

# Investigation of Time-Domain and Frequency-Domain Based Features to Classify the EEG Auditory Evoked Potentials (AEPs) Responses

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## **ABSTRACT**

The auditory evoked potentials (AEPs) are a kind of electroencephalographic (EEG) signal that is produced by an acoustic stimulus from the region of the brain. The people who are unable to maintain the verbal communication and behavioral response through the sound stimulation, EEG based brain-computer interface (BCI) technology could be an effective alternative to rehabilitate their hearing ability. In this paper, the AEP responses of three distinct English words namely bed, please and sad have been recognized. The EEG features in terms of Fast Fourier Transform (FFT), power spectral density (PSD), spectral centroids, standard deviation, Log energy entropy, mean, skewness, kurtosis has been selected as a feature extraction method. Support Vector Machine (SVM), Linear discriminant analysis (LDA) and K-Nearest Neighbors (K-NN) have been employed to classify the extracted features. Among all these features, power spectral density with SVM classification has achieved the best accuracy. Different performance measures were evaluated to identify the best set of features as well as model. The best classification accuracy was demonstrated by the developed SVM model was observed as 82.86% which clearly indicates that the method provides a very encouraging performance for detecting the AEPs responses.

**KEYWORDS:** EEG, BCI, Auditory evoked potential, SVM, Machine learning

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