

UNIVERSITI TEKNOLOGI MARA

**ELECTRODE OPTIMISATION AND
FEATURE EXTRACTION OF
ELECTROENCEPHALOGRAPH
SIGNAL TO IDENTIFY DYSLEXIC
AND NORMAL CHILDREN**

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of the requirements for the degree of
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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

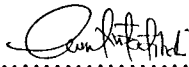
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ABSTRACT

The Dyslexia is learning difficulties which cover reading, spelling and writing. Diagnosis of dyslexia in children at an early stage is very important because they are in the beginning of learning which will help them to cope with the situation very well. An investigation into the feature extraction of EEG signals with dyslexia using Fast Fourier Transform, Average Spectrum and Welch Power Spectral Density has been studied in this work. Before feature extraction was carried out, the optimum electrode was identified using Fast Fourier Transform. Two types of EEG signals were investigated, one from adults and the other from children. In the first stage, the EEG signals were recorded from 70 adults using electrodes C3, C4, P3, P4, O1, O2, T3 and FC5. In the second stage, the EEG signals were acquired from 8 normal and 8 dyslexic children using two optimum electrodes found from the first stage. The FFT was then performed on EEG signal from 70 subjects. Then, the EEG signals were analyzed using three methods; Fast Fourier Transform, Average Spectrum and Welch Power Spectral Density from eight subject normal and eight subject dyslexic. Four statistical parameters; minimum frequency, maximum frequency, mean frequency and standard deviation were calculated for each method. From the analysis results, it was found that P3 and P4 are the optimum electrode placement and thus parietal lobe is the active area of the brain during writing. This lobe play an important role in the process related to spatial cognition and in what have been described as quasi- spatial processes, such as used in arithmetic and reading. Therefore, P3 and P4 electrode placements were used in the second stage to identify the best feature extraction method. Results from the second stage showed that the Welch Power Spectral Density is the optimum method to differentiate between normal children with the mean frequency is the optimum parameter.

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