EE324 : Controls Lab
Lab 3 Report
Noise cancellation in headphones
Group 16

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Aim:

To design and implement an analog circuit for noise cancellation in headphones. using the IR sensors provided on the robot for this purpose.

Objectives:

1. To achieve an attenuation of 20 dB, when a noise of 100 Hz frequency is applied.

2. To design an analog compensator to stabilize the system, i.e. loop shaping of the loop transfer function.

Prerequisites:

System identification (frequency response analysis), Compensator design and implementation,Matlab coding.

Equipment used:

Headphone setup, DSO, Function generator, Probes, Amplifier ICs, Breadboard, Wires,Jumpers,Wire stripper.

Methods:

Procedure:

- Applied sinusoidal input to the Headphone setup using function generator and calculated peak-peak voltage of input and output using DSO.

- The gain of the Headphone setup is calculated by dividing peak-to-peak voltages of input and output is used to plot frequency response(magnitude and phase plot) of the Headphone setup .

- After studying the magnitude and phase response of the Headphone setup we tried to achieve an attenuation of 20 dB, when a noise of 100 Hz frequency is applied to the input in MATLAB

- After above constrained is achieved we designed lag compensator to stablize the system.

- The poles and zeros of the lag compensator were tuned to make the negative gain margin magnitude greater than 3 dB phase margin magnitude greater than 30 degrees.

Observations:

We observe that our setup is successful achieveing the required constrain of the LAB of attenuation of 20 dB, when a noise of 100 Hz frequency is applied ,and system is stable after implementing the compensator to it.
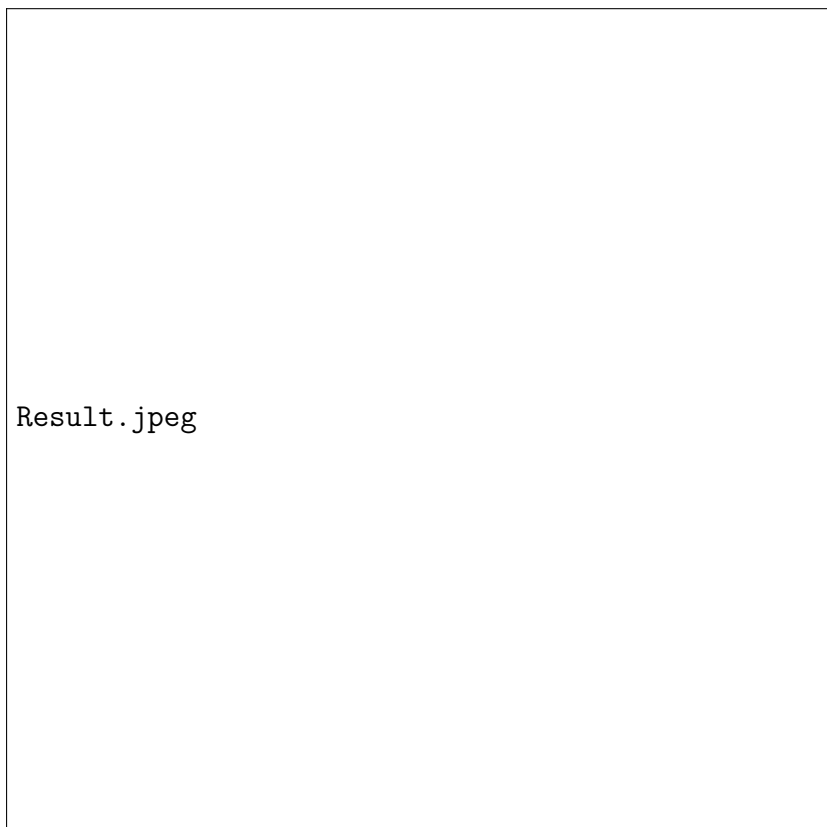
Problems Faced:

- It was difficult to get the readings for frequency response in a noisy surrounding .

- Reading of Peak-peak voltage and phase difference was fluctuating in DSO. Due to which got wrong readings.

- Hard to find values of resistances and capacitance which were available for designing the compensator .

Parameters Obteined:

- Transfer function of Compensator =

- Gain Margin =

- Phase margin =

- Gain at 100Hz =

Experiment Completion Status:

The experiment has been completed .

Result.jpeg