engineering council

# THE ENGINEERING COUNCIL EXAMINATION

## PART 2(C) - PROJECT

# DEVELOPMENT OF A COMPUTER SIMULATED DIGITAL COMMUNICATION SYSTEM

PANAYIOTIS PANAYIOTOU

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CYPRUS

HIGHER TECHNICAL INSTITUTE

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*To my son*

*Stefanos…*

# Acknowledgments

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Finally I am grateful to my wife who remained patient, understanding and supporting as this study was developed.

# 'Development of a Computer Simulated Digital Communication System'

## Abstract

This project deals with the design and development of a software program to simulate a digital communication system, using simple or coded PCM signals and Matched filter detection. The digital communication system is basically consisted of a data generator to produce a random bit stream, the noise generator to introduce noise to the signal, the matched filter detector to maximize the signal to noise ratio at the receiver and the error counter.

The program, written in Matlab programming language, can be used as a laboratory demonstration system and enables the user to realize the operation of the digital communication system. Through the software the operator can visualize, on a step by step basis, the transmission of digital signals from one point to another and at the same time experiment with different features offered in the program.

# Contents

# CHAPTER 1 Introduction

It is difficult to imagine what modern living would be like without ready access to reliable, economical, and efficient means of communication. Communication systems are found wherever information is to be transmitted from one point to another. Telephone, radio, and television are common, everyday examples of communication systems. It is hardly an overstatement to say that today communication systems are not only necessary to business, industry, banking, and the dissemination of information to the public, but also essential to the national welfare and defense. [5]

This project deals with the design, implementation and experimental evaluation of a simulated digital communication system using simple or coded PCM signals and Matched filter detection. The communication system is basically consisted of a data generator to produce a random bit stream, the noise generator to introduce noise to the signal, the matched filter detector to maximize the signal to noise ratio at the receiver and the error counter.

The project can be used as a laboratory demonstration system and enables the user to realize the operation of the digital communication system as well as to experiment with different features. As soon as the program is executed the operator can choose the kind of signal to be transmitted and the amount of noise to be inserted. Then there is a view of the filtering steps and errors produced. Furthermore there is the option of running a performance test at any desired noise level and viewing the results. The program is written in Matlab, an interactive system and programming language for general scientific and technical computation. [7] This project can find applications in places where the study of telecommunications is involved. It can be used as a helping tool for the instructor to familiarize students with digital communication systems.

The report is divided in six chapters. The first chapter deals with the introduction, the second and third are considered with the design, the forth shows the output results, chapter five discusses the performance evaluation and finally chapter six is devoted to discussion and conclusions.