

The Brain Fingerprinting Through Digital Electroencephalography Signal Technique

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ABSTRACT

A brain computer interaction has been developed to record the brain signal / electric activity through Digital Electroencephalography. The Brain Fingerprinting is a advanced computer-based technology to determine the falsely accused innocent suspects of a crime accurately and scientifically by measuring brain-wave responses to crime-relevant words or pictures presented on a computer screen. By using electroencephalography to ascertain the presence or absence of information into human brain.

Keywords : Brain finger printing ,Digital EEG , BCI ,

Introduction :

The primary application of the brain computer interface is to map the brain signal of human being through digital EEG[1]. Basically the happened incidents in our life has to be recorded / stored into our mind. If someone required to know that incidents , it could be possible by applying a standard technique brain finger printing through digital electroencephalograph.

Brain Fingerprinting technique used to determine mapped signal, what information is, or is not stored in a particular brain[2]. Not a measure of guilt or innocence, Measures the response to visual or audio stimulus. Actually this technology is based on the principle that the brain is central to all human acts. In a criminal act, there may or may not be many kinds of peripheral , but the brain is always with planning, executing, and recording crime. The fundamental difference between a true or and falsely accused, innocent person is that the perpetrator, having committed the crime, has the details of the crime stored in his brain, and the innocent suspect does not.



fig1: brain waves

The secrets of Brain Fingerprinting :

“Matching the happened incident at the crime scene with incidence in the brain” .When a crime is committed, a record is stored in the brain of the perpetrator. Brain Fingerprinting provides a means to objectively and scientifically connect facts from the crime scene with incidence stored in the brain. Brain Fingerprinting measures electrical brain activity on computer / laptop screen regarding crime-investigation. when and only when , the things stored in the brain matches the happened things from the crime scene[3]. Thus, the guilty can be identified and the innocent can be cleared in an accurate, scientific, objective, non-invasive, non-stressful. A memory and encoding related multifaceted electroencephalographic response is elicited when an individual recognizes and processes an incoming stimulus that is significant or noteworthy[4]. The procedure used is similar to the Guilty Knowledge Test; a sequences/ combination of words, sounds, or pictures are presented via computer to the subject for a fraction of a second each. When an irrelevant stimulus is seen, it is insignificant and not noteworthy, and the electrode response is absent. The electrodes response occurs within a second after

the stimulus presentation, and can be readily detected using EEG electrodes, amplifiers and a computerized signal-detection algorithm.

Phases of Brain Fingerprinting:

Brain Fingerprinting works similarly, except that the happened incident collected both at the crime scene and on the person of the suspect (i.e., in the brain as revealed by electrical brain responses) is informational facts rather than physical happened incident[5]. There are four stages to Brain Fingerprinting as:

1.Crime Scene Collection:

In this, an expert examines the crime scene and other incidents connected with the crime to identify the crime.

2. Brain Incidence Collection:

This is done to determine whether or not the incidence from the crime scene matches evidence stored in the brain of the suspect.

3.Computer -Analysis :

In this, the Brain Fingerprinting system makes a mathematical determination as to whether or not this specific incidence is stored in the brain, and computes a statistical confidence for that determination. This determination and statistical confidence constitute the Scientific Result of Brain Fingerprinting.

4. Result.

There are two types of result as: a)Either "information present" – the details of the crime are stored in the brain of the suspect. b) or "information absent"– the details of the crime is not stored into brain of the suspect .

Computer Controlled System :

Nowadays every thing is based on the computer and treating as a human computer interface means behind the each and every successful technology , business , science , arts , commerce field computer is playing a most important role by controlling the device ,machine as a natural way[6]. The entire Brain Fingerprinting System is under computer control, including presentation of the stimuli and recording of electrical brain activity, as well as a mathematical data analysis algorithm that compares the responses to the three types of stimuli and produces a determination of "information present" or "information absent", and a statistical confidence level for this determination[7]. At no time during the testing and data analysis do any biases and interpretations of a system expert affect the stimulus presentation or brain responses.

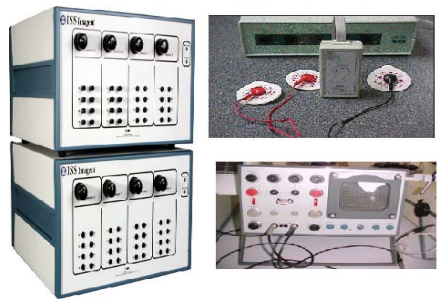


fig 2 : brain fingerprinting devices.

Experiment :

To detect the person who is having information and involving into any criminal cases activities, can be find out by seeing the Brain-Signal only. The brain signal can be obtained through Digital Electroencephalography technique[8]. Test is shown in given fig(3).

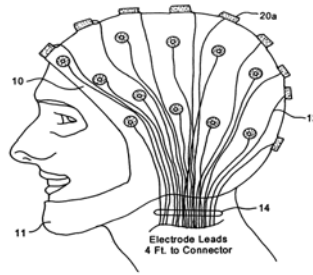


fig 3. electrodes connected on the scalp.

Brain Signal Types : There are four types of waves as[9]:

Alpha wave: this is green colored wave. Its frequency is 9 – 13 Hz occurring during wakefulness and are strongest over the occipital(back of the head) and the frontal cortex.

Beta wave: this is blue colored wave. Its frequency band is 15-30 Hz. Beta activity is "fast".

Theta wave: this is reddish colored wave. Its frequency is 4 to 7.5 Hz and is classed as "slow" activity. It plays an important role in infancy and childhood.

Delta wave: this is gray colored wave. Its frequency is 1 to 3 Hz (usually 0.1-3.5 Hz), occur in deep sleep and reflect the unconscious mind. Delta waves are the lowest frequency EEG rhythms.

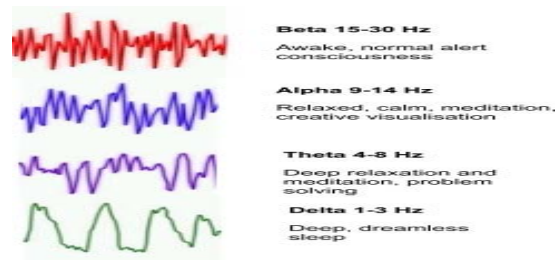


fig 4 : different types of brain waves.

But in brain fingerprinting a suspected subject is tested and by seeing only three type of brain signal we can detect the falsely accused persons[10].

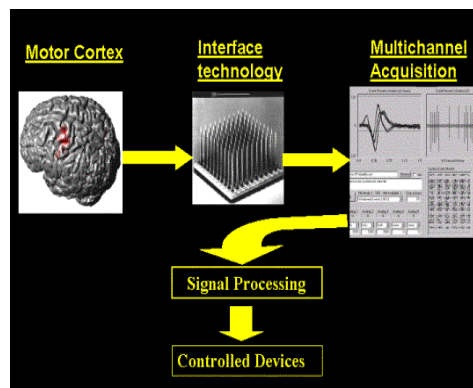


fig5: brain waves generated during test.

Output : The EEG electrodes connected on the brain scalp to maps the brain-wave. If someone isn't having information, the brain-signal graph will be shown as in fig (6)

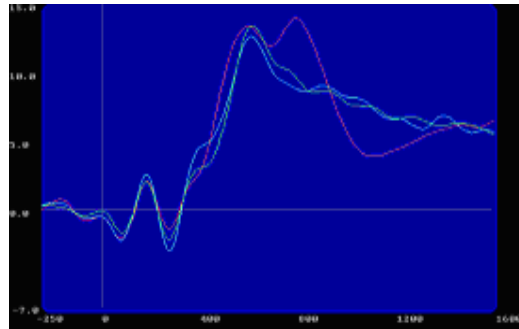


fig 6. information absent.

If person having information into his / her brain, the brain waves will as displayed as in given fig (7).

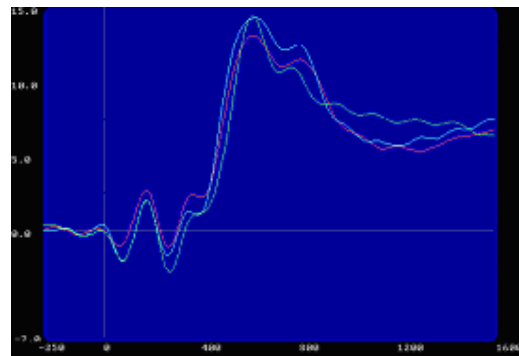


fig 7. information present.

APPLICATIONS:

1) National security: To Identify terrorists , fugitives, criminals and accomplices prior to attack by determining whether specific information is embedded into brain memory of the subject.

2) Medical diagnosis :

- a) Alzheimer's Disease : detects p300 brainwave, symptoms reversible through dietary and medicinal changes.
- b) Pharmaceutical companies: to see effects of new medication, doctors can monitor treatments and adjust them.

3) Advertising :

It allow advertisers to determine what information from an ad is retained in memory as (i) what elements do people pay attention to .(ii) what type of media is most effective . (iii) how to people all over the world.

Cons of Brain fingerprinting Tech : a) very Costly b) available at few specific Laboratories only.

c) used to solve complex and important criminal cases only.

Conclusion:

Brain Fingerprinting technology is a advanced brain computer interface technology for solving the criminals case and also identify the perpetrators, and exonerating innocent suspects. This technology provide the 99.9% accurate result towards crime victims, falsely accused innocent suspects.

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