

Determining the Region Accuracy of a Region-Based P300 Speller Paradigm

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Since the brain-computer interface (BCI) speller was first proposed by Farwell and Donchin, there have been modifications in the visual aspects of P300 paradigms. Most of the changes are based on the original matrix format such as changes in the number

of rows and columns, font size, flash/blank time, and flash order. The improvement in the resulting accuracy and speed of such systems has always been the ultimate goal. In this research paper, we have conducted a set of experiments to determine the errors related to various regions in a region-based P300 BCI paradigm (RB), which is not based on the original matrix format. We have designed RB paradigm in which similar characters are distributed in all the seven regions and user input was recorded using electrodes. The results show that the spelling error related to the center region was highest among the subjects.

Infrascanner: Cost Effective, Mobile Medical Imaging System for Detecting Hematomas

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Early identification of intracranial hematomas in patients with traumatic brain injury is crucial for the successful outcome of the intervention. Infrascanner is a hand-held, noninvasive, near-infrared based mobile imaging device to detect brain hematoma within the “golden period.” This refers to the period following head trauma where assessment of the neurological condition and medical intervention of a victim is most needed and can significantly reduce the mortality and morbidity rate. In Infrascanner,

hematoma detection is based on the differential light absorption of the injured versus the noninjured part of brain. When extravascular blood is present due to internal bleeding, there is a greater local concentration of hemoglobin that results in greater absorbance of the light on the bleeding side of the brain as compared with the contralateral uninjured side. This differential can be detected via sources and detectors placed on symmetrical lobes of the skull noninvasively. In a multicenter study, Infrascanner demonstrated high sensitivity (88%) and specificity (91%) in detecting intracranial hematomas larger than 3.5 ml in volume and less than 2.5 cm from the surface of the brain. These results suggest that this technology may be useful to supplement clinical information such as neurological examination in determining need for and urgency of further imaging studies. Infrascanner is intended to be used as an adjunct to the standard diagnostic workup to aid the decision in prioritizing high risk patients with suspected hematomas for urgent CT scans and surgical interventions. It can further facilitate surgical intervention decisions in environments where access to CT scan is restricted or not available.