

ABSTRACT

This project presents the design and implementation of a configurable Finite Impulse Response (FIR) filter using Very Large Scale Integration (VLSI) techniques. The filter architecture integrates advanced components such as Booth Multiplier in the multiplier stage and Approximate Carry Look-Ahead Adder in the adder stage to enhance efficiency and performance. The utilization of Booth Multiplier optimizes the multiplication process by reducing the number of partial products, thus minimizing hardware resources and power consumption. Additionally, the integration of Approximate Carry Look-Ahead Adder improves the speed of addition operations, enhancing the overall throughput of the filter. The proposed FIR filter design is configurable, allowing users to adjust filter parameters such as tap coefficients and filter length according to specific application requirements. Configurability enhances versatility, enabling the filter to adapt to various signal processing tasks efficiently. The implementation of the filter is validated through simulations and hardware synthesis, demonstrating its functionality and performance metrics such as speed, area, and power consumption. Overall, the presented FIR filter design offers a promising solution for real-time signal processing applications where efficient utilization of hardware resources and configurability are paramount. The integration of advanced VLSI techniques contributes to improved performance and flexibility, making the filter suitable for a wide range of applications in fields such as telecommunications, image processing, and digital signal processing.