iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** V **Month of publication:** May 2022

DOI: https://doi.org/10.22214/ijraset.2022.43218

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue V May 2022- Available at www.ijraset.com

Brain Machine Interface

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Abstract— ***Brain Machine Interface is also known as 'A brain-computer inteface'.A brain-computer interface (BCI), sometimes called a direct neural interface or a brain-machine interface, is a direct communication pathway between a human or animal brain and an external device. In one-way BCIs, computers either accept commands from the brain or send signals to it (for example, to restore vision) but not both. Two-way BCIs would allow brains and external devices to exchange information in both directions but have yet to be successfully implanted in animals or humans. In this definition, the word brain means the brain or nervous system of an organic life form rather than the mind. Computer means any processing or computational device, from simple circuits to silicon chips. Research on BCIs began in the 1970s, but it wasn't until the mid-1990s that the first working experimental implants in humans appeared. Following years of animal experimentation, early working implants in humans now exist, designed to restore damaged hearing, sight and movement. With recent advances in technology and knowledge, pioneering researchers could now conceivably attempt to produce BCIs that augment human functions rather than simply restoring them, previously only a possibility in science fiction.***

I. INTRODUCTION

Man machine interface has been one of the growing fields of research and development in recent years. Most of the effort has been dedicated to the design of user friendly or ergonomic systems by means of innovative interfaces such as voice recognition, virtual reality. A direct brain-computer interface would add a new dimension to man-machine interaction. A brain-computer interface, sometimes called a direct neural interface or a brain machine interface, is a direct communication pathway between a human or animal brain(or brain cell culture) and an external device. In one BCIs, computers either accept commands from the brain or send signals to it but not both. Two way BCIs will allow brains and external devices to exchange information in both directions but have yet to be successfully implanted in animals or humans.

Brain-Computer interface is a staple of science fiction writing. In its earliest incarnations no mechanism was thought necessary, as the technology seemed so far fetched that no explanation was likely. As more became known about the brain however, the possibility has become more real and the science fiction more technically sophisticated. Recently, the cyberpunk movement has adopted the idea of 'jacking in', sliding 'biosoft' chips into slots implanted in the skull(Gibson, W.1984).Although such biosofts are still science fiction, there have been several recent steps toward interfacing the brain and computers. In this definition, the word brain means the brain or nervous system of an organic life form rather than the mind. Computer means any processing or computational device, from simple circuits to silicon chips (including hypothetical future technologies like quantum computing).

II. WORKING ARCHITECTURE

Before moving to real implications of BCI and its application let us first discuss the three types of BCI. These types are decided on the basis of the technique used for the interface. Each of these techniques has some advantages as well as some disadvantages. The three types of BCI are as follows with there features:

Dobelle's first prototype was implanted into Jerry, a man blinded in adulthood, in1978. A single-array BCI containing 68 electrodes was implanted onto Jerry's visual cortex and succeeded in producing phosphenes, the sensation of seeing light. The system included TV cameras mounted on glasses to send signals to the implant. Initially the implant allowed Jerry to see shades of grey in a limited field of vision and at a low frame-rate also requiring him to be hooked up to a two-ton mainframe. Shrinking electronics and faster computers made his artificial eye more portable and allowed him to perform simple tasks unassisted.

In 2002, Jens Naumann, also blinded in adulthood, became the first in a series of 16 paying patients to receive Dobelle's second generation implant, marking one of the earliest commercial uses of BCIs. The second generation device used a more sophisticated implant enabling better mapping of phosphenes into coherent vision. Phosphenes are spread out across the visual field in what researchers call the starry-night effect. Immediately after his implant, Jens was able to use imperfectly restored vision to drive slowly around the parking area of the research institute.

BCIs focusing on motor Neuroprosthetics aim to either restore movement in paralyzed individuals or provide devices to assist them, such as interfaces with computers or robot arms. Researchers at Emory University in Atlanta led by Philip Kennedy and Roy Bakay were first to install a brain implant in a human that produced signals of high enough quality to stimulate movement. Their patient, Johnny Ray, suffered from 'lockedin syndrome' after suffering a brain-stem stroke. Ray's implant was installed in 1998 and he lived long enough to start working with the implant, eventually learning to control a computer cursor.

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III. CONCLUSIONS

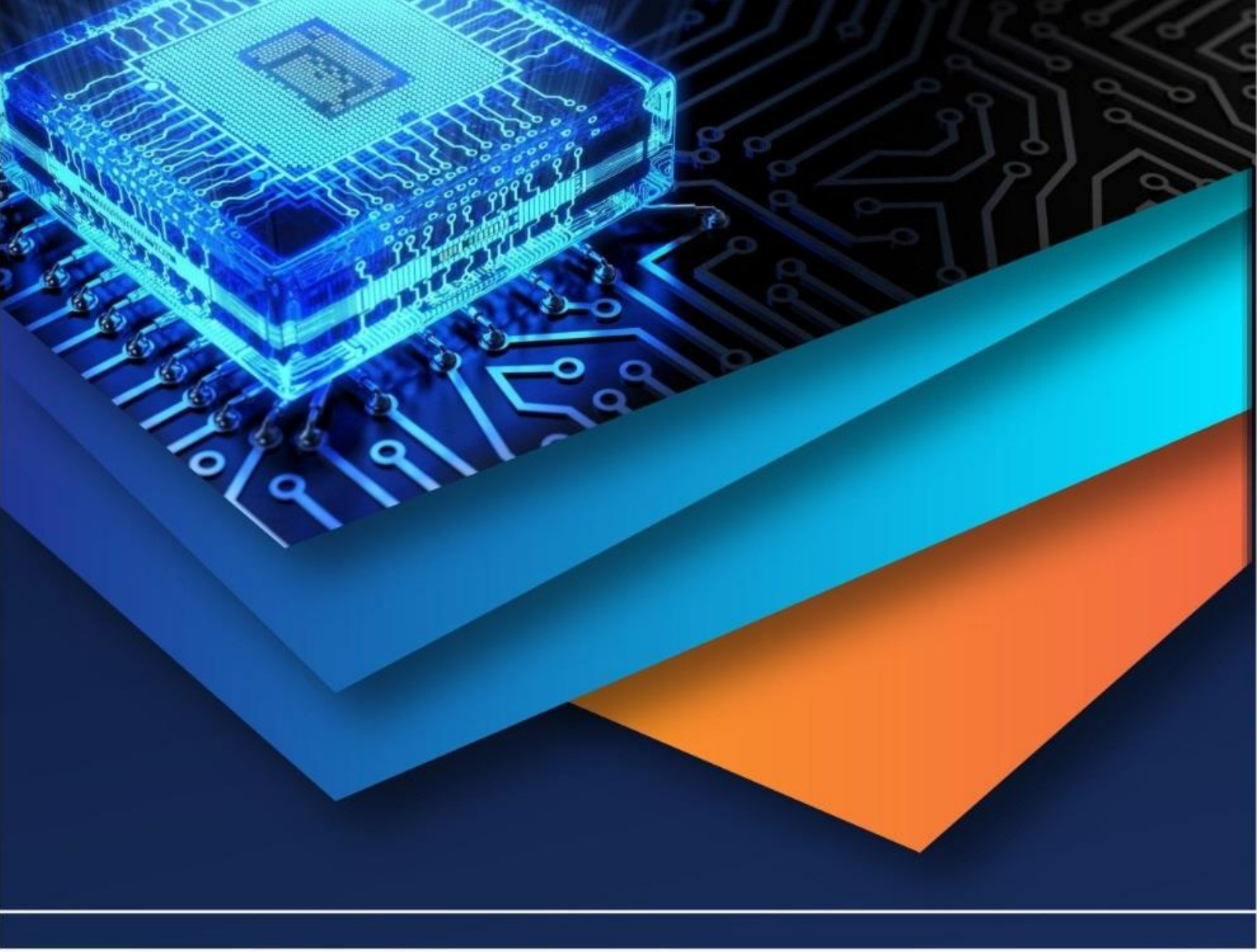
Brain-Computer Interface (BCI) is a method of communication based on voluntary neural activity generated by the brain and independent of its normal output pathways of peripheral nerves and muscles. The neural activity used in BCI can be recorded using invasive or noninvasive techniques. We can say as detection techniques and experimental designs improve, the BCI will improve as well and would provide wealth alternatives for individuals to interact with their environment.

IV. ACKNOWLEDGMENT

It gives us pleasure in presenting the Complete project report on 'Brain Machine Interface' Firstly, we would like to express our indebtedness appreciation to our internal guide Prof. A. A. Bamanikar her constant guidance and advice played very important role in making the execution of the report. She always gave us her suggestions that were crucial in making this report as flawless as possible. We would like to express our gratitude towards Prof. Dr. R.V. Patil Head of Computer Engineering Department and Principal P.D.E.A. College of Engineering for his kind co-operation and encouragement which helped us during the completion of this report. Also, we wish to thank to all faculty members for their whole-hearted co-operation for completion of this report. We also thank our laboratory assistants for their valuable help in laboratory. Last but not the least, the backbone of our success and confidence lies solely on blessings of dear parents and lovely friends.

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