

# EEG Based Brain Controlled Robot

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**Abstract:** Brain Control technology is at its beginning of its advancement to bring back the nature of uninhibitedly in a handicap. Electroencephalogram based personality controlled versatile robots can fill in as fruitful helpers for to an awesome degree injured individuals in their well-ordered life, particularly to engage them to move intentionally. Eye blink and Attention levels are used to control the direction of robot. The wireless Brain control technology can be used for physically handicapped people in day today life

Keywords— Brain Computer Interface (BCI), Cerebrum Controlled Robot, Electroencephalography (EEG), Event Related Potentials (ERP), Electromyogram (EMG)

## I. INTRODUCTION

A Electroencephalograph-based cerebrum controlled robot is a robot that utilizes Electroencephalograph-based BCIs to extend human power. Cerebrum controlled versatile robots can be isolated into two groupings as displayed by modes. One gathering is sorting out control by the BCI which construes the Brain Computer Interface makes an explanation of Electroencephalograph signals into advancement orders for controlling robots especially. Differing frameworks are acknowledged in this procedure. One basic case is created by Tanaka et al. [1] who at first developed a mind controlled mechanized wheelchair whose left or right turning improvements are particularly controlled by looking at development summons translated from customer cerebrum signals. Also, the second gathering of cerebrum controlled robots has been conveyed from a viewpoint, where a client (utilizing a Brain Computer Interface) and controller, (for example, self-speaking to course framework) share the control over the robots.

## II. RELATED WORK

Outline of in excess of 100 related papers, we show a comprehensive overview and an essential examination of the aggregate structures, key techniques, and evaluation issues of mind controlled versatile robots nearby a couple of bits of information into the creative work around there. Choi [2] and colleagues utilized a BCI based engine which can perform three movement orders including turning left and right and going ahead. Mandel et al. [3]. BCI that issues orders (turning left and right, and going ahead and back), and an independent route framework that securely executes the issued orders.. Another typical example of this kind of robots is the robotic wheelchair, developed by Rebsamen et al. [4], where a desired location is predefined by using a P300 BCI, but the user can stop the wheelchair by ERD/ERS BCI or fast P300 BCI at any time. Rebsamen et al., Iturrate et al. [5] also combined a P300 BCI and, an autonomous navigation system to develop a robotic wheelchair. The main difference between them is that it allows a wheelchair to move in an unknown situation. In addition, the user can control the wheelchair to turn left or right at any time by focusing his/her attention on the “turn left” or “turn right” icons at the lower section of the visual display to elicit a corresponding P300.

## III. PROPOSED METHODOLOGY

BCI is Cerebrum Machine Interface which gives a contact between the human cerebrum and the PC. The electrical signs are can be assessed and recorded. When, we think a colossal number of neurons are given up together and each cerebral state produces assorted cases of development.

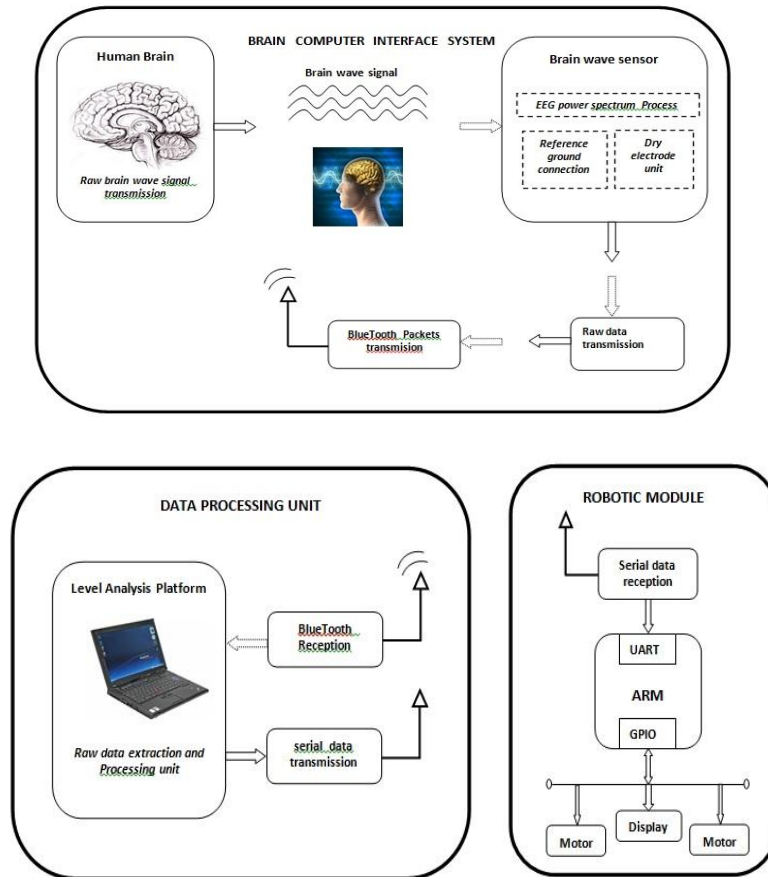


Fig. 1 BCI Interface

**IV. PRINCIPLE OF WORKING:**

The EEG signals are captured from the brain when we think or image something for example moving of left leg or hand). Depending on BCI different feature extraction and processing methods are applied on the received signals. The sensor is used to recognize the EEG signals. The sensor gets the signals from the brain, the second ear cut is a grounds and reference, which passes the electrical noise. The signals are to be taken from the cushion and preprocessed. An EEG-based Brain-controlled ROBOT was created for incapacitated individuals to lead their day by day life with no troubles. Firstly, two consecutive blinks are taken for starting the robot. For forward motion of the robot Attention level is considered and for Backward motion of the robot the Meditation level is considered. For left and Right motion of the Robot Blink level is taken into consideration.

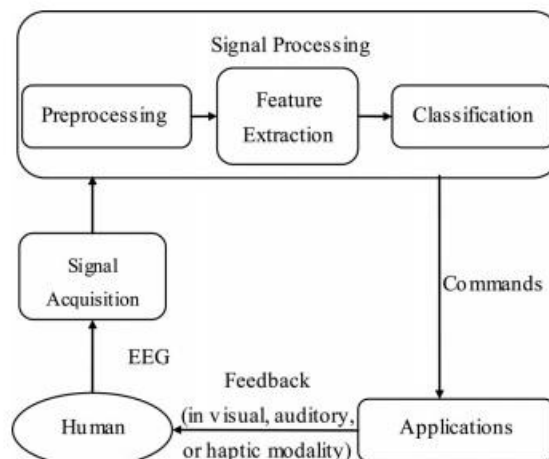


Fig 2. Schematic of the main BCI components.

### V. BRAIN ACTIVITY

Depending on the level of consciousness, normal people's brain shows different rhythmic activity. Difference rhythmic activity can be observed in wake state called Attention state. Various Brain Rhythms are as shown in below figure And each Rhythm has different frequency.

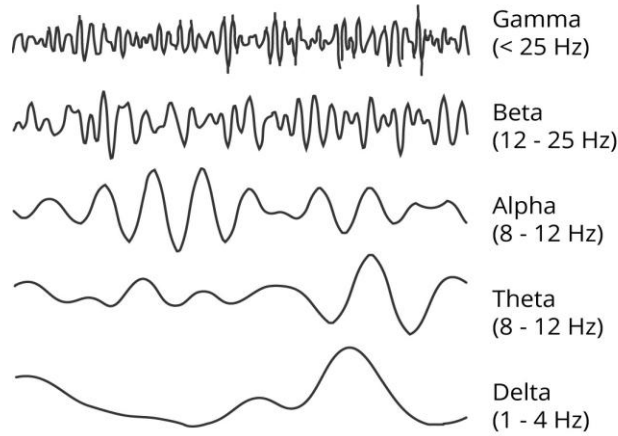


Fig .3 EEG signals waveforms

### VI. BRAIN WAVE SECTION

Electro encephalography is a method used in measuring electrical signals of the brain. The activity of single neuron cannot be measured with the scalp EEG.



Fig 4. Blink detection in MATLAB

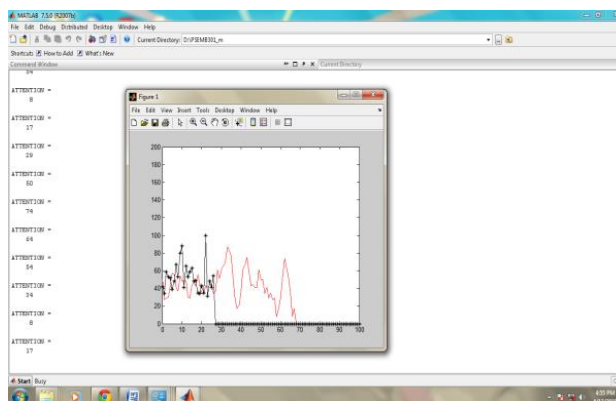


Fig 5. Brain Wave signal representation in MATLAB

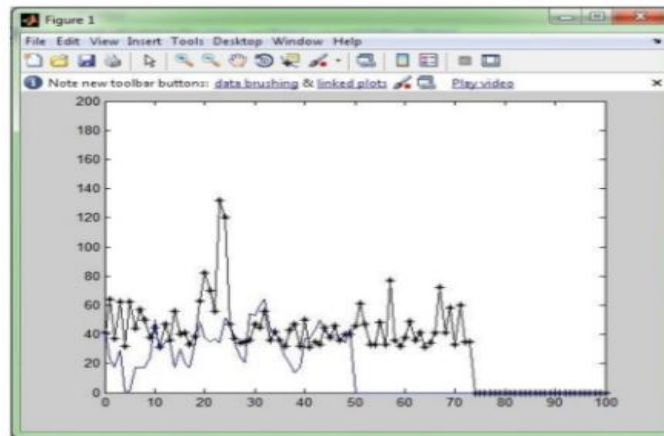


Fig. 6 Plot of Blink and Meditation in MATLAB

## VII. ROBOTIC SECTION

The estimation of rough EEG movement with the best repeat of 512 Hz is examined. The data which are secured in a bunch will be differentiated and the edge centers given by the customer. In this endeavor, the MATLAB segment sits tight for two successive flicker to send the Robot initiation flag. At that point in view of the consideration level esteem Robot Move Forward Command will be send to the Robot module through Zigbee transmission and Backward Command through Meditation level . What's more, program will filter for a left squint and right flicker to turn the Robot right and left

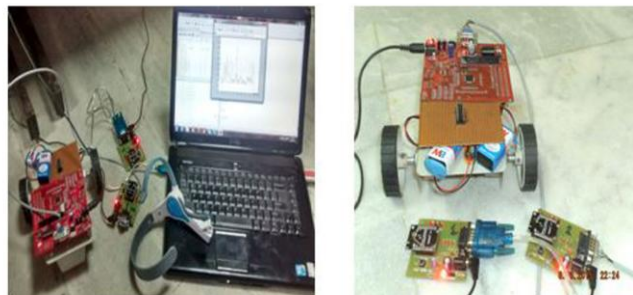


Fig.7 Robotic Module

## VIII. CONCLUSION

An EEG-based Brain robot was developed for disabled people to make their daily life easier without any difficulties. Two methodologies are used first Eyeblick and Meditation- Attention level. Using these two techniques robot can move Forward, Backward and Right-Left.

## IX. ACKNOWLEDGMENT

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