IMPLEMENTATION OF QUANTIZATION IN MPEG-2 ENCODER USING XILINX FPGA TECHNOLOGY

Project report presented in the partial fulfillment for the award of the

Bachelor of Electrical Engineering (Hons)

UNIVERSITI TEKNOLOGI MARA

RAZILAWATI ABDUL RAZAK

FACULTY OF ELECTRICAL ENGINEERING

UNIVERSITI TEKNOLOGI MARA

40450 SHAH ALAM

SELANGOR DARUL EHSAN

MALAYSIA

ACKNOWLEDGEMENT

In the name of ALLAH the Most Gracious and the Most Merciful, it is with the deepest gratitude that Allah gives me strength and ability to complete this project.

First of all I would like to express a special gratitude to my supervisor, Mr. Abdul Hadi Abdul Razak for patiently assisting in effort to complete this project.

I would also like thanks to all my friends who help me a lot to complete this project, especially Amir Hamzah Jailani and Saiful Azhar Abdull Manaf for their willingness to spend their time to teach and discuss with me about VHDL and Xilinx environtment.

Lastly, a special thanks to my beloved family for their greatest support especially my parent Mr. Abdul Razak Ahmad and Thanks to all.

Razilawati bte Abdul Razak

Bachelor (Hons.) of Engineering (Electrical)

Faculty of Electrical Engineering

Universiti Teknologi MARA

Shah Alam, Selangor

Malaysia

4 November 2007

ABSTRACT

The aim of this project is to presents the design of quantization in MPEG-2 encoder for FPGA implementation using XILINX FPGA technology. Quantization is the process that determines what information can be discarded without a significant loss. The purpose of this project is to study the quantization process used in MPEG-2 video compression and implement it on FPGA by Xilinx. Very High Speed Hardware Description Language (VHDL) is used to program the behavioral logic design of quantization. The simulation of quantization process in Xilinx ISE environment involves the 2D-DCT algorithm that is coded in VHDL. The pixel value is the applied to the testbench waveform to observe the output. The design is then implemented on two Xilinx FPGA technology; Spartan and Virtex model to study the speed of processing and resource utilization on several chips on each model.

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CHAPTER I

INTRODUCTION

1.0 BACKGROUND

Digital image and video compression is now significant in our diurnal activities. Internet teleconferencing, High Definition Television (HDTV), satellite communication and digital storage of movies would not be feasible without a high degree of compression. Hence, such applications are far from realizing their full potential largely due to the limitations of common image compression technique.

In order to make it realistic, quantization process will be need in the compression process. Quantization is the process of limiting the value of function at any sample to one of an encoded number of acceptable values, so that it can be represented by a finite number of bits in a digital word. Quantization plays a major part in lossy data compression. Quantization can be viewed as the fundamental element that distinguish lossy data compression from lossless data compression, and the used of quantization is nearly always motivated by the need to reduce the amount of data needed to represent a signal [1].

Compression is achieved by subsequent of quantization of the transform coefficients. For video compression, the transform coefficient used is two-dimensional discrete cosine transform (2D-DCT). The 2D-DCT is then quantized and entropy coded. By reducing the precision of the transformed values using quantization, the number of bits needed to represent the image can be reduced substantially.