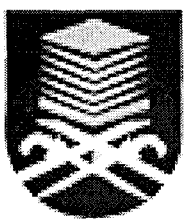
DESIGNING GABOR FILTER FOR FINGERPRINT RECOGNITION USING VERILOG HDL



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ABSTRACT

This paper presented the implementations of Gabor filter for fingerprint recognition using Verilog HDL. This work demonstrated the application of Gabor Filter technique to enhance the fingerprint image. The incoming signal in form of image pixel will be filter out or convolute by the Gabor filter to define the ridge and valley regions of fingerprint. This was done with the application of a real time convolve based on Field Programmable Gate Array (FPGA) to perform the convolution operation. The main characteristic of the proposed approach were the usage of memory to store the incoming image pixel and the coefficient of the Gabor filter before the convolution matrix take place. This FPGA filter can be categories as reconfigurable filter as the characteristic of the Gabor filter can be change by changing the coefficient stored in the memory.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND STUDY

The increasing demand for reliable human large scale identification in governmental and civil applications has boosted interest in scientific testing of biometric systems. Biometric is an emerging technology that is used to identify people by their physical and/or behavioural characteristic that inherently requires that one to be identified is physically present at the point of identification. Fingerprint identification is one of the most used and important biometrics. Fingerprints offer advantages when compared with other biometrics. For instance, iris reader fail when one wears contacts lenses or cannot maintain either their eyes open for a while or in front of intense luminosity. Gait and voice recognition can be imitated and there are similar patterns. Because of its uniqueness, the fingerprint has been used widely.

Fingerprint enhancement is a necessary process for fingerprint verification process. The most important measurement element in fingerprint recognition process is the texture of the fingerprint. Fingerprint enhancement is a necessary process for practical fingerprint verification. The main reason is because the imperfect live-scan fingerprint-sensors with the current technology[1]. The most popular for live-scan fingerprint touch sensors are optical and capacitive devices. However, these kinds of fingerprint touch sensor need to be cleaned periodically. So fingerprint enhancement technique employs contextual filter which their characteristics adapted depending on local text need to be implemented.

Fingerprint enhancement using Gabor filter is one of highly computational complexity in fingerprint verification process[1]. Gabor filter have a complex valued convolution kernel and a data format with complex values is used. So implementing Gabor filter is very significant in fingerprint verification process[2]. Designing Gabor filter will help enhancing the quality of fingerprint image. In fingerprint recognition, Gabor filter optimally capture both local orientation and frequency information from a fingerprint image. By tuning a Gabor filter to specific