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Polyphase Structure Used In Discrete Wavelet Transform For Ultra Low Power, High Efficiency

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ABSTRACT

In today's world, where communication is an important aspect. Wavelet Transform has gained a lot of popularity in the field of signal processing, due to its capability of providing both time and frequency information simultaneously. It is one of the solution for processing non-stationary signals (real), this leads to the demand for efficient architectures for the implementation of Wavelet Transforms, which could lead to ultra low power consumption. Due to the demand for portable devices and real-time applications, the design has to be realized with very low power consumption and a high throughput. We will illustrate that a DWT design using a Polyphase structure gives the better results. Also, simulation results are obtained using Xilinx which shows reduction in component used, leading to reduction in work area and finally low power consumption.

Keywords:- *polyphase structure, discrete wavelet transform, Xilinx.*

I. INTRODUCTION

Objective: Project significance / Relevance with ongoing academic activities:-
Our aim is to establish better results which leads to ultra low power and high efficiency so that communication systems which is an important aspects in today's life can work more efficiently leading to customers satisfying qualities. The Wavelet Transform at high frequencies gives good time resolution and poor frequency resolution, while at low frequencies the Wavelet Transform gives good frequency resolution and poor time resolution.

II. PROJECT IMPACT – EXPECTED OUTCOMES

With the introduction of polyphase structure and better programming we reduced the no. of devices/ components which are used, thus leading to reduction of work area and finally power consumption decreases. Also efficiency of the device increases to a great extent which leads to increases in life of the devices. This helps customers to depend and be satisfied with the devices, increasing the demand of the architecture used.

The project leads to excellent outcomes by increasing the performances by the following measures, which are as follow:

- Good efficiency.
- Ultra low power.
- High throughput.
- Less components.

- Consumes less area.
- Low cost.
- Multiresolution obtained.

III. LITERATURE SURVEY ON NATIONAL & INTERNATIONAL SCERARIO:-

Due to the properties of Wavelet Transform non-stationary signals are successfully applied for analysis and processing e.g. speech and image processing, data compression, communications etc. Due to this its demand is growing in number of applications in various areas,. I.Bennour implemented Mallat's Discrete Wavelet Transform architecture using Direct Form structure which uses FIR filter which is composed of multiplier, adder and delay units. The multiplier in the FIR filter consumes a large hardware area. This architecture had a large critical path delay and latency.

R.A. Hawley solved this problem by applying appropriate hardware pipelining techniques within the DF filter and by using Polyphase filters instead of decimating after filtering. Polyphase and pipelining techniques for 1-D DWT convolution based architecture were implemented by Marino for a low power and high speed VLSI architecture.

Ali.M.Haj implemented Discrete Wavelets Transform Polyphase architecture using Serial Distributed technique. But this SDA architecture had large latency and low throughput because output depends on the number of bits of the input signal. Thus it is required that we implement / design architecture which provides high throughput and ultra lower power. Coding to achieve this is done using Xilinx and results expected are achieved.

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