IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Vol. 8, Issue 6, June 2021

DOI: 10.17148/IARJSET.2021.86139

IMPLEMENTATION OF BRAIN ACTUATED APPLICATION FOR PARALYZED PEOPLE

Anitha R[1],Bhavana J[2], G S Surabhi [3], Madhu S[4], B.Sudarshan[5]

Final year B.E, Department of ECE, K.S Institute of Technology, Bangalore,India[1,2,3,4]

Assistant Professor, Department of ECE, K.S Institute of Technology, Bangalore, India[5]

Abstract: Each and every person in this world has a desire to live a normal human life but accidents, diseases, elder-ship make their desire into disability. Moreover, there are lots of handicaps and elders as well as the number of paralyzed people are increasing day by day. They always need another person in moving the wheelchair .The proposed system helps them to move freely & safely and also takes the activities in a cost effective manner. The intention of this work is to propose and develop a Brain-computer interface solution for people with movement disabilities. A smart wheelchair is developed by using Brain recognition system control the movement of wheelchair and also with Arduino interfaced. The proposed solution will read ,monitor and translate brainwaves generated from the central nervous system of a person with movement disabilities to replace/rehabilitate his/her natural movements or for allowing them to control different software and hardware applications such as password authentication, virtual keypad communication, emergency commands and wheelchair. The brain waves used in this work are those produced when a person blinks. This prototype uses a controlled mechanism based on the raw Electroencephalography (EEG) data extracted from a mind wave mobile/brain sensor for manipulating real life applications.

Keywords: Electroencephalography (EEG), Brain computer interface (BCI), Paralyzed, and Brainwaves

I. INTRODUCTION

In India, there are about 5 million disabled people (in movement/motor functions). The disabled people affected with neuromuscular disorders such as multiple sclerosis (MS) or amyotrophic lateral sclerosis (ALS), brain or spinal cord injury, Myasthenia gravis, brainstem stroke, cerebral palsy, etc.; to express themselves one must provide them with augmentative and alternative communication. Brain Computer Interface (BCI) systems has been developed to address this need. Recent advancements in BCI have presented new opportunities for development of new prosthetic arm interface for such people based on thought or brain signals.

BCIs systems include the conventional channels of communication which is muscles and speech instead they provide direct communication and control between human brain and physical devices by translating the brain activity into commands in real time. Early prosthetics were simple. They were immovable prosthesis like wooden shaft, pegs and metal hooks. Later advances facilitate the movement of the prosthesis, but they looked very different from a human hand. Emphasis was given on the improvement in both the function and appearance of prosthesis. As technology advanced, the hands became more natural. An EEG sensor detects various waves from the brain such as alpha, beta, Gama, and theta by using this waves the Brain sense brainwave sensor measures attention, meditation and concentration values the values are assigned for the specific task to be performed by the 3D Print prosthetic arm which is controlled by servos.

Brain sense measures brainwaves and translates it into meaningful data to make the most of cognitive performance. The Brain wear can measure, track and help you improve your Attention, Focus, Meditation, Eye blink. By using the parameters by wheelchair can be controlled.

II. LITERATURE SURVEY

[i] In this paper **Design of an EEG-based Brain Controlled Wheelchair for Quadriplegic Patients** by Antora Dev, Md. Asifur Rahman, and Nursadul Mamun**,** an EEG-based brain controlled wheelchair has been designed using Brain Computer Interface (BCI) with the help of Neurosky Mind Wave EEG Headset. Quadriplegic patients cannot move any organ of their body below their necks. Implementation of this device will assist the quadriplegic patients to move independently on their own. The movement of the wheelchair is controlled by variation of attention level of the patient. Turning on or off this device is controlled by double eye blink of the patient. Graphics based fuzzy image has been added in the design of the wheelchair for assisting the patients varying their attention levels if needed.

[ii] In this paper **Prosthetic Arm control by Human Brain** by Orgil Chinbat and Jzau-Sheng Lin, Electroencephalogram (EEG) signal is used to find problems related to electrical activity of the brain. EEG based BrainComputer Interface (BCI) prosthetic arm can help as a powerful support device for severely disabled people in their

IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Vol. 8, Issue 6, June 2021

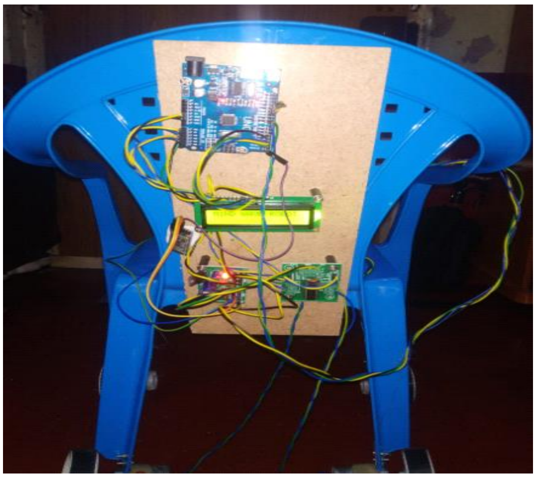
DOI: 10.17148/IARJSET.2021.86139

regular activities, especially to aid them to move their arm voluntarily. The brain waves can be sensed by sensors in the neurosky mind wave mobile. Then EEG signal is processed by a microcontroller to control servo motors and move an artificial hand. Patient that suffers from amputee below the elbow can benefit from this prosthetic arm. The major goal of this paper is to let the physically disabled person become independent on others in their daily life time for their purposes.

[iii] In this paper **General Perspectives on Electromyography Signal Features and Classifiers Used for Control of Human Arm Prosthetic** by Faruk Ortes, Derya Karabulut, Yunus Ziya Arslan, provides a general overview of the EMG signal features and their classification methodologies which have critical issues for controlling of human arm prosthetics. EMG-driven human arm prosthetics are highly sensitive to the scientific and technological advances. Through the last decades, many of EMG signal features calculation and discrimination methods have been proposed and applied to prostheses. Precise and intuitive control of prosthetics depends mainly upon the type of extracted feature and classification techniques. Making a significant difference or advancing the dexterity in the control of prosthetic devices depend on achieving the optimum signal feature and classifier architecture. Needless to say that in addition to the control structure, mechanical structure of the prosthetics also plays a major role in the completion of complex motor tasks which deserves to be extensively dealt with in a separate report.

[iv] In this paper **Task Based Motion Intention Prediction with EEG Signal** by D.S.V Bandara, Jumpei Arata, Kazuo Kigichi. In this paper, a neural network based real-time estimation method is proposed to detect human motion intention in terms of intended task, using EEG signals. The inputs of bandpower time series signals let the neural network identify the dynamic nature of the tasks performed. Experimental details, methodology and the prediction results are presented.

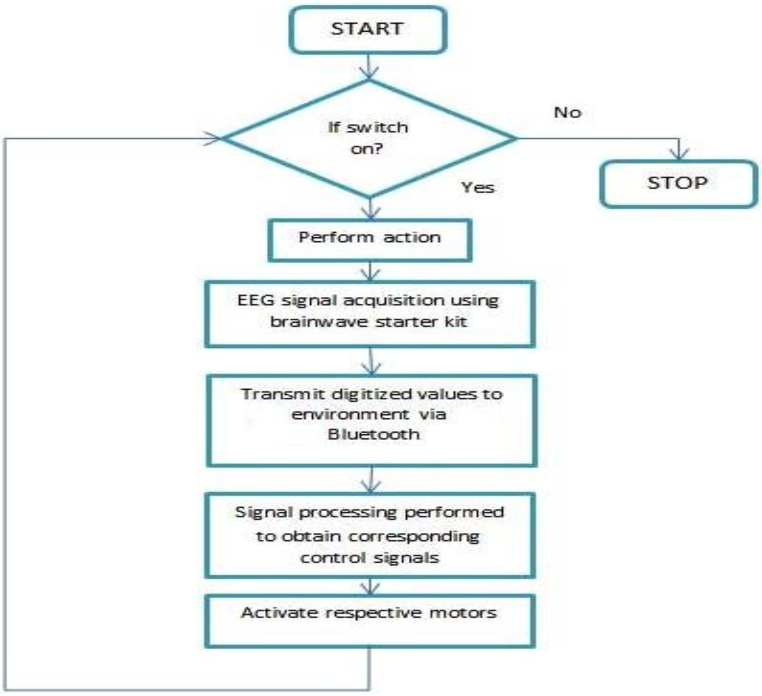
III. Methodology



IARJSET
ISSN (Online) 2393-8021
ISSN (Print) 2394-1588
International Advanced Research Journal in Science, Engineering and Technology
Vol. 8, Issue 6, June 2021
DOI: 10.17148/IARJSET.2021.86139

Implementation:
For our proof of concept, we have used an EEG headset called Neurosky Mobile 2. The headset is Bluetooth capable and transmits brainwave data with negligible latency. The EEG data is transmitted to a processor which uses neural networks to determine intent of thought and sends the command.
1. EEG Module: Consists of the BCI headset and is responsible for detecting the P300 waves and sending the serial data to the processing unit. Any open source headset can be used as long as the latency and accuracy are limited to reasonable amounts.
2. **Control Module:** The software-based processing unit which translates the raw EEG serial data pertaining to a particular thought.
It is basically a Brain Computer Interface (BCI) System. A BCI is a non-muscular communication channel that enables a person to send commands and messages to an automated system such as a prosthetic arm, by means of his/her brain activity.
The basic idea of BCI is to translate user produced patterns of brain activity into corresponding commands. One of the most important features in a BCI system is represented by acquisition. The most spread acquisition technique is EEG, and it represents a cheap and portable solution for acquisition. The EEG technique assumes brainwaves recording by electrodes attached to the subject's scalp. EEG signals present low level amplitudes in the order of microvolt and frequency range from 1 Hz up to 100 Hz. Specific features are extracted and associated with different states of patient brain activity, and further with commands for developed applications. Using EEG one more drawback can be eliminated (i.e. dangerous surgery can be avoided for invasive method where electrodes are placed inside of brain called implants).
The EEG Headset or the Brainwave Sensor detects the electrical signals from the brain and sends them in the form of data packets to a Bluetooth. This received data is processed and the control commands are then transmitted to the Arduino via RF. Based on the data received by the Microcontroller it performs certain predefined actions based on the level of concentration.
Here based on the command given by the brain sensor it will do the respective application.
At the beginning we need to choose wheelchair or Commands. If we choose the wheelchair then based on the commands send by the EEG sensor the wheelchair will move otherwise if we choose the Emergency Commands then based on the commands sent by the EEG Sensor it will tell that the person needs a water or he needs a food so that the person what he needs can get it. Here for food one threshold value will be there and for water some other threshold value will be there. Those threshold values will depend on the mood of the patient which is sent by EEG sensor.

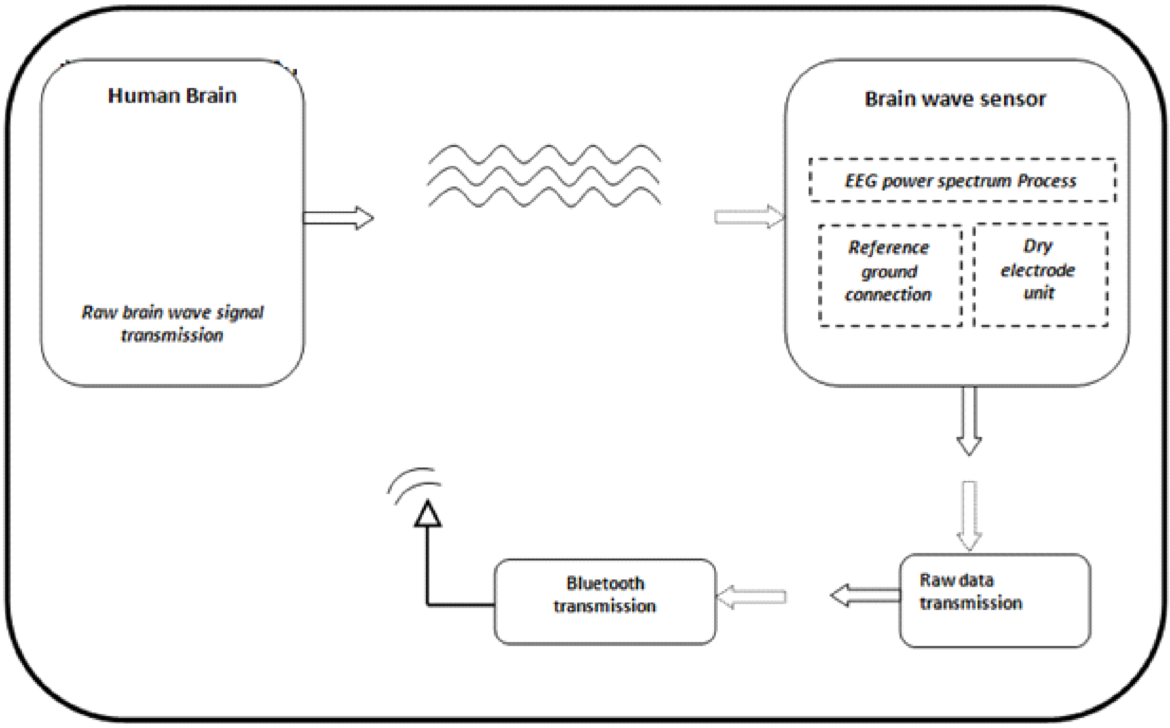
Flowchart:

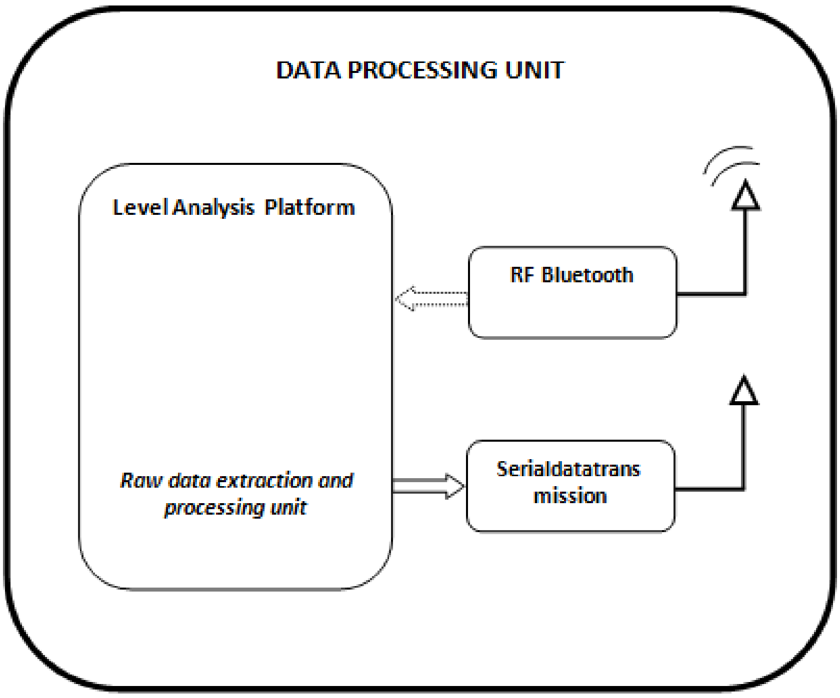


IARJSET
ISSN (Online) 2393-8021
ISSN (Print) 2394-1588
International Advanced Research Journal in Science, Engineering and Technology
Vol. 8, Issue 6, June 2021
DOI: 10.17148/IARJSET.2021.86139

IV. BLOCK DIAGRAM

Transmitter Section





IARJSET

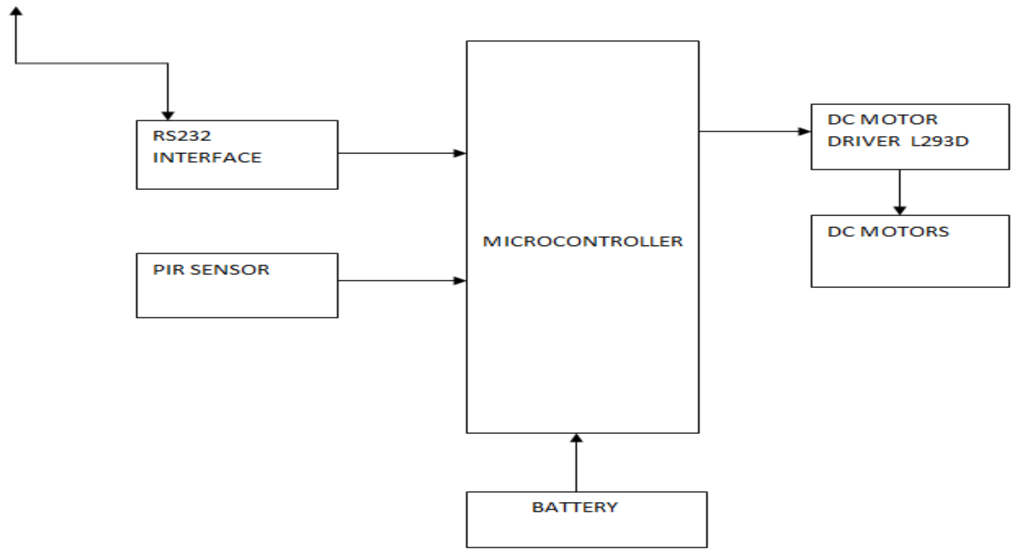
ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

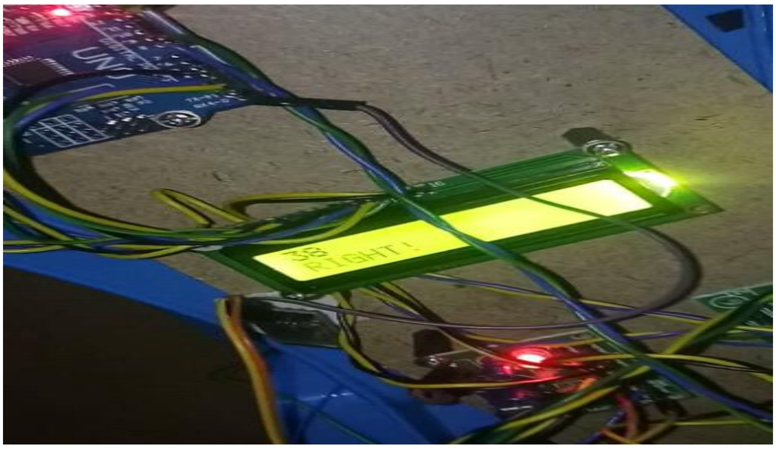
Vol. 8, Issue 6, June 2021

DOI: 10.17148/IARJSET.2021.86139

Receiver Section



V. RESULTS



IARJSET

ISSN (Online) 2393-8021
ISSN (Print) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

Vol. 8, Issue 6, June 2021

DOI: 10.17148/IARJSET.2021.86139

VI. CONCLUSION

Our model "Brain Actuated Application for Paralyzed People" is proposed for paralysed people. The Brain Computer Interface uses brain signal for all application, since Neurosky mindwavemobile/Brain sense uses AAA- battery and electrode is just placed in the scalp, it doesn't make any harm to the brain. It can be pre-configured for every user to increase the accuracy of blink classification to use the application. It makes every paralyzed people to be independent in some applications. The Brain wave sensor can measure, track and help you improve your Attention, Focus, Meditation, Eye blink. By using the parameters by wheelchair can be controlled.

REFERENCES

[1]. Taha Beyrouthy, Samer K Al Kork, Joe Akl Korbane, Alhamza Abdulmonem,"**EEG Mind Controlled Smart Prosthetic Arm**" 2016 IEEE International Conference on Emerging Technologies and Innovative Business Practices for the Transformation of Societies (EmergiTech).

[2]. Md Raju Ahemed "**Prosthetic Arm Control Using Electromyography(EMG) Signal**" International Confrence on Advancement In Electrical and Electronic Engineering,2018.

[3]. Antora Dev, Md. Asifur Rahman, and Nursadul Mamun,"**Design of an EEG- based BrainControlled Wheelchair for Quadriplegic Patients**" 2018 3rd International Conference for Convergence in Technology (I2CT).

[4]. Orgil Chinbat and Jzau-Sheng Lin,"Prosthetic Arm control by Human Brain 2018 International Symposium on Computer, Consumer and Control (IS3C).