

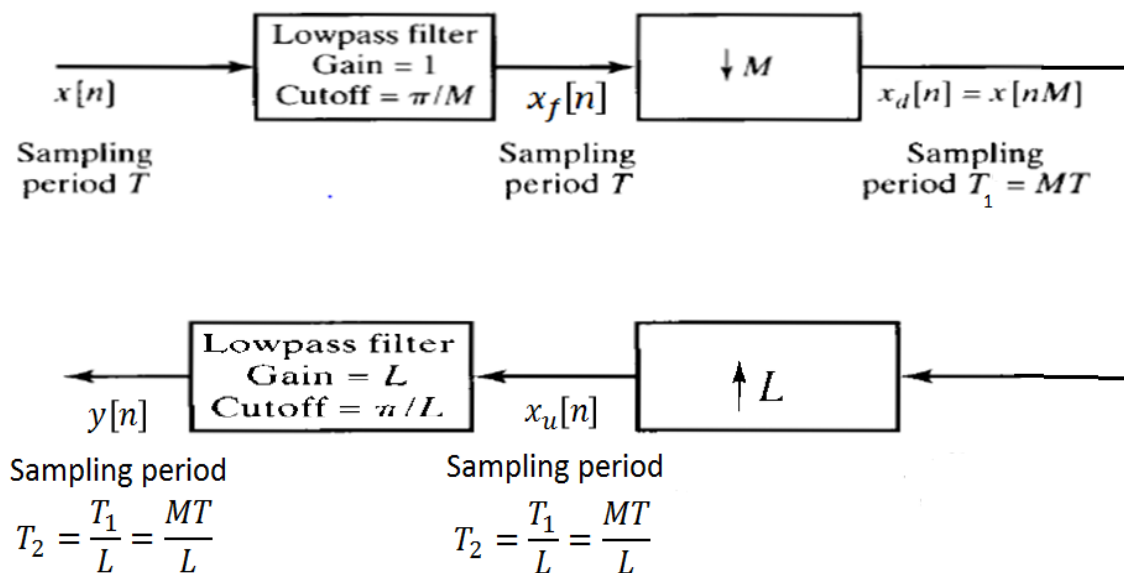
EE5301: DSP Lab/EE5801: CSP Lab

Assignment 3

Problem:

Implementation of Computational efficient decimation and interpolation with **Half Band Filter** properties.

Technical details:



Take $M=L=2$

Input $x[n]$ and **impulse response** $h[n]$ are same as assignment 2.

Instructions:

- Instructions of assignment 2 also applies here.
- Use **half band filter(HBF)** properties to reduce the computational complexity of filtering operation in decimation and interpolation. i.e. you need to replace the convolution function with low complexity

implementation of filtering operation as discussed in lecture 4.

- Compute the error vector $e[n] = y[n] - x[n]$, with average error in the order of 10^{-2} .
- Compute the time taken by the decimation and interpolation operation
 1. Without HBF properties
 2. With HBF properties
- You should get less computation time for case 2.

Submission Details:

- Write C code to implement above system.
- Write main.c and two separate files named common_functions.c which contains separate functions corresponding to different blocks and header file named common_functions.h which contains function declarations.
- Upload main.c, common_functions.c, common_functions.h files and a text file containing your output $y[n]$ and error vector $e[n]$ and computation time for both case.
- Also write your understanding about computational efficient implementation of decimation and interpolation in your own words and upload a pdf file.
- Submit all files in a single zip file with your id, Example: EE20MTECH11010_**A1.zip.