

# Neural Interfacing

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**ABSTRACT**-Neural interfacing is a power full system which can develop a robust bridge between human and machines. In this paper we emphasize on neural interfacing as an evolving trend in wireless communications by taking into account one of its important application is cyborgs.

The operational features of cyborgs with the experiments conducted and proposed to be conducted in future and in the process give a brief description of the advantages and disadvantages of this technology.

Attachment and interface mediate our interaction with the environment and usually are positioned on the surface of the body. Physical objects would be called tools or attachment while information utilities would be Called interface in the same way a neural interface allows human brain communicate directly with a computer without any other equipment. Interface allows any illusions to be inputted to human nervous system. Neural interfacing fantasies have mainly grown out of science fiction.

A recent article on neural interfacing in the IEEE Transactions report that a Microelectrode array capable of recording from and stimulating peripheral nerves at prolonged intervals after surgical implantation has been demonstrated. These tiny silicon based array were implanted in to the personnel nerves of rats and remained operative for up to 13 months. The ingeniously designed chip are placed in the pathway of the surgically severed nerve. The regenerating nerve grows through a matrix of holes in the chip while the regenerating tissue surrounding it anchors the device in place. This chip receives the signals from the surrounding nerves and sends it to a computer through a wireless medium. Within several decades active versions of these chips could provide a direct neural interface with prosthetic limbs and by extension a direct human computer interface. This human computer interface may now lead to a revolutionary organism called as cyborg which was thought of as a science fiction earlier.

## I. INTRODUCTION

Neural interfacing is a power full system which can develop a robust bridge between human and machines. In this paper we emphasize on neural interfacing as an evolving trend in wireless communications by

taking into account one of its **important** that are attached to the outside of the human body.

I shall be looking at 'dry' devices.

It is not only in the medical field this neural interfacing have made incredible advances. With the popularity of microcomputers (present in many households now) the refinement of input devices, (it's still not easy to use your computer in the bath, in bed or while knitting) now receives much attention. This type of interfacing with its intuitive, convenient input method shall be the way of the future. Virtual reality systems in particular will benefit from this technology.

Most of my research was done online on the World Wide Web where there is a surprising amount of information on this research. There are several innovative companies that already market devices, software and games and also university and company (and military) research groups that are looking at this emerging field. The ultimate goal of neural interface research is to create links between the nervous system and the outside world either by stimulating or by recording from neural tissue to treat or assist people with sensory, motor, or other disabilities of neural function. Although electrical stimulation systems have already reached widespread clinical application, neural interfaces that record neural signals to decipher movement intentions are only now beginning to develop into clinically viable systems to help paralyzed people. We begin by reviewing state-of-the-art research and early-stage clinical recording systems and focus on systems that record single-unit action potentials. We then address the potential for

neural interface research to enhance basic scientific understanding of brain function by offering unique insights in neural coding and representation, plasticity, brain-behavior relations, and the neurobiology of disease. Finally, we discuss technical and scientific challenges faced by these systems before they are widely adopted by severely motor-disabled patients.

**CURRENT USES** - Neural interfacing is currently used in the fields of medicine, physical therapy, music, games and as an interesting new input device. It is currently most utilized in helping the disabled in various ways.

As previously discussed, neural implants is being used to help the blind and deaf. EOG signals has been used to diagnose and train patients with Strabismus, which is a misalignment of the eyes, causing gaze direction to stray.

Neural interfacing is the only method of communication for some disabled people, particularly those with neuromuscular disorders and spinal injuries. Some people can only blink or move the muscles of their faces. These people can use EMG or EOG signals to select letters or move basic objects on a computer screen. EEG signals also have a lot of promise in this area, but their complexity makes them difficult to use in this manner and work is continuing in these areas.

Physical therapists use neural interfacing to monitor and collect biological signals for analysis. Uses range from monitoring how much progress a recovering muscle is making by monitoring the EMG signals it causes to checking that back or wrist muscles are not being stressed unduly by posture (ergonomics). Custom exercise programs with hardware and

software equipment that monitors heart rate and respiration rate and other signals and reports on your progress can also be found in clinics and on the market (for extremely high prices).

**FUTURE PROJECT-** The chip in the implant will receive signals from the nerve fibres and send them to a computer instantaneously. For example, when we move a finger, an electronic signal travels from the brain to activate the muscles and tendons that operate the hand. These Nerve impulses will reach the finger. These nerve pulses are received by the implanted silicon chip and it sends the signal of impulses to a computer through wireless path. The signal from the implant will be analogy, so we'll have to convert it to digital in order to store it in the computer. The computer receives the signal and sends it back to the implant .This ensures whether the same response of moving the finger will be created by sending same impulse signal to the implant.



When we waggle the left index finger, it will send a corresponding signal via the implant to the computer, where it will be recorded and stored. Next, we can transmit this signal to the implant, hoping to generate an action similar to the original. No processing will be done inside the implant. Rather, it will only send

and receive signals, much like a telephone handset sends and receives sound waves.

It's true that on-board power would increase the options for programming more complex tasks into the implant, but that would require a much larger device. In the similar way experiments are proposed to be conducted to provide vision to blind people. In this method a camera is made to have an interface with the implant. This camera captures images and sends them to the silicon chip implant where the images are sent to the brain and processing takes place with this the image is seen by the blind person even without his eyes.

## II. ADVANTAGES

- Allow paralysed people to control prosthetic limbs with their mind.
- Transmit visual images to the mind of a blind person, allowing them to see.
- Allow games to control video games with their minds.
- Transmit auditory data to the mind of a deaf person, allowing them to hear.
- Allow a mute person to have their thought displayed and spoken by a computer.
- New method of interfacing with machines, computer where no physical touch is required.
- No conduction gel required for the electrodes.
- Relatively cheap compared to other EEG devices.

## III. DISADVANTAGES

- Research is still in beginning stages.
- The current technology is crude.
- Electrodes outside of the skull can detect very few electric signals from the brain.
- Ethical issues may prevent its development.

- Electrodes placed inside the skull create scar tissue in the brain.
- Hard to market since not many people are known to the idea of BCI.

## IV. CONCLUSION

Certainly the applications for BCI devices discussed in this paper is long reaching and BCI devices are not currently powerful enough to perform the tasks mentioned above. But possibility of thought control machines would elimination of a bottleneck in data processing and computer interaction including communication that would improve not just the environment but people themselves.

## REFERENCES

- [1] [www.wikipedia.org](http://www.wikipedia.org)
- [2] [www.gogal.com](http://www.gogal.com)
- [3] [www.slideshare.net/kirtanshah33/neural-interfacing](http://www.slideshare.net/kirtanshah33/neural-interfacing)
- [4] [www.seminaronly.com/IT/Neural-Interfacing.php](http://www.seminaronly.com/IT/Neural-Interfacing.php)