HIGHER TECHNICAL INSTITUTE

ELECTRICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

CONSTRUCTION OF A GREEK SPEECH SYNTHESIS SYSTEM

by

SALIDES SAVVAS (E/190)

JUNE 1994

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SUBMITTED BY : Salides Savvas

In partial satisfaction of the award of diploma of technician engineer in Electrical Engineering of the Higher Technical institute of Cyprus

PROJECT SUPERVISOR : Mr. C. Theopemptou

EXTERNAL ASSESSOR : Mr. A. Alexandrou

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This project is dedicated to my family, to my fiends and to all the people who offer their love to their fellow human

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CONTENTS

PART III
SOFTWARE

SUMMARY

This project deals with the design and construction of a Greek speech synthesis system for handicapped children. The book is separated in three main parts.

At the first part, an introduction to the most important speech encoding - decoding methods is made and the appropriate method for the requirements of this project is selected.

The second part deals with the design and operation of the system. It begins with chapter three which gives a block diagram and a brief explanation of the system operation. The rest chapters, four to nine, are concerned to the specific parts of the system.

Finally, in part three the software design is presented.

INTRODUCTION

A speech synthesizer in simple words is a system which uses various predefined instructions and stored data in order to cause speech to be heard from a speaker. The process through which speech is converted into these stored data is called speech encoding and the opposite process which converts the stored data into speech is called speech encoding. These are various methods to encode-decode speech, each one having different results according to sound fidelity required, the various speed characteristics and the availability of storage space.

The first method that was used is the Pulse Code Modulation (PCM) which gives good sound quality only if a lot of storage space is available. This problem is overcome with Delta Modulation (DM) which requires much less space but gives poor sound quality. This method was used in the past from an HTI student but it gave poor quality results.

Instead of encoding the recorded speech, various words can be synthesized by correct programming of special IC's, the voice synthesizers. This concept was used by an HTI student but it produced Greek words of English accent.

The solution is decided to be given with 8-bit PCM since only few words are required (little storage space) for the purpose of the project. This selection is also based on the availability of encoding tools in the Cypriot market. The words were encoded with the aid of " Sound Blaster " Card which uses 8-bit PCM and stored in EPROMS.

A storage card is designed which comprises the EPROMs with the stored 8-bit codes. The latter are drawn from a microprocessor controlled card, the MPB85-1 designed by a former HTI student, Argyris Constantinou and sent to a Digital to Analog Converter, a low pass filter an amplifier and a speaker. The system is powered up by 8 x 1.5V alkaline batteries and it has a socket for operation from a 12V dc power supply. The above features (apart from the power supply) are contained in a box comprising also 12 large word keys to be easily operated from a child with shaking hands. The user will press the key representing the selected word and turn off again to provide minimal power consumption requirements. The whole construction will be fitted on the wheelchair of the little child, hoping not to erase the smile she already has on her little face.