**BMI IN FORENISC SCIENCE**

**ISHA**

Brain computer interface is an emerging field that is a connecting link between the brain and the computer so as to serve the purpose of conveying of messages, thoughts without the aid of an appendages. The basic plus point of BMI is it’s non muscular communication system adapted to transfer messages. BCI has a vast application in all most every field ranging from medical implementations to forensic analysis. Being non-invasive, accurate and cheap, the technology serves all the purpose. Talking about the forensic implementation of BMI is the criminal forensic, that involves the use of electroencephalography.

EEG not only monitors human brain but also connects the neurobiological researchers to forensic investigation so as to render justice. EEG produced serves as a corroborative evidence in the court of law. The BCI used for EEG has effective applications, serving control , entertainment , virtual reality and security.

Analyzation of any admissible evidence requires appropriate observation and documentation. The purpose can be served by EEG that monitors the neurological responses of the suspects with a scientific proof from the same. Lie detection is a challenging field while referring to as forensic analysis. Various tools based on multiple parameters including psychological response, speech, behavior etc. are currently encorprated while analyzing of the truth about ab incidence. Though these methods are subjective in nature.

EEG basically works on the principle that stress would produce change in the involuntary psychological and neurological conditions. The electrical activity of brain is measured as per the answers given by the suspect pertaining to the matter being investigated. The major consideration being that of noise, which is to be taken care of so as to maintain the accuracy of results.

HOW EEG WORKS?

Brain fingerprinting uses EEG so as to measure the brain waves. The procedure basically involves attaching electrodes to the scalp which detects the brain wave pattern and accordingly the results are generated.

The basic principle lying is the response given by the brain differs on whether the incident was a per of the memory or not. fMRI is another technology linking BMI to forensic. The brain signals encountered by EEG are unique based on their presence or absence in memory. The measurement of the responses is done by the electrode placed on the scalp. The received signals are then extracted for further analyzation.

The entire process could be summed up as, EEG measures the waves with the help of sensors, that produced as a result to the probe shown. The signal produced is picked up by BCI for further processing and analyzation so as to give a meaningful decision on the basis of the waves so formed.

MAJOR CONSIDERATIONS WHILE USING BCI AS A FORENSIC TOOL

As EEG involves recording the brain’ s reaction to the stimulus as a result of neurons firing in the brain. The signals encountered are of low resolution and so as to enhance their analyzation noise should be minimized. The noise can be due to various factors including non interest signal waves traveling in brain. EEG, EOG and EMG are also found to be a considerable reason for noise production.

SPECIFICATION OF EEG

The system contains electrodes, amplifier, A/D converter and a recording device. Signal from the scalp is encountered by the electrodes, which is amplified using the amplifiers. The A/D converter digitalizes the signal amplified and then the presentation of data is done by the recording device. Thus, producing an electrogram to be studied. The frequency bands used in electrodes are delta(0.5-4 Hz), theta (4-8 Hz), alpha (8-13 Hz) , beta( 13-30 Hz) and gamma (30-60 Hz) respectively corresponding to the state of mind at that the time.

Brain- based technology has proved to be a boon while investigation. It has not only reduced the time duration for detection but also has increased the accuracy of investigation. The assessment on the basis of abnormality caused in the waves could only be made possible with BMI, proving to be the advancement for the future that has begun to approach us.