HackMD

CHANGED 5 MINUTES AGO

Subscribed

DSP. Assigment 4 Report

General

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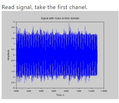
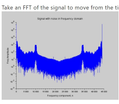
Tasks

1. Construct filters and remove noise.

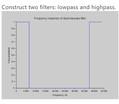
1. Read signal, take the first chanel.



2. Take an FFT of the signal to move from the time domain to the frequency domain.

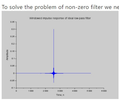


3. Construct two filters: lowpass and highpass.

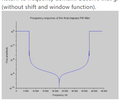


4. Move to time domain. To solve the problem non-causal filter we need to shift the filter.

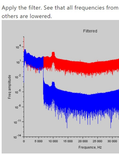
5. To solve the problem of non-zero filter we need to apply window function to the filter.



6. Return to frequency domain. Observe that graph is smoothier that in the original one (without shift and window function).



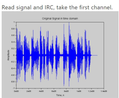
7. Apply the filter. See that all frequencies from ~40 Hz to ~5000 Hz were not changed, all others are lowered.



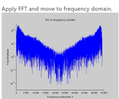
8. Listen the result.

2. Cancel echo of the room.

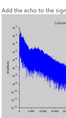
1. Read signal and IRC, take the first channel.



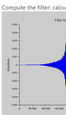
2. Apply FFT and move to frequency domain.



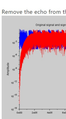
3. Add the echo to the signal by convolving it with IRC.



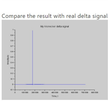
4. Compute the filter: calculate the inverce IRC, shift and apply window function.



5. Remove the echo from the signal by convoling signal with echo and filter.



6. Compare the result with real delta signal. They are pretty similar.



7. Listen to the result

Conclusion

While performing this assignment:

- I have learned how to constuct highpass and lowpass filters to left only human voice and remove the noise.
- I have learned how to constuct filter to remove echo of the room.
- I have practiced with using SciLab.
- I have faced with several technical issues:
  - Accidently I have plotted different graphs on the same figure and result was very strange. Solution was to add `figure(id)` before plotting each function.
  - My laptop were broken and I was not able to turn it on. I was forced to spend some time to fix the issue, reinstall the OS and Scilab. Fortunately, code was saved.