1. INTRODUCTION

Vector Quantizer (VQ) systems are used widely in many different areas of signal processing including coding, compression (image, audio and video), image restoration, classification and recognition (pattern and speech) systems. In this thesis, I will present a hardware implementation of a Programmable CMOS Analog Vector Quantizer system. Template-book (code-book) of the proposed VQ system contains 64 template-vectors (template-word, code-word) of size 16. The resolution of the vector elements is 6 bits. The template-book is stored in a Random Access Memory (RAM) in order to modify easily template-vectors for different applications. The silicon area consumption of VQ system's building blocks that measure and classify the distance between input and template-vectors is very small compared to other implementations.

Vector Quantizer system is implement using AMS 0.6μm CUQ double-poly, double-metal technology. The silicon area of the VQ system including the bonding pads is approximately 3.7mm x 4.1mm (15.17mm^2). RAM block consumes more than % 70 of the system silicon area.

I will present Vector Quantization problem and definitions related to Vector Quantization in Chapter 2. Brief information about Kohonen's Self-Organizing Feature Map, implementation principles of Vector Quantizer system and general description of VQ system building block's functions will be presented in this chapter too.

In Chapter 3, I will analyze function, performance limit, silicon area consumption, power consumption, resolution and speed of all of the VQ system building blocks in detail. Especially, I will analyze the error caused by the fabrication process noise for the analog blocks that influences the resolution of the system.

In Chapter 4, I will present the layout automation tool LATool developed to automate the layout generation of the distance matrix. I will show the behavior of the

Vector Quantizer system with the aid of 3 simple examples. I will analyze the performance of the implemented Vector Quantizer system.

Finally, in Chapter 5, I will draw some conclusions about the design process of a VQ system and terminate with concluding future works to do for improving the performance and cost of the overall system. I will give also a comparison between the similar works.