International Journal of Advanced Technology in Engineering and Science
Vol. No.8, Issue No. 02, February 2020
www.ijates.com
ijates
ISSN 2348 - 7550

Skeleton Machine Interface

Pranav Kulkarni[1], Neeraj Chordiya[2]

[1,2]Guru Gobind Singh polytechnic, India

ABSTRACT

Skeleton Machine interface is an industrial and application of Elon Musk backed Neuralink, which involves brain machine interface. An EEG based BMI Is used to get the electrical signals from the brain, and the signals are interpreted and converted into digital signals using the chip.

Keywords:*BMI, EEG, electrical signals, Neuralink, Skeleton machine interface*.

I. INTRODUCTION

In this age of technology, we dream of controlling every aspect of our life with ease. But between our cars being automated, phones getting smarter, and computers getting smaller and powerful, there is still something fundamentally different to be desired, that could make our dream of effortless control over machines possible. And... We might have a small possible insight to it. Our goal is to combine the power of Elon Musk's Neuralink tech, with machine arms. While Neuralink is focused on bringing back the voluntary senses of the people have lost them, we dream of using this technology for a more common use case for those who haven't.

II. WORKING

There is an involvement of an EEG (Electroencephalography) based BMI (Brain machine interface) chip, a fit human (with a brain of course), a powered exoskeleton, and a serial connection (like USB) between the chip and the exoskeleton. The chip is enclosed in a cylinder of 8mm x 4mm along with around a 1000 electrodes distributed among 90 threads connected to the chip. It needs to be implanted inside the skull, which will be powered through a small external battery pod as the chip is wireless (as you would expect it to). The electrodes, which are placed inside the brain within 60 microns from the synapse (refer fig 1.1), are just about the size of a neuron, which makes it easier for them to catch the electrical signals from the neuron. This process is done by the robot which ensures that the threads are placed perfectly in the brain (refer fig 1.2). The chip interprets these electrical signals as ones and zeros which can then be used in digital form. This Digital signal can then be sent to the microcomputer responsible for the primary working of the Exoskeleton.

The Exoskeleton is programmed to operate with the help of the electrical activity generated by the brain. The microcomputer controls the mechanism of the Exoskeleton, allowing it to rotate the arms and elbows, and have other voluntary movements as well (refer fig 1.3).

International Journal of Advanced Technology in Engineering and Science
Vol. No.8, Issue No. 02, February 2020
www.ijates.com
ijates
ISSN 2348 - 7550

III. CURRENT STATE

Despite the very rapid growth in the EEG based BCIs, there are still some problems that need to be addressed before this can be implemented for regular use. This includes overcoming the problem of latency to which the exoskeleton reacts, and the low degree of freedom for instance turning, sitting and standing that the first generation of products could possess. These are major concerns that need to be thought over. Also, the material from which the exoskeleton is to be made, must be robust, elastic, and light weight while also giving some kind of protection to the operator's body from external threats, and shouldn't be ridiculously expensive. A material with such properties and abilities is yet to be discovered.

IV. APPLICATIONS

a. Exoskeletons are designed to provide a strong aid in lifting heavy objects to people who have arms. But this concept can work with its full potential while even supporting a paralyzed patient, aiding him to walk or lift something that he/she could only dream of.
b. Precise and minute manual machining work that requires long hours, could be easily carried out automatically with just a couple of instructions given to the exoskeleton by the brain.
c. In surgeries for extremely accurate movement with the doctor controlling it remotely.

V. SAFETY CONCERNS

a. Safety is an extremely important factor to be taken into consideration before implementing a brain-controlled machine.
b. The paralyzed patients wearing them need to proceed with caution, as the exoskeleton might malfunction if the impulses from the patient's brain are interpreted incorrectly, and thus injuring the patient even more.
c. It has been proved that the gait assistance on the basis of the EEG signals is feasible, however, the level of assistance varies between patients.

VI. FIGURES AND TABLES

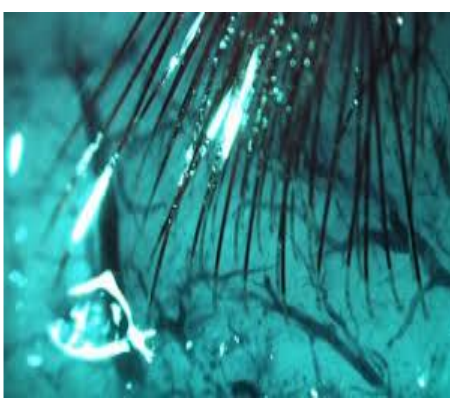

Fig 1.1

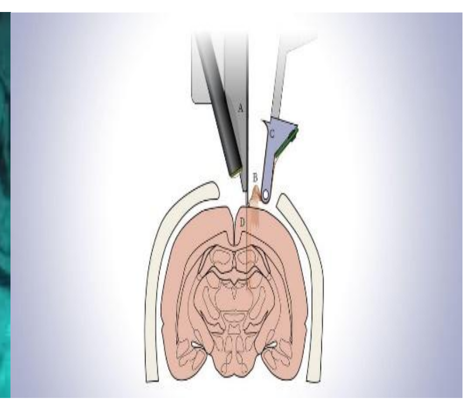

Fig 1.2

Fig 1.3

VII. ACKNOWLEDGEMENTS

This is an alpha stage concept. The final product will cost quite a good amount for a patient, or an organization willing to use it. The manufacturing cost of one piece that is ready-to-operate will eventually come down, as the industry adopts the use of BMI based devices, and this may even see a wide adoption in hospitals, workshops, car factories, etc. once the BMI-equipped devices gain a world-wide interest.

VIII. REFERENCES

[1] Elon Musk, https://www.biorxiv.org/content/10.1101/703801v4 (2019).
[2] Leigh R.Hochberget al. "*Neuronal ensemble control of prosthetic devices by a human with tetraplegia*" (2006).
[3] Wei Wang. "*An Electrocorticographic Brain Interface in an Individual with Tetraplegia*" (2013).
[4] Elizabeth Lopatto, "*Elon Musk unveils Neuralink's plans for brain-reading 'threads' and a robot to insert them*" (2019).