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| **Author(s) Name:** | Md. Asadur Rahman and Md. Mamun or Rashid and Farzana Khanam and Mohammad Khurshed Alam and Mohiuddin Ahmad | | |
| **Contact Email(s):** | Khurshed709@aiub.edu | | |
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| **Abstract:** |  |
| **Since several work requires continuous alertness like efficient driving, learning, etc. efficient measurement of the**  **alertness states through neural activity is a crucial challenge for the researchers. This work reports a practical method to investigate the alertness state from electroencephalography (EEG) of the human brain. Here, we have proposed a novel idea to monitor the brain alertness from EEG signal that can discriminate the alertness state comparing resting state with a simple statistical threshold. We have investigated two different types of mental tasks: alphabet counting & virtual driving to monitor their alertness level. The EEG signals are acquired from several participants regarding alphabet counting and virtual motor driving tasks. A 9-channel wireless EEG system has been used to acquire their EEG signals from frontal, central, and parietal lobe of the brain. With suitable preprocessing, signal dimensions are reduced by principal component analysis and the features of the signals are extracted by the discrete wavelet transformation method. Using the features, alertness states are classified using the artificial neural network. Additionally, the relative power of responsible frequency band to alertness is analyzed with statistical inference. We have found that the beta relative power increases at a significant level due to alertness which is good enough to differentiate the alertness state from the control state. It is also found that the increment of beta relative power for virtual driving is much greater than the alphabet counting mental alertness. We hope that this work will be very helpful to monitor constant alertness for efficient driving and learning.** | |