

## MIND WAVE SENSOR CONTROLLED WHEEL CHAIR

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**ABSTRACT:-** Paralysis is one amongst the major neural disorder that causes loss of motion of one or more muscles of the body. A brain computer interface (BCI) is a direct neural interface between a human brain and an external world. BCIs acquire brain signals, analyze them, and translate them into commands that are relayed to output devices that carry out desired actions. Eye movement can be used by the paralysis patients and armless persons to perform simple tasks. This project describes the acquisition and analysis of Eye blink signals for wheel chair operating for paralysis patients. For this the system is presented in which wheelchair is controlled using EEG signals obtained from the human brain. The Brainwave sensor products i.e. mind wave device headset is used to measure the human brainwave signals. The standing potentials in the eye can be estimated by measuring the voltage induced across a system of electrode placed middle the eyes as the eye-gaze changes, thus obtaining the blinks. And this blink signal can be used as an input for a MATLAB in PC and perform classification and interfacing to microcontroller in order to control wheel chair. Few switches are provided to operate manually by the patient.

**Keywords:-** Brain computer interface (BCI), Electro Encephalography (EEG)

### I. INTRODUCTION

As a result of various forms of illnesses or accidents such as spinal cord injury (SCI) or a form of motor neurons disease or SLA, many people suffer from a severe motor function loss and are forced to accept a reduction in the value of life, depending on the care of others. Therefore, the main objective is to develop a wheelchair controlled by EEG to facilitate mobility assistance to perform complex navigation tasks in realistic environments for paralyzed patients. In the arena of brain-computer interface (BCI), which uses significant information directly derived from the brain's activity of a user to manipulate the systems.

### II. BRAIN COMPUTER INTERFACE

A computer brain interface (BCI) is termed as mind machine interface (MMI), or a brain machine interface (BMI). BCIs researches have demonstrated that nonphysical communication control is probable and could serve the people who could not able to predict the technology. In the arena of the research and development of BCI focuses mainly on neuro protective applications its purpose is to restore sight, hearing and movement. The noninvasive proposed BCI system recovers brain waves using dry electrodes positioned on the subject's forehead, exactly in the FP1 position of the 10-20 electrodes system using the brain sensor startup kit. EEG-based BCI capabilities can be partitioned into the four types of subsystems: gaining the signal, processing the signal, signal translation characteristics into commands, and application of BCI for special purpose.

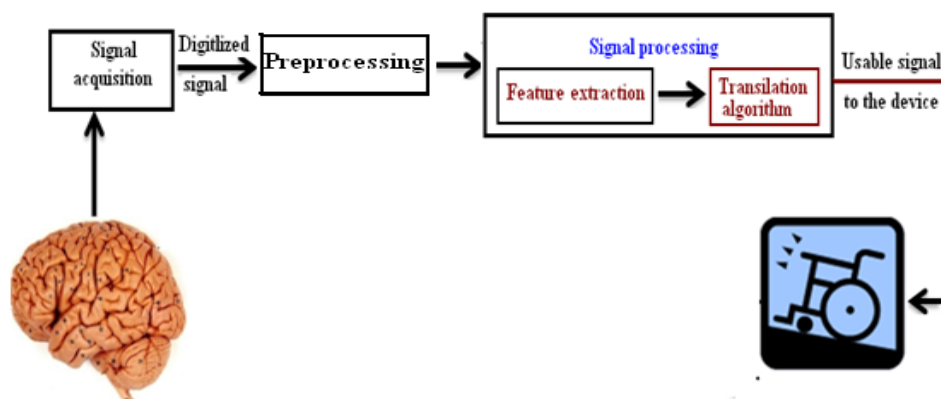
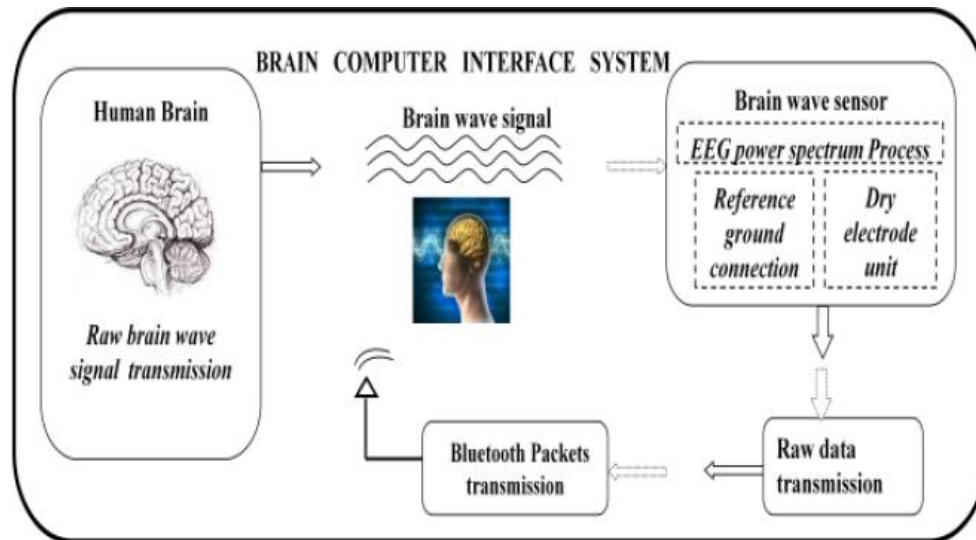


Figure1: The schematic diagram of BCI

### III. BLOCK DIAGRAM OF PROPOSED SYSTEM

In this instructions are given through Image processing by Brain indication, and then the sensors will be triggered by writing commands in Matlab. So, automatically this one is given towards driver circuit and this driver circuit will automatically give towards the transmitter then it sends to the receiver. In receiver, controller is present and this controller will process the data, so that it will control the wheel chair.

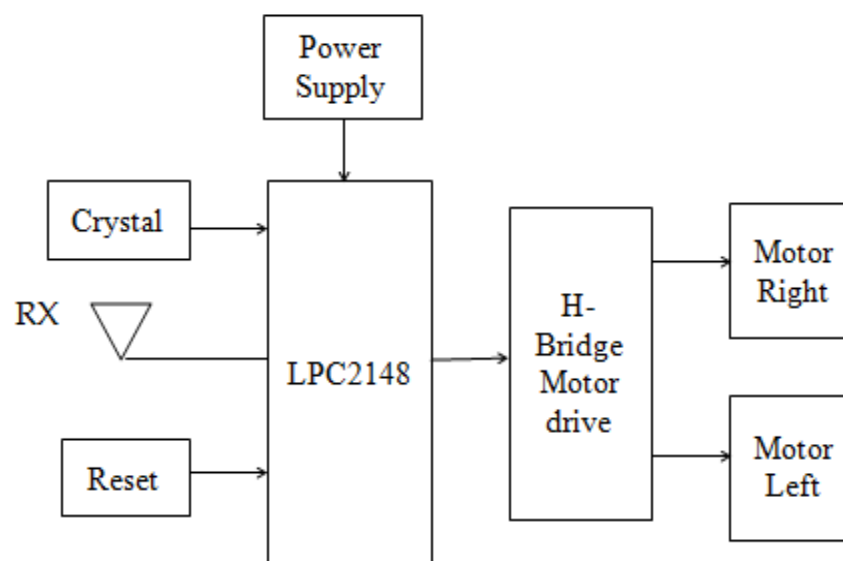
#### TRANSMITTER SECTION



**Figure2: Block diagram of transmitter section**

Electroencephalography is the recording of electrical activity of the human brain with the scalp. EEG varies resulting fluctuations in ion ions ion voltage inputs in brain neurons. In the clinical context, EEG recording of spontaneous brain's electrical activity for an instant time, commonly 20 to 40 minutes of time, as reported by multiple electrodes located on scalp. Genetic diagnostic applications concentrate on spectral contents of EEG, i.e., with this type of brain waves it can be viewed in Electroencephalography signals. EEG is utmost often diagnosing epilepsy causes abnormal readings of EEG. It will also diagnose coma, sleep disorders, encephalopathy and also brain death. In spite of narrow spatial resolution, the EEG remains a very important search and diagnostic tool, especially when a millisecond of time resolution is needed.

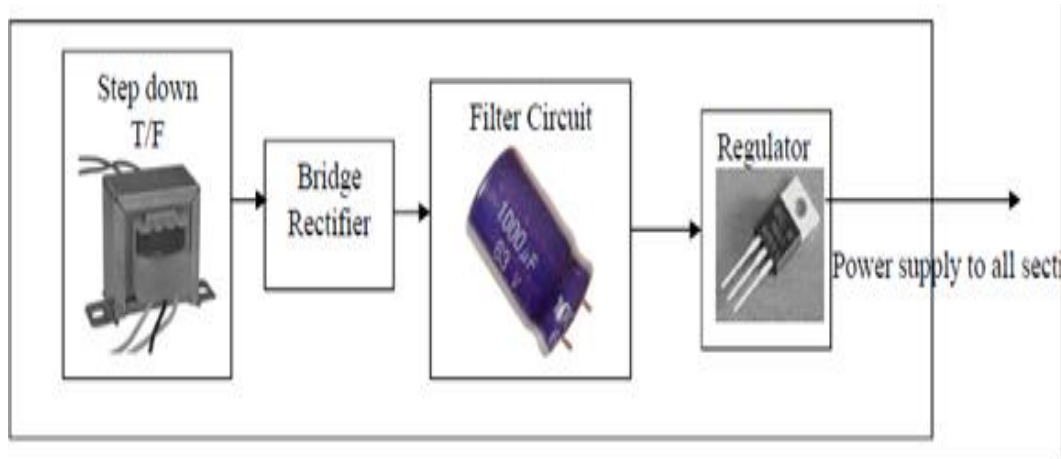
#### RECEIVER SECTION



**Figure3: Block diagram of Receiver section**

### **REGULATED POWER SUPPLY**

The circuit input is applied by the regulated supply. Then the AC input i.e., 230V from the substations is step down by the transformer to 12V and is provide for Bridge wave rectifier. The output acquired from rectifier is a pulsating DC voltage. Thus, in order to acquire a pure continuous DC voltage, the output voltage of the rectifier is providing with a filter, that is, component which exists even after rectification and also to eliminate low voltage voltages and become continuous signal. Now, this voltage is supplied to a voltage regulator to obtain a pure constant dc voltage. So, this regulated power supply part consists of step down transformer, bridge wave rectifier, electrolytic capacitor, 7805 three terminal voltage regulator to obtain 5V pure DC voltage supply.



*Figure4: Block diagram of Regulated Power Supply*

### **IV. BRAIN SENSE MIND WAVE MOBILE DEVICE**

Brainwave Visualization is a colorful and also an interactive brain controlled application that shows a graphical illustration of your brain's activities. The display includes brainwave visualization, displaying the brain wave spectrum chart and e Sense meters of meditation and attention.

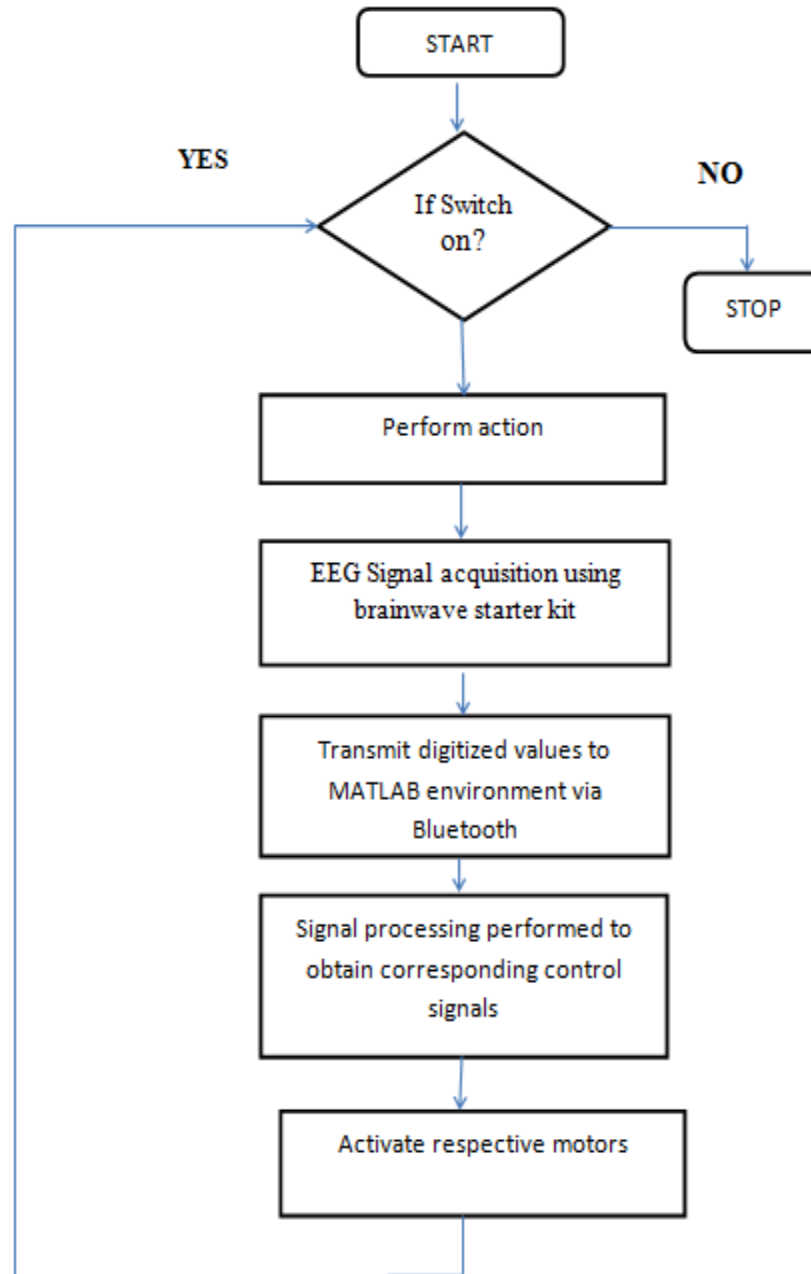
### **V. ESENSE, ATTENTION ESENSE, MEDITATION ESENSE**

Esense is an exclusive Neuro Sky algorithm used to define the mental states. To measure eSense, the Neuro sky with the think Gear technology strengthens the primary brainwave patterns and eliminates muscle movement and environmental noise. The eSense algorithm then enforced to the residual signal, resultant in interpreted eSense meters. Note that the eSense value counter does not reveal an exact number, but describes the activity ranges. At this scales, a value between 40 and 60 at a given point of stage, it is considered as "neutral" and is similar to the "base" recognized in conventional brainwave measurement techniques. A value of 60 to 80 is measured as "slightly raised" and can be taken as levels tends to be greater than the normal (level of care or concentration that may be greater than ordinary for a precise person). The values from 80 to 100 will be considered as "high", which means they are strongly analytical for high level of eSense.

Esense meter attention shows the intensity or level of care or user's mental health attention, such as occurs during steady concentration and mental activity. In general, attention can be sustained by a visual approach. Focus on a singular idea. Try to channel your focus and concentration the logic thread to push the counter up. Other suggestions include choosing a dot on the screen to see or imagine the action you are annoying to accomplish. For example, observe the meter's attention and imagine that the line moves to the highest numbers. Interruptions, traveling thoughts, absence of concentration or anxiety can reduce the level of care.

This ESense meter specifies the mental relaxation or a user's relaxation levels. Meditation is mainly related to the reduced activity of brain processes active in the brain. For meditation; usually helps to try to be lying down. Associate the mind with an intellect of peace and calm by emptying mind from thoughts and interruptions. For the maximum people, lie down the body habitually supports the mind to relax. Eye closure is often effective in increasing the meditation level metering method. If you have difficulty meditating, close your eyes, wait a few seconds and then open the eyes to see how the counter responded. Interruptions, travelling thoughts, nervousness, anxiety and sensual stimuli can reduce meditation level gauges.

## VI. FLOW CHART OF PROPOSED SYSTEM



## VII.RESULTS

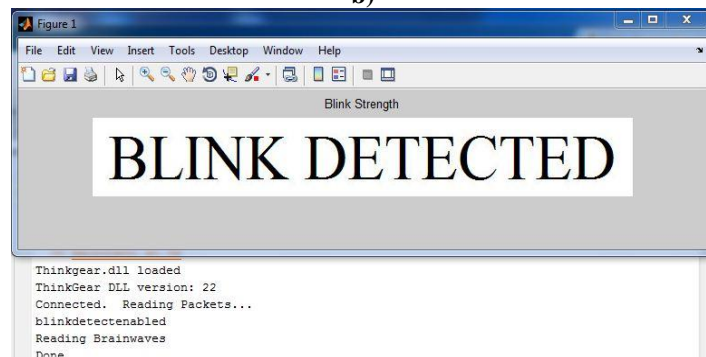
The Commands for the proposed wheel chair is illustrated in below table which shows that for every indication there will be respective movements. For 1-Eye blinking the wheel chair moves forward direction. For 2-Eye blinking pulse wheel chair moves in backward direction. For 3-Eye blinking pulse wheel chair moves in left direction. For 4-Eye blinking pulse wheel chair moves rightwards. Likewise the commands are given to wheel chair in order to move forward, backward, left, and right. The mind wave device headset used to measure the brain activities E Sense meter values i.e., attention meters, meditation meters, brain wave visualizer.



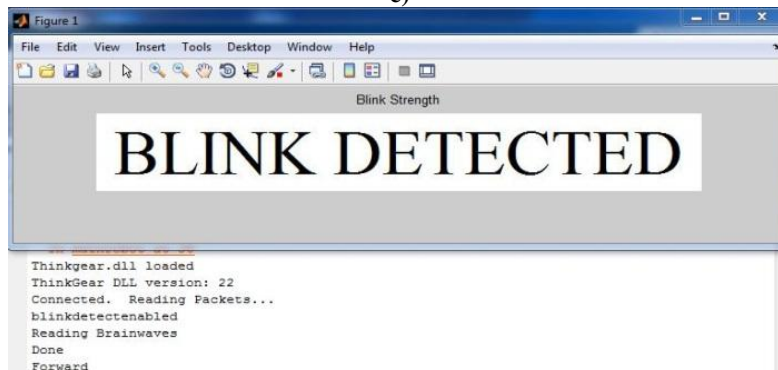
a)



b)

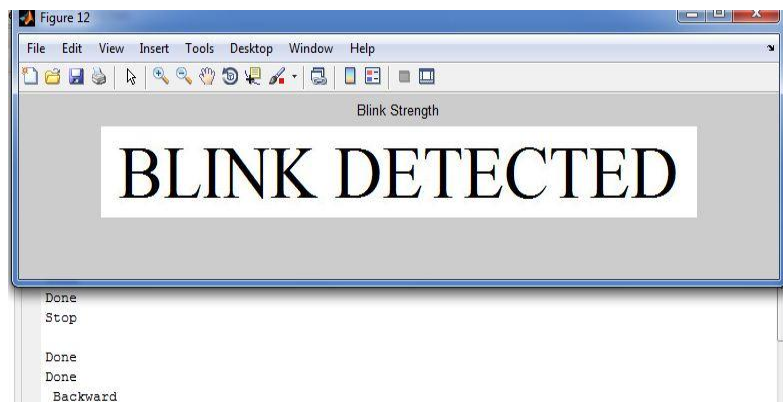


c)

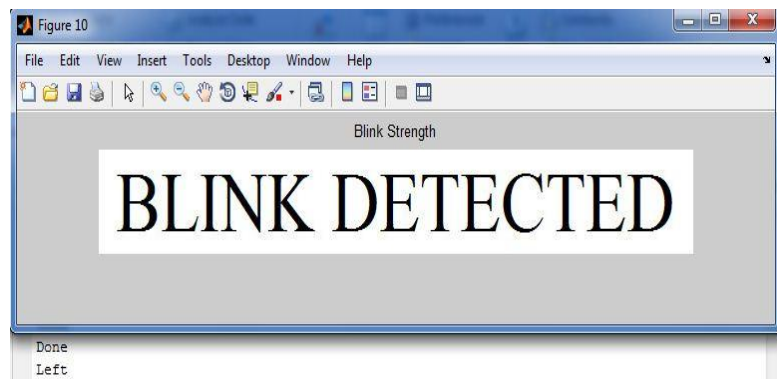


d)

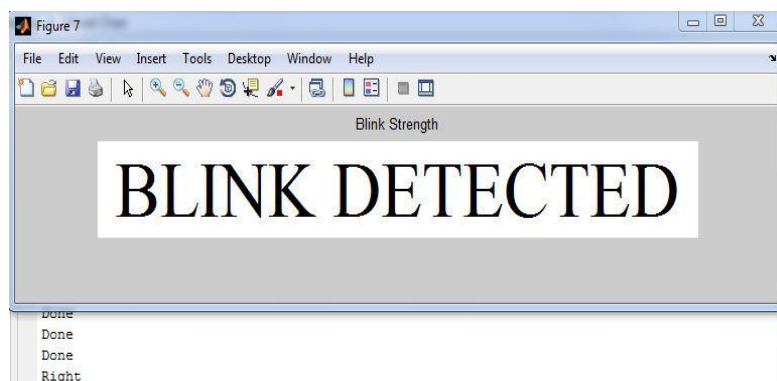




e)



f)



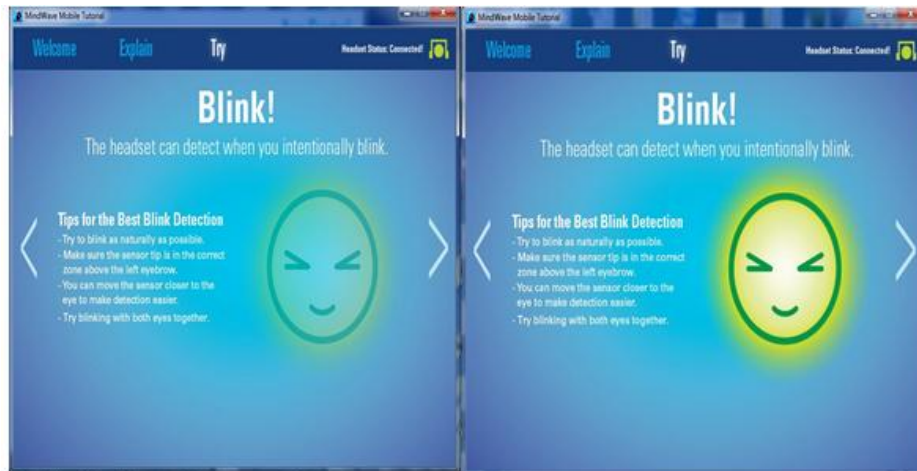
g)



h)



i)



j)

**Figure5: a) Brain wave sensor representation b)Real time implementation c) Output of reading brain wave d) when wheel chair moves forward direction e) when the wheel chair moves backward direction f) When the Wheel chair moves leftwards direction g) when the wheel chair moves right direction h) Output of Attention Levels i) Output of meditation levels j) Output of Eye Blinks**

## CONCLUSION

This experiment is an attempt to control direction of wheel chair via brain signals. The result shows that higher efficiency is indeed achieved using the embedded system and Image processing. It has verified that the proposed system is extremely useful for patients. The mind wave device headset is used that gives measure of brain activity in terms of blink detection and eSense meter values. The BMI translates the user wishes or commands into device commands that will achieve the user's intent. The wheelchair can merely be controlled by human thinking with almost 100% accuracy. Thus implemented system provides new world of interactivity to the people suffering from so called locked-in syndrome, but cognitively intact and alert.

The proposed one is to design a wheelchair that is controlled by human thoughts that can help people with disabilities in their daily lives to do some work without depending on others. This will be in less cost and comfortable for the society to intake these technologies at their homes. Besides, the proposed system demonstrated the possibility of forecasting the disabled people's vigilance in real time. Proposed work uses a hearing assistance from a single electrode (Mind wave headset), which reduces the cost of the equipment needed for the company and performs the wheelchair four operations (right, left, front, back) without GUI unless systems require any control device high level however.

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