

# Development of EEG-Based System to Identify Student Learning Attention Ability



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**Abstract** It cannot be denied that teaching and learning are vital in education systems regardless of the level of education either in primary school, secondary school or higher institution. The main job of either teachers or lecturers is to make their students understand and pay full attention to each topic being taught. Here, the main challenge of teachers and lecturers are how to make sure their student giving attention in class during lectures. To cater this issue, the technology of Electroencephalogram (EEG) can be employed. In nowadays technology, human attention or concentration can be studied using their brainwaves or EEG signals. In this research, EEG technology and detection tool are used to capture the attentive of the student in class to determine either student is attentive or not attentive during lectures. The main objective of the study is to detect the level of attention of student during the lecture class using brainwaves signal processing technique. Here, the captured EEG raw data from human's brain will be filtered using pre-processing technique to remove the noises or artifacts. Next, the EEG signals are converted to its power spectrum using Fast Fourier Transform (FFT) technique and fifth order of the Butterworth bandpass filter is used to separate EEG Alpha and Beta bands from the filtered EEG signals. Next, feature extraction technique is employed to extract the unique EEG features in term of Power Spectral Density (PSD) and k-Nearest Neighbors (k-NN) and Support Vector Machine (SVM) classifiers are used to classify the selected features. The study includes the construction of Graphical User Interface (GUI) to display the results of the overall process of the signal processing technique in determining student attention level during class lecture. The results of the study indicate that the level of attention of students in the class is obtained at 80.5% classification accuracy.

**Keywords** EEG · Human attention · EEG features · EEG classification · GUI

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