Brain Fingerprinting Technology and its Application

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Abstract*—Brain Fingerprinting is a new technology in computer science which is designed to bring up the information which could be hidden in a person's brain by sensing brain wave responses respective to words, phrases, or pictures presented on a display unit. When the brain senses some data which could be familiar, the brain reacts with a wavelike response which is known as a memory and encoding - related multifaceted electroencephalographic response (MERMER). It contains the brain reactions known as P300. The test can be done in more or less 10 minutes. Brain fingerprinting was invented by Lawrence Farwell which uses (EEG) electroencephalography .Brain Fingerprinting detects information by measuring information processing which relates to the logical part of the brain not that part which deals with emotions. Brain Fingerprinting does not detect emotions, stress or lies. Brain Fingerprinting on computation basis deals with whether an information is present or an information is absent.

Index Terms— Brain Fingerprinting, Electroencephalography, MERMER, P300

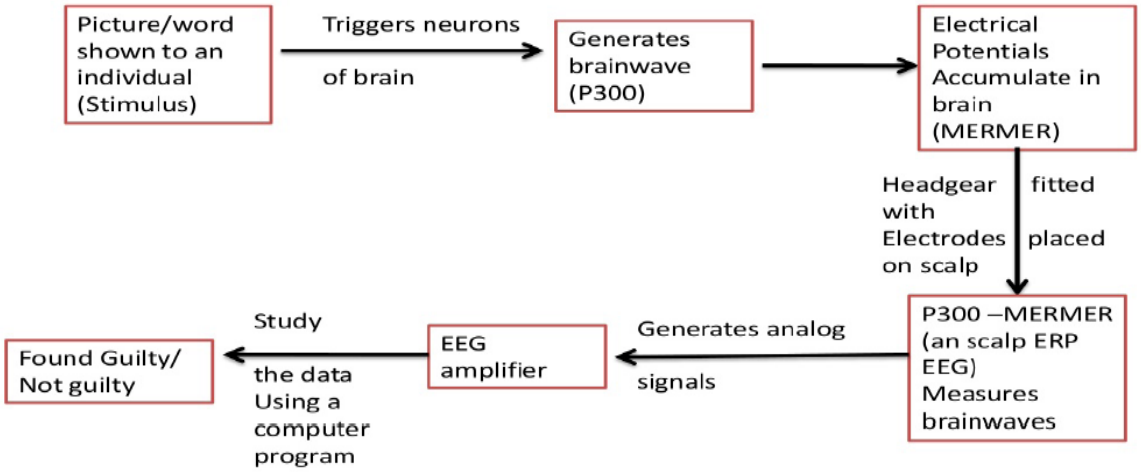
I. INTRODUCTION

Brain fingerprinting is a computer technique which is all the more controversial since it is advocated as a way to identify a terrorist or other dangerous person by measuring the electrical brain waves of that person when shown a similar writing or an image that was previously familiar which may be of a training camp or any other such incidents. The electrical brain wave responses is based on the P300 complex, a series of well-known brainwave components that can be measured. The method is said to be more useful than a lie detector.

The major difference between a person who commits crime and one who doesn't is that the criminal having committed the crime has the details of the crime stored in his memory while the innocent suspect does not. This is what this technology detects scientifically by the presence or absence of specific information in his memory

Brain Fingerprinting is an interaction between brain and computer. The working of brain is the key for its development. We know that with every stimulus there is a corresponding reaction in the brain. The reaction depends on the very last memory of the same stimulus.

II. OPERATING MECHANISM



III. APPLICATIONS

1. **To Counter National Threats:**

In any criminal act, the brain of the criminal is always involved in all the processes such as planning in the beginning to performing the crime in the end. The presence of other evidences is not so certain. Brain fingerprinting technology can identify the plotters and planners of criminal acts by detecting the memory of the criminals about the presence of any such event. Even more, this technology can be used to identify terrorists who have been trained.

2. **Criminal justice:**

Not 100% but 99.9% times it has been observed that brain fingerprinting has been true to its data. So, it can be used to do criminal justice. There have been several such examples which have proven to do justice except for believing on very little available evidences like fingerprints, etc.

3. **Medical Field:**

In case of diseases like Alzheimer's, patients are tested for relation with any entity be it a person or a location to check if they have a fair amount of memory of that event or incident which could help the doctors.

4. **Advertising:**

Not actually a reality but in the future for sure, brain fingerprinting can be used to examine the "pulse of people" by getting the information in brains of people to the effects that advertisements being used for publicity create. Though it's a long shot it will be a reality in the near future.

IV. ADVANTAGES

1. As per our study about this topic in this paper itself we have known that the percentage of success is very high. So, we can say that it is effective for a large number of cases.

2. Though it has been used heavily in criminal cases, this technology can be or we can say this technology is a milestone in medical healthcare and has not been utilized well. Also in the psychological fields, it can be highly useful.

V. DISADVANTAGES

1. Since Brain Fingerprinting is a computer technology, it uses its predecessors like EEG sensors and other techniques which result in increasing the overall cost of the final product.

2. According to the above point, as the technology is costly, not all the patients or innocent people can use this technology to save themselves.

3. The chances of availability of the equipment's is very low.

4. This technique is not 100% true in every case as it only detects information in the brain of a person. It may be that an innocent person maybe knowing about the crime as a third person or listener or maybe that he may be present at the crime scene. So this may give an opportunity to the criminal to create a scene of doubt as the technology doesn't actually specify the roles of the people showing electrical brainwave responses.

VI. COMPARISON WITH OTHER TECHNOLOGIES

Brain fingerprinting being a computer technology has both advantages and disadvantages in comparison to other investigation methods. One of the major advantages from other methods is that in other methods it can be a case that there may not be sufficient information or the criminal may have erased such useful sources of information but in brain fingerprinting the advantage is that the source of information cannot be deleted. Many times this information can be very useful.

Brain fingerprinting is different from the old lie detector test in many ways. These differences are the advantages that we get over these conventional tests.

Both the brain fingerprinting and the conventional tests mainly focus on the criminal. They are mainly concerned with the physical awareness of the suspect at the crime spot. The lie detector test also questions the culprit and his conscience by pressurizing the culprit in an attempt to detect lies but this doesn't give a 100% perfect solution from which a person can be proven culprit or innocent but brain fingerprinting directly detects the information stored in the brain based on the brainwave responses from the suspect.

VII. LIMITATIONS

Brain fingerprinting cannot be applied to every case or to every suspect because there may be cases in which the investigators may not be knowing anything about the crime scene while the criminal disappears from the hearing. So, no conclusion could be deciphered. There can be cases when the criminal may claim that he was present at the crime scene but only as an eye witness. So, in this case the person knows everything about the crime

scene but did not commit the crime. Therefore, no information can be deciphered.

VIII. CONCLUSION

In spite of the disadvantages or limitations of the brain fingerprinting, the importance of this technology cannot be overruled because of the higher rates of criminal cases and also the higher rates of complexities of the cases. In all these, brain fingerprinting could provide some valuable information.

In general, for an investigating method to be viable the error percentage of the method should be between 1%-5% while in this regard brain fingerprinting serves a long way as it rarely produces any error.

Therefore, in spite of all the limitations and disadvantages, brain fingerprinting is not only a great investigation method but also serves in medical and other fields.

IX. REFERENCES

[1] www.ncbi.nlm.nih.gov/pmc/articles/ PMC3311838/

[2] International Journal of Innovative Research in Computer and Communication Engineering (An ISO 3297: 2007 Certified Organization) Vol.2, Special Issue 1, March 2014 Proceedings of International Conference On Global Innovations In Computing Technology (ICGICT'14) Organized by Department of CSE, JayShriram Group of Institutions, Tirupur, Tamilnadu, India on 6th & 7th March 2014

[3] www.slideshare.net/PriyodarshiniDhar/ brain-fingerprinting-30123748

[4] www.scribd.com/doc/37122802/Brain-Fingerprinting-Ppt

[5] Volume 5, Issue 1, January 2015 ISSN: 2277 128X International Journal of Advanced Research in Computer Science and Software Engineering Research Paper Available online at: www.ijarcsse.com Brain Fingerprinting Jackson Olive Aluri Dept. of CSE, Gayatri Vidya Parishad College of Engineering Visakhapatnam, Andhra Pradesh, India

[6] en.wikipedia.org/wiki/Brain_fingerprinting