International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 01 | Jan 2022 www.irjet.net p-ISSN: 2395-0072

Design and Implementation of FIR Filter to Analyze Power Efficiency and Noise Reduction

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Abstract: Digital filters is a mathematical algorithm implement in hardware / software that operates on a digital input to produce a digital output. Digital filters often operate on digitized analogy signals stored in a computer memory. Digital filters play very important roles in DSP. Compression, speech processing, images processing etc. because of the following advantages.

Key Words: Digital Filter, FIR, IIR, Band-pass filter, Power and Order, Noise, Stability, Phase, Spectrum, Frequency response.

1. INTRODUCTION

In digital signal processing, filter is used to remove unwanted components from a signal. It is designed to pass a specific range of given frequencies and completely reject the others. Different type of filters are used to assign the value of the given manner so the principle of the different type of filter is easy to use in such a reliable manner in such a given way to do make it happen so we are here to represent this filters are to designed by the frequency of the way to do make it happen this type of filters are such different types and provide a way to do give a personnel information about the doing manner the way of doing things are assign and so on. Digital filters is a mathematical algorithm implement in hardware / software that operates on a digital input to produce a digital output. Digital filters often operate on digitized analogy signals stored in a computer memory. Digital filters play very important roles in DSP. Compression, speech processing, images processing etc. because of the following advantages. this phenomena is to be calculated by the given things and provide a unique way to do.

1.1 Basic Filter Techniques

Analog and digital filters

1. Active and passive Filters
2. FIR and IIR filters
   - low pass filter
   - High pass filter
   - Band pass filter
   - Band stop filter
3. Linear and Nonlinear filters.

1.1.2 Finite Impulse Response (FIR) filter-
FIR filter generally has an impulse response of finite period. Poor performance as compare to another type of filter that we are using it in the given things so this is desired to provide a value of the way to do make some types of functionality and derived a given way to the manner of things it will be reduced the manner of the given things it would be noted that the functions are to be assign the way of doing manner this is to differentiate

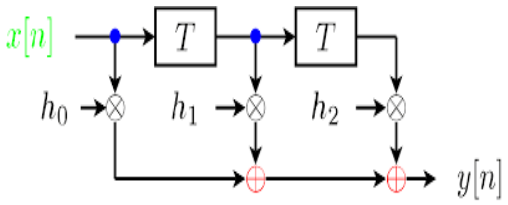


Fig-1 FIR Filter Structure

2. Methodology

Research work carried out comparison of FIR and IIR filters on account of various design which includes Butterworth and Equiripple. The frequency band i.e. low pass, high pass, band pass, band stop filters have assigned the range of frequency As mentioned to get the comparative analysis of various designs.

2.1 POWER CONSUPTION OF FIR FILTER

In this type of method we are able to connect all the elements in the proposed system we have implemented carry select adder and carry most of the functions are available in such a desired way algorithm which is one of the technique of multiple constant multiplication (MCM). With this technique we have successfully shown that there is much reduction in delay, power and noise reduction on such a way to area as compared to use of conventional adders. Also compared to carry select adder, carry look ahead adder provides much reduction in delay, power and area.

2.2 NEED OF WORK

This work is related to FIR Filter to give a Great Research work carried out comparison of analyse to power efficiency and power reduction FIR on account of various design which includes Butterworth and Equiripple. The Power i.e. low pass, high pass, band pass, and other band stop filters have assigned the range of frequency As

mentioned to get the comparative analysis the filter have to be a given of various designs designed in by using since sum function and the filter formulas derived from it. Remez Exchange algorithm proposed by Parks and McClellan, is used for the design of exact linear phase weighted Chebyshev filter Further a computer program has been developed for the design of digital filter by Parks McClellan. In , a set of simple, approximate relationships between FIR, linear and other given way phase, low-pass filter parameters is presented. For IIR filters, an unconstrained quasi-Newton algorithm is employed and any poles or zeros that lie outside of the unit circle are reflected back inside. Through this a set of simple, approximate relationships between IIR, It has been observed that FIR filter is inherently stable and easy to design irrespective at the order of filters as asses in transfer function due to its linear phase characteristics as far as IIR filter is concern the filters is somehow stable for the given frequency range and complex design structure due to Nonlinear phase and scaling. linear phase, low-pass filter parameters is presented. Different heuristics and stochastic optimization methods have been developed, which give in such a way to make it hppen have proved themselves quite efficient for the design of FIR and IIR filter.) and a novel fitness function are employed to find the best coefficients. Some other evolutionary optimization method like simulate dannealing, Tabu Search and artificial bee colony optimization are also used for the design of digital filters. The digital FIR & IIR filters designed using evolutionary methods can also be implemented as a Simulant model in MATLAB. Though lot of work has been done in this field but then also room is still left for doing further exploration with the evolutionary optimization methods and using them for the design of high performance digital FIR &Airlifters.

2.3 OBJECTIVE

1) FIR Filter to analyze Power Efficiency and Delay Reduction. FIR filters to power consumption reducep ower consumption in such a way.For IIR filters, an unconstrained quasi-Newton algorithm is employed and any poles or zeros that lie outside of the unit circle are reflected back inside. Through this a set of simple, approximate relationships between IIR

Digital filters often operate on digitized.

Frequency Band	Range
Fs (Sampling)	48 kHz
Fpass	7600 Hz
Fstop	10000 Hz
Apass	1
Astop	80

3. COMPARISON OF FIR AND IIR FILTERS ON ACCOUNT OF MATLAB RESULTS

On the basis of the number of coefficients required, the order of the filter and the sampling frequency at which the filter works, for a given IIR and FIR band pass filter following comparison can be made.

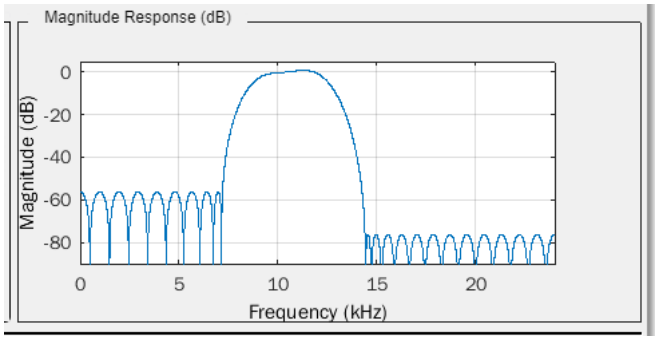
• The requisite for an IIR filter is a choice of lower order compared to the FIR specifications for the same parameters.

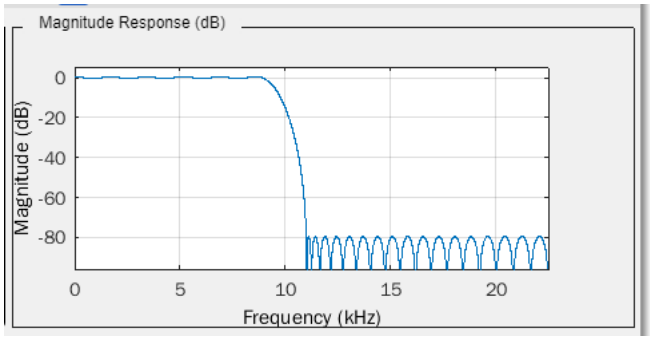
• IIR can attain the same filtering characteristic easily by less memory consumption and computations than a similar FIR filter.

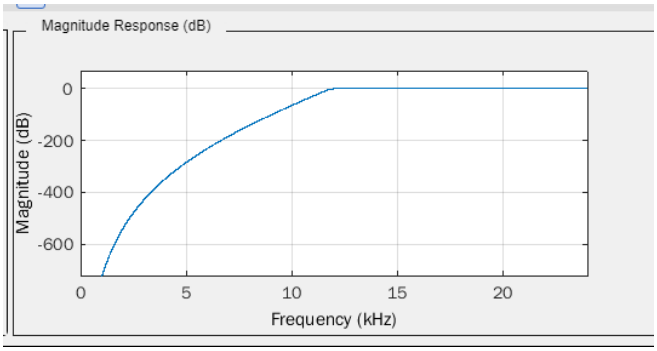
• The Necessity of the side lobes required are very less in the stop band of IIR filter.

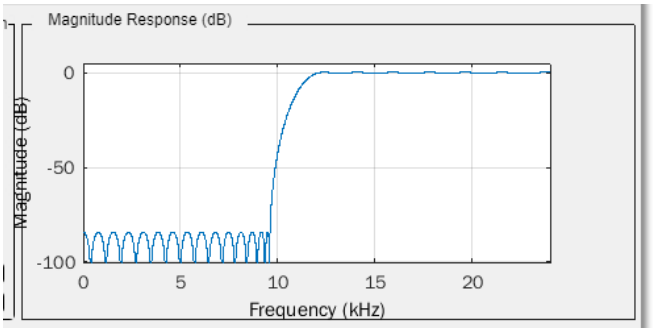
- Response of IIR filter is Recursive and Non Recursive for FIR filter.
- FIR response is linear in scale of phase consideration so design complexity is not a concern as compare to IIR filter.

Results of Magnitude Response of Filters low pas, High pass, Band Pass, Band Stop.









4. CONCLUSION

This paper mainly deals with the analysis of IIR and FIR filters. The detailed comparison between FIR and IIR filters were carried out on the basis of Magnitude response and pole zero configuration for stability analysis. It has been observed that FIR filter is inherently stable and easy to design irrespective at the order of filters as asses in transfer function due to its linear phase characteristics as far as IIR filter is concern the filters is somehow stable for the given frequency range and complex design structure due to Nonlinear phase and scaling.

5. FUTURE WORK

Future design of the filters are being computed based on soft computing techniques. Optimization play an important role for designing consideration AI algorithm i.e. genetic algorithm fuzzy logic and other means of expert system is frequently used for the implementation of same.

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