

CONTENTS

1	INTRODUCTION	5
1.1	State of Art	5
1.2	Goals of the Dissertation	6
1.2.1	Speech Signal Processing	6
1.2.2	Speaker Dependent Feature Extraction	6
1.2.3	Design of Biometric Security System (BSS)	6
2	SPEECH SIGNAL PROCESSING	7
2.1	Recording, Digitising and Pre-processing	7
2.2	Common Features	7
2.2.1	Energy and Zero-Crossing Rate	7
2.2.2	Linear Predictive Coding (LPC)	8
2.2.3	Discrete Transforms	8
2.2.4	Mel-Frequency Cepstrum Coefficients (MFCC)	9
2.2.5	Average Long-Term LPC Spectrum	9
2.3	Voice Activity Detection (VAD)	10
2.3.1	Common VAD Methods	10
2.3.2	VAD Using Neural Network	10
3	SPEAKER DEPENDENT FEATURE EXTRACTION	11
3.1	Speaker Dependent Frequency Filter Bank (SDFFB)	11
3.2	Speaker Dependent Frequency Cepstrum Coefficients	12
4	SPEAKER RECOGNITION	13
4.1	Hidden Markov Models with Gaussian Mixtures	13
4.2	Decision-Making	14
4.3	Approaches to the Speaker Recognition	15
5	DESIGN OF BIOMETRIC SECURITY SYSTEMS	16
5.1	Single- and Multi-Biometric Security System	16
5.2	Task of the BSS	16
5.3	Biometry in Cryptography	17
5.4	Unique Vector Generating from the Speech Signal	17
5.5	Robustness of the BSS	18
6	EXPERIMENTAL RESULTS	19
6.1	Voice Database and Feature Sets	19
6.2	VAD Using Neural Network	19
6.3	Speaker Recognition Experiments	20
6.4	Unique Vector Generating	24
7	CONCLUSIONS	26
8	REFERENCES	27