**ABSTRACT**

In this thesis Isolated Words Speech Recognition system was designed. Linear Predictive Coding (LPC), Mel Frequency Cepstral Coefficients (MFCC), and Spectrogram methods were used as feature extraction methods. Artificial Neural Network (ANN) was used as a technique to classify the spoken words to different patterns so the system can recognize unknown spoken words according to these patterns. The developed system has a Graphical User Interface (GUI) that contains many buttons to allow the user to choose the necessary method, train the network, choose trained or not trained spoken words and recognize them. The system allows the user to add noise (in different Signal to Noise Ratio (SNR) values) to the speech signal. 30 spoken words were recorded by the author voice using Audionic AH-112 headphone set. Different methods were used to extract the features of words then the features of 30 words were used to train the neural network. Testing the system was divided into three steps. Step one is the testing of the system with the trained words, step two is the testing of the system with not trained words, and step three is the testing of the system with the trained words with noise added. The system was tested using various numbers of hidden layers. The obtained results show that the number of the hidden layers has no effect on the Recognition Rate (R.R) of the system when trained words were tested. The best R.R obtained for LPC method was 73.3% for not trained words. Using MFCC method the R.R was 83.33% for not trained words. For Spectrogram method R.R was 73.33% for not trained words. Because every method produces a different number of output data from feature extraction process, the number of neurons in the input layer of the neural network was different for each method. The neurons in the input layer of the neural network were 420 neurons-when LPC method was used, 613 neurons-when MFCC method was used, and 4235 neurons-when Spectrogram method was used. The best R.R obtained from testing of the system with trained words was 100% for all the three methods. For MFCC method the best R.R obtained was 100% when low noise was added to the speech signal (30 dB SNR) and 96.67% when high noise was added to the speech signal (5 dB SNR). For LPC method the best R.R obtained was 70% when noise was added to the speech signal. For Spectrogram method the R.R was 100% when low noise was added to the speech signal (30 dB SNR), but the result decreased to 86.67% when high noise was added to the speech signal (5 dB SNR). Finally the simulation results demonstrate that the best method used for feature extraction was MFCC comparing with LPC and Spectrogram methods. MFCC method has low number of output data produced comparing with Spectrogram method.

**Key Words: Speech Recognition system, LPC, MFCC, Spectrogram, Neural Networks.**