise in Signals

Signal noise in an industrial environment has the ability to cause havoc with process control systems. This electrical noise can inject itself onto analog or digital signals and fool control equipment into thinking the process variable is different from what it actually is. This miscommunication between process control equipment, as with all kinds of miscommunication, can lead to any number of unforeseen, unintended consequences. As any electrical engineer will tell you, no system can continue to function properly without proper communication.

No industrial facility is ever going to be 100% free of electrical noise. The low levels of noise present in most plants is typically not enough to cause a problem, and it is when the signal-to-noise ratio gets to unmanageable levels that it becomes a problem. Hardware and software solutions are available to help combat signal noise in particularly noisy environments, including noise filter settings that may be available in existing equipment already installed but inadequately utilized. Buying expensive new equipment in order to filter noise or isolate signals should, in most cases, be unnecessary if proper planning and installation practices are adhered to in the first place. Knowing what signal noise is, what causes it, and how to prevent it from interfering with signal networks should provide the right arsenal of tools needed to keep communication flowing.

Question 01

a. Define signal noise using an example.
b. Identify three major causes of signal noise and briefly describe them.
c. Explain problems arose due to the signal noise.

Question 02

Choose the relevant signal sample given in the drive according to the given instructions.

Link:
https://drive.google.com/drive/folders/1bMdzq8aGY_tDfJC2s3646__R7Zzi8VFo?usp=share_link

Signal	Group
Sample 01	The last number of the registration number is odd
Sample 02	The last number of the registration number is even

1. Plot the time domain graph of the signal.
2. Plot the frequency spectrum (use FFT-Fast Fourier Transformation) of the signal.
3. Identify the fundamental frequency of the signal.
4. Write a simple MATLAB code to eliminate signal noise.
5. Re-plot the frequency domain graph after noise cancellation.
6. **Write a report describing your results. Also, include your MATLAB programs as an appendix.**

Note that copied reports will not accept.

Instructions for Submission:

1. Write your name and the registration number clearly on your answer script.
2. Upload a zip file including your report and soundtracks to the given drop box on or before the deadline.
3. Save the folder with the **Snumber**.

Assignment due date: 30/11/2023

No late submission will be accepted.