

Digital Signal Processing Lab (EE 521)

Lab 4 Report

Task:

1. Implementation of 5th order FIR filter.

FIR filter:

FIR filter is a filter whose impulse response is of finite duration, because it settles to zero in finite time. This is in contrast to Infinite Impulse Response IIR filters which may have internal feedback and may continue to respond indefinitely.

For a causal discrete FIR filter, FIR filter of order N , each value of the output sequence is a weighted sum of the most recent input values:

$$y(n) = \sum_{k=0}^{M-1} h(k) x(n-k)$$

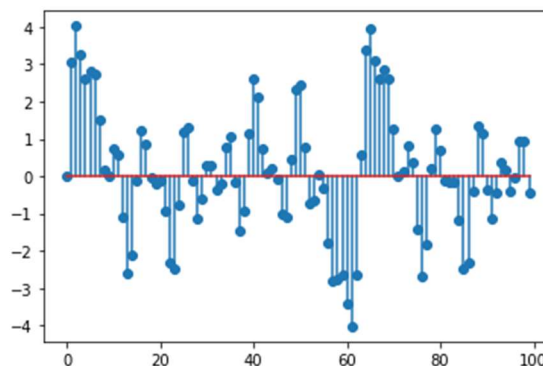
FIR design:

An FIR filter is designed by finding the coefficients and filter order that meet certain specifications, which can be in the time domain and/or the frequency domain.

Window design method, Frequency sampling method, Least Mean Square Error method are some of the designing method of FIR filter.

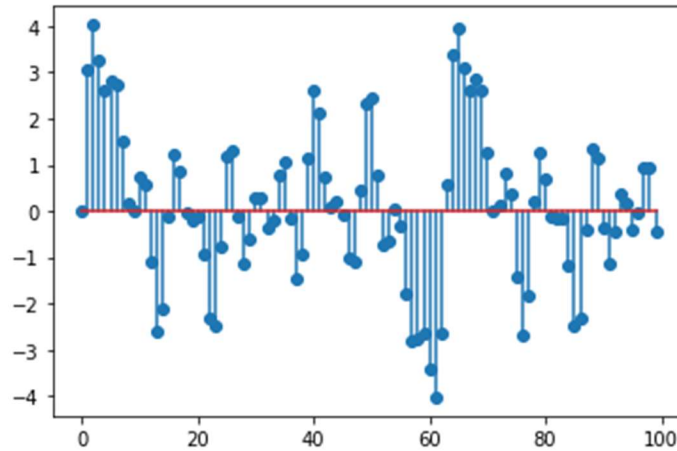
Filter coefficients : `coeff = [-0.003020658565811766647218883363734676095, -0.005088522432020306518474228596460307017, 0.001943642616515480793515369128954262123, 0.001943642616515480793515369128954262123, -0.005088522432020306518474228596460307017, -0.003020658565811766647218883363734676095]`

Input Signal :



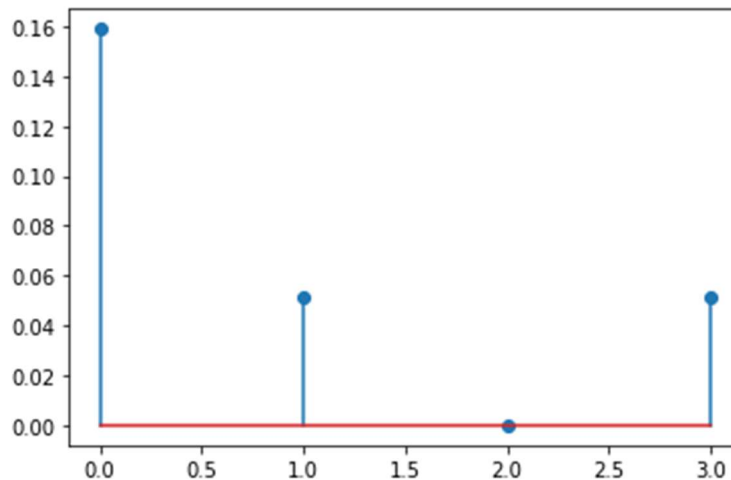
Output signal :

Convolution of Input and Filter impulse response in time domain gives the output signal in time domain. Size of the signal will be $m+n-1$ where m is the size of input signal and n is the size of impulse response in time domain.



Filter output in Frequency domain :

Applying the DFT (4 point dft is applied here) the time domain output signal can be represented in frequency domain.



Code : <https://colab.research.google.com/drive/14tRErwa9JpUv5Q5kTXDt2lMEB-8P1GFF#scrollTo=hTOleEtqT3k>