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Abstract
The measurement of EEG is to record the tiny voltage signal by the electrodes under the scalp. The acquired wave signals are called brain wave or Electroencephalogram(EEG). Regarding the current researches of brain wave, there are a lot of researches which has been studying how to communicate with others and how to transfer information by using EEG signals, except for psychological diseases and the effect of EEG resulting from some kind of special disease. The goal of our research is to design one kind of BCI system. So called BCI (Brain Computer Interface) is one kind of communication technique for helping the serious disabled with spine/central nerve injury or without upper limb/foot by EEG signals. This BCI technique can help the disabled to communicate with others and take care of themselves. In this research, the brain wave amplifier we used is the NuAmps amplifier and the analytic/acquisitive software for EEG is named “Scan 4.3”. Both of them were developed by NeuroScan company. The other software we used to write a human-machine interface is LabVIEW 8.2.1 version that was developed by National Instruments. We used the TCP/IP communication protocol to connect Scan 4.3 with LabVIEW. In the experiments, we aimed at VEP (Visual Evoked Potential) to design this system. There are four direction arrows (up, down, left, right) shown on the monitor randomly for stimulating the subject. In the data analysis, we used ICA (Independent Component Analysis) to filter the artifact of EOG/EMG, and calculate the average value after summation of all trials. We can find the results that electroencephalography (EEG) always appears as a positive deflection in voltage at a latency of roughly 200 ~ 300 ms after VEP stimulation and as a negative deflection in voltage at a latency of roughly 400 ~ 500 ms after VEP stimulation. So we regard these results as one kind of brain wave feature, and apply this feature to control the cursor. The recognition ratio of EEG resulting from VEP is about 90 % if the subject can be concentrative at the test.
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