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An implementation of electroencephalogram signals acquisition to control manipulator through brain computer interface (Conference Paper)

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Abstract

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Brain computer interface (BCI) technology can be used to design a robotic arm whose decision would be based on the brain activity and brain signals. This proposed design can be more beneficial for the paralyzed people and the patients who are suffering from Amyotrophic lateral sclerosis (ALS), Locked in syndrome (LIS), or neurodegenerative disease. Due to these disease patients would not be able to hold and grip the objects properly. Extensive literature review showed that various EEG signal analysis has been completed with the accuracy of 70% to 85%. The suggested solution would be beneficial to the patients in terms of performing every day functions easily like draws opening, holding dishes and opening and closing of doors as well with more accuracy. In the proposed research electroencephalogram signals were observed and used to classify the type of the motion. Data acquisition comprised of three stages amplification can be considered as cost effective signal conditioning. High pass filter, low pass filter and then converted from analog to digital. Open vibe software was used to design the basic neuron scenario for the brain signals and then classified into alpha and beta waves. Robotic arm movement was based on the alpha and beta waves were performed precisely. Simulated results proved that proposed EEG signals acquisition performed better and can be acknowledged as cost effective. Researchers showed the successful execution of the brain wave signal classification with less false alarm rate for the robotic arm movement by modulation, digitization of the brain signal. Moreover, comparative analysis has been performed of Quadratic Discriminant analysis, k-NN and Medium Gaussian SVM in terms of accuracy prediction speed and training time. Comparative analysis proved that Medium Gaussian SVM worked better than the other classifiers with the accuracy of 95.8%. It was also proved that Medium Gaussian classifier has the capability to predict 10000 observations per second in 0.75466 training time. © 2019 IEEE.

SciVal Topic Prominence

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