

# Mapping of Nanorobots with Neuroscience

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**Abstract** - In recent days nanotechnology and neuroscience are the emerging fields. Combining these field together, it is able to develop a product which will be innovative and effective. By combining neuroscience and nanotechnology we can develop a mapping nanorobots with neurotransmitters. It was about of building many number of nanorobots, swarms of tiny robots that can link together in any arrangement imaginable which are mapped with neurotransmitters. Due to this, the nanorobotics themselves to form the object which the user thought in his mind. In April, 2014, Ex-president Obama announced a hugely ambitious science project on neurotechnologies. He also promise of hard cash of \$100m in 2014 and up to billion of dollars. The research was made by Dr. Paul Weiss, Dr. Anne Andrews. This can be used in many applications like defence, house hold robots, security purpose etc. The interfacing of nanorobots and brain is done with the concept of Brain-Control Interface, Electro encephalogram and electromagnetic field.

**Keywords**- encephalogram, Brain-Control Interface, electromagnetic field, neurotechnologies.

## I. INTRODUCTION

Almost every people in the earth need an assistant to do their works and makes them to live a comfort life. Think that the assistant can perform all the functions. You need not need to command just think of the work. The work will be completed by it. These type of direct communication of brain to the computer or to the external product is called Brain- computer interface [1]. This is effectively getting information from the brain by using Electroencephalography (EEG). In this work, is of interacting brain with the thousands of nanorobots. Thus we target to make use for the tomorrow's society. This type of nanorobots used in any fields like medicine, agriculture, security and authentication, Smart environment, as a assistant etc.. The main function is to making the function of peripheral nervous system communication into mechanical interacting robot. But these process is quite tough compared in using joystick or other controlling devices. Because, BCI has many usability challenges like Information transfer rate is poor due to nonlinearity, nonstationarity and noise. Fortunately, we can preprocess these difficulties by improving the signal to the noise ration [2].

In this paper work, There takes place the two type of functions. Firstly the command in brain is stored to we try to interface the command from our brain using EEG and interface to the computer through BCI technique. The command stored is performed by performed by nanorobots which is surrounded with electromagnets. There is brief explanation about the components and products used in the following descriptions. This concept

gets its idea from the American 3D animated superhero film, Big Hero 6.

## II. BACKGROUND

In the previous applicant's paper, BRAIN- Controlled Wheelchairs: A Robotic Architecture, Tom Carlon and Jose Del R. Millian, March 2013. Using Brain- Controlled Interface For Control Robot Movenment, Jaromir Svejda, Roman Zak, Roman Senkerik and Roman Jack, Department Of Informatics And Artificial Intelligence.

First paper is about Brain Computer Interface is interfaced with wheelchair. In that project, the wheelchair detects it way and the commands of the user and makes its way to the desired place. They uses stimulous driver P300 system. That paper speaks about the various testing stages i.e: sensitivity, computer vision-based hindrance detection, updating the possession grid, action planning. In this combining BCI with wheelchair allowing user to predefined the routes or to remain stable for the majority of routing time.

Secondly, in that paper BCI system consists of three parts: signal sensing, signal processing and external system control. In this project , they used Emotiv EPOC neuro-headset for receiving EEG signals. Since, it can automatically solves elementary issues takes place during sensing. In signal processing , the program is done by differentiating the instaneous excitement and long-term excitements. For external system, they used robotic device mindstroms EV3 programmed through Labview. Fig1.is speaks about design and operation of BCI.

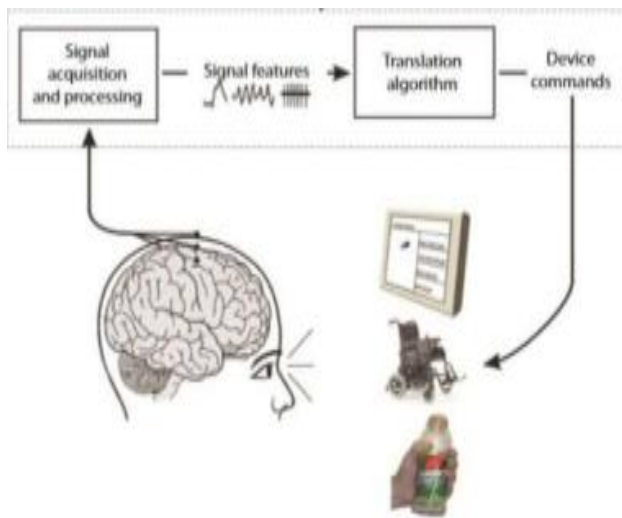


Fig 1. Design and operation of BCI.

### III. THEORIES USED BRAIN-CONTROL INTERFACE

A brain-control interface (BCI) are also known as Mini-Machine Interface (MMI) or direct neural interface is a direct communication between the brains peripheral region to the external devices. The BCI are used where communication is done by thinking not through speech. This works based on the change in electrophysiological signal like EEG[3]. The Electroencephalogram (EEG) is a continuous reading of brain signals with its frequency and amplitude[4]. It continuously monitors or records the brain electrical activities. In this electrodes are placed in the scalp. EEG measures the voltage fluctuations that take place in the neurons of the brain through their electrodes. EEG measures the alpha and beta values of the brain. It also functions during the sleeping times Figure 1. Shows the alpha and beta EEG values of left hemisphere of the brain.

### IV. ELECTRO MAGNETIC FIELDS

An electromagnetic field is also known as a physical field which is produced by electrically charged particles [5]. It is created by making electrically charged particles (like electrons) surrounded by charged particles, which in turn produce them in motion. That produces magnetic fields i.e. EMF is generated [6]. In this electromagnetic field is used to attract different nanorobots at different sites. So they make their own shapes.

#### 1. Specification of Technical Equipments:

The mapping of nanorobots through BCI has two stages: One is by making the EEG connecting to the product by means of BCI. Other is making the commands from BCI to energize the electromagnet and organize them into required form according to the user's wish. The BCI

stages consist of three sections: indicating sensing, signal processing and external system.

#### 2. Indicating Sensing

The process of indicating the signal is through the electroencephalogram (EEG) is a noninvasive test that records electrical signals / patterns of the brain. It is based on the concept that there are a billion of nerve cells in the brain which produce very small electric signals. The collection of electrical signal is by making the electrode attached to the scalp. The electrode detects the brain waves and the EEG machine amplifies the signal and records in the graphical pattern [7]. The amplitude varies from zero to hundred microvolts. The Emotiv EPOC is recently used as a neuro-headset as it obtains signal from the brain perfectly. The Emotiv EPOC also includes the gyroscope for determining the current location of the head. It is used since it mostly avoids the elementary problems. Figure 2 speaks about the Emotiv EPOC neuro-headset images. Each channel has its own label based on its position on the head: AF3, F7, F3, FC5, T7, P7, O1, O2, P8, T8, FC6, F4, F8 and AF4. Internal sampling frequency of the neuro-headset is 2048Hz. It also provides signal with a sampling frequency of 128Hz. [8].



Fig.2. Emotiv EPOC neuro-headset.

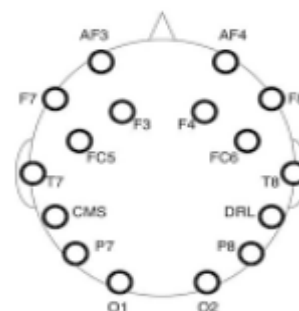


Fig. 3. About channels labeled based on the position of the head.

#### 3. Signal Processing

The signal variation can be used to detect the state of the brain by the electrode. It can be used to differentiate instantaneous signals and long-term excitement.

Instantaneous signal : It is feeling of physiological excitement with positive value. Excitement is activation of sympathetic nervous system.

Long-term excitement : It is similar to the instantaneous signal. It is characteristics of excitement for lone-time.

#### 4. External Control System

The external system is connected to the nano robots. Which is then activated by the electromagnetic field Then using electromagnetic field , the nanorobots are combine to form a figures which is thought in user's brain. The information in brain is collected by Emotiv EPOC.

### IV. DISCUSSION AND CONCLUSION

Thus, using the sensory signals in the brain the recent technologies are emergeing in this field. The idea of interfacing robots and brain is one of the path in the development of technologies. They are used in all the fields like security, medicine, agriculture and particularly as a personal assistant. It can also be negatively used. So the algorithm is made robots in the positive way.

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