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**Title :** Consonants Recognition and Noise Reduction for Arabic Phonemes Based Malay Speakers

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Arabic phonemes can be categorised into 28 consonants. The variations in each phoneme and vowel cause difficulties for the non-native Arabic speakers, particularly the Malay speakers, to pronounce these letters correctly. Hence, in this thesis, noise reduction and consonants recognition are conducted among the Malay speakers. The Malay race has been chosen due to the high usage of the Arabic language for reciting Al-Quran. Generally, the study is divided into two parts, namely, the study of noise reduction and consonant recognition. First, two noise removal methods were developed. The first method is based on combining Negative function with Gamma correction function. The second noise reduction method is addressed by utilising 2D Gabor filter. Furthermore, the consonant study was conducted based on Automatic Speech Recognition (ASR) system concept. The ASR composes of feature extraction stage followed by speech recognition. On the other hand, the feature extraction was implemented by investigating three different methods, namely, Mel-Frequency Cepstrum Coefficients (MFCC), Linear Prediction Coefficients (LPC) and Perceptual Linear Prediction (PLP). Finally, the speech recognition process was

conducted by utilising three methods: Dynamic Time Warping (DTW), Artificial Neural Network (ANN) and Deep Neural Network (DNN). Experimental analysis and results showed that the proposed noise reduction methods have advantages over the traditional methods in terms of the consonant waveforms enhancement quality and the computational time as well. The MFCC has shown better performance compare to LPC and PLP as a feature extraction technique. Additionally, the comparison between DTW and ANN has proven that the ANN more suitable for Arabic consonant recognition. On the other hand, the joining of ANN and DTW has worked optimally as well. Lastly, the DNN are the most suitable methods for recognition process of Arabic consonants based on Malay speakers' usage.