

Real Time FPGA Based System for Image Enhancement

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Abstract:

Medical imaging is widely used for diagnosis and treatment, but image quality is often degraded due to noise, poor contrast, and artifacts. This paper presents a real-time image enhancement system implemented using a Field Programmable Gate Array (FPGA). The system is designed using Verilog Hardware Description Language (HDL) to achieve high-speed and efficient hardware-based image processing. The proposed method includes various enhancement techniques such as noise reduction, contrast enhancement, and edge detection to improve image clarity. Algorithms like median filtering, Gaussian filtering, histogram equalization, and Sobel edge detection are implemented on FPGA. Due to the parallel processing capability of FPGA, multiple operations can be performed simultaneously, resulting in faster execution and reduced latency compared to conventional systems. The reconfigurable nature of FPGA allows flexibility for different medical applications. This work demonstrates that FPGA-based image enhancement systems improve image quality and support accurate medical diagnosis.

Keywords:

FPGA, Image Enhancement, Medical Imaging, Verilog HDL, Real-Time Processing, Noise Reduction, Edge Detection, Low Power Consumption.