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Brain Controlled Vehicle

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Abstract: Brain Controlled Vehicle is a device that can be remotely controlled utilizing the brain signal emitted by the user. This framework utilizes BCI(Brain Computer Interface) to give the path for communication between our mind and the automated vehicle. It utilizes an EEG (Electroencephalogram) headset to secure information, groups and deciphers the information on hardware device, and accomplishes wanted function on the automated vehicle dependent on the given order. The information is exchanged through a Bluetooth module, while the direction is executed by Arduino. This paper incorporates the construction of mind driven vehicle, which would be of extraordinary help to the physically handicapped individuals.

Keywords: Neurosky Mind Wave sensor, Arduino UNO, HC-05 Bluetooth module, L293D Motor Driver.

I. INTRODUCTION

Physically disabled individuals continually depend on their family members for their everyday movements. There is a ton of research proceeding to help these individuals control their movements using brain signals. For acquiring the brain signals we utilize a method called as electroencephalogram (EEG), which deals with the electric signals produced in the mind, by extricating these pulses we can follow the condition of the psyche, for instance meditation, attention. An electroencephalogram (EEG) provides us with various frequencies which can be additionally decoded as the state of mind. For the general population with inabilities, it very well may be utilized to control a vehicle or it very well may be executed for anything which should be dealt with for movement through wheels.

II. METHODOLOGY

The control of the vehicle is in accordance with the EEG signals from the brain. The electroencephalogram (EEG) is a record of the motions inside of the brain. The recorded waveforms mirror the cortical electrical movement. The intensity of the signals emitted by the brain is very small and is measured in microvolts (mV).The fundamental frequencies of the human EEG waves are Delta, Theta, Beta, and Alpha. We are catching EEG signals utilizing Neurosky mindwave headset. The human brain is comprised of billions of interconnected neurons; the emotional states and thoughts are the representation of the interaction patterns of these neurons. Each interaction between neurons makes a tiny electrical release; alone these charges are difficult to gauge from outside the skull but, the movement made by several thousand simultaneous releases totals into waves which can be recorded. Diverse mind states are the consequence of various patterns of neural communication. These states of mind lead to waves described by various amplitudes and frequencies; for instance waves somewhere in the range of 12 and 30 hertz, Beta Waves, are related with focus while waves somewhere in the range of 8 and 12 hertz, Alpha Waves, are related with meditation.

III. BLOCK DIAGRAM

Block diagram given in fig 1, comprises of Neurosky Mindwave Sensor, HC-05 Bluetooth Module, Arduino UNO.
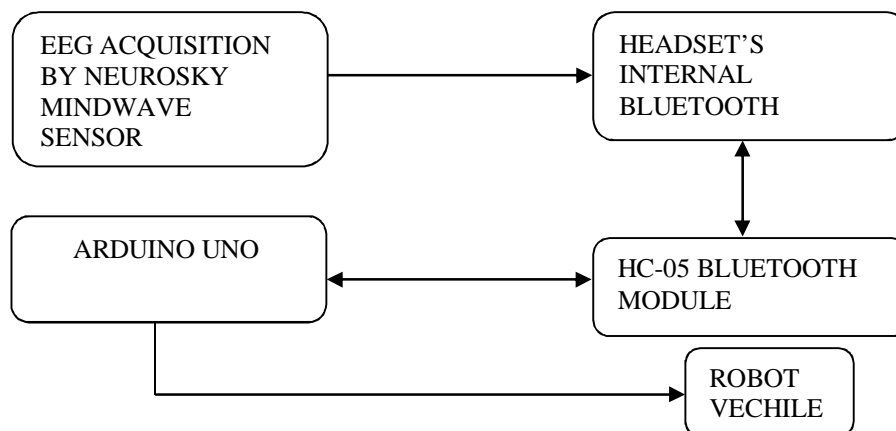

Fig 1: Block diagram of Brain controlled vehicle

A. Neurosky Mindwave

The MindWave Sensor safely measures and outputs the EEG power spectrums (alpha waves, beta waves, etc), NeuoSky eSense meters (attention and meditation) and eye blinks. Brain wave sensing module is very important or basically it is aa master of whole system, this module contain passive bio sensor which are electrode tip for capturing electrical or EEG signal emerging form brain. It has a ability to convert analog data into digial form this digitalized data are being transferred to Arduino via Bluetooth module. Human brain react differently at different time such as relaxing, deep meditation etc.
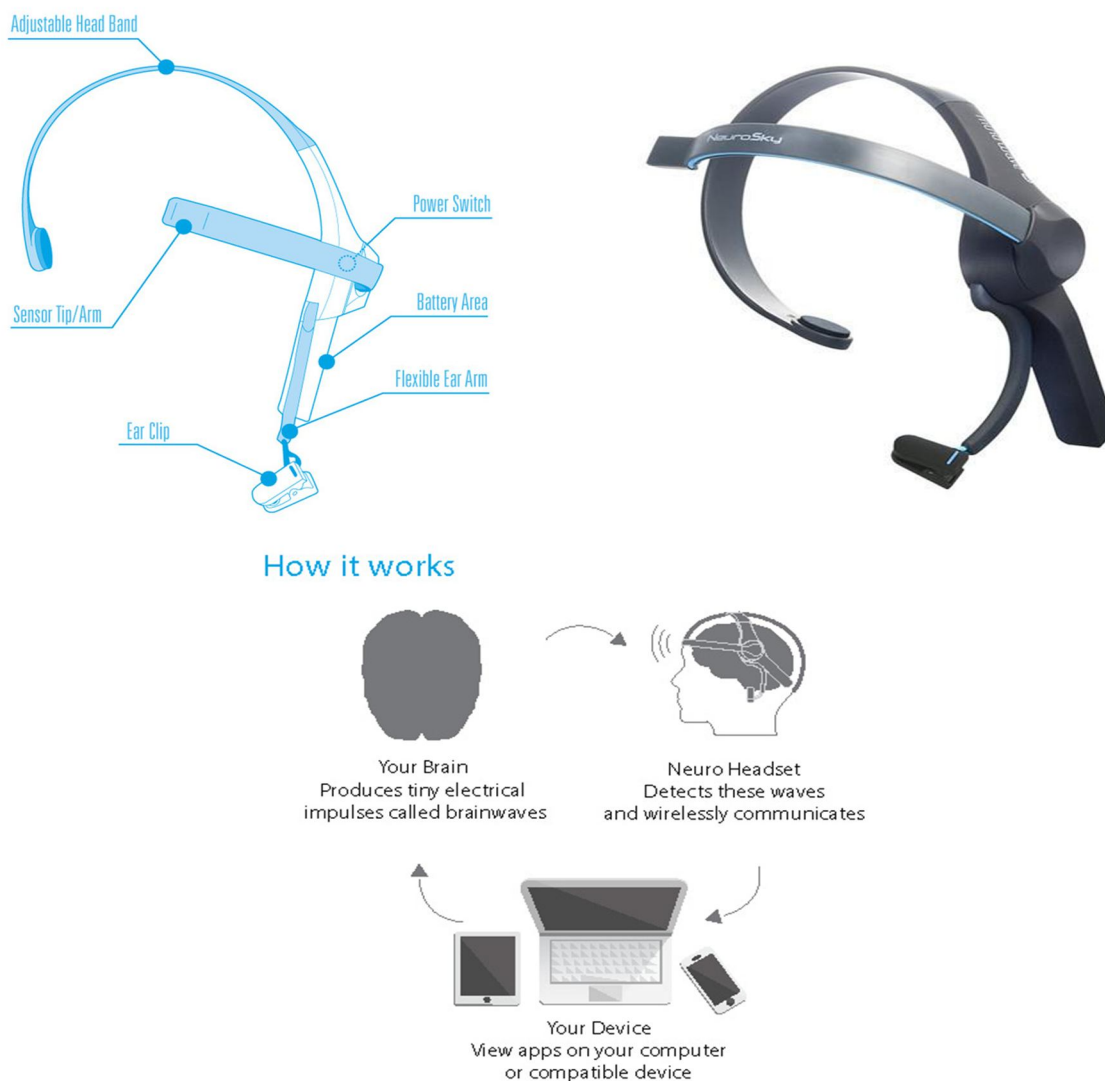

Fig 2: Neurosky Mindwave and its working.

B. HC-05

HC☐05 is a Bluetooth module which follow SSP(Serial Port Protocol), designed for transferring data on wireless channel. The HC-05 Bluetooth Module can be used as Master or Slave configuration, it solve the problem of wireless communication at some extend.

Fig 3: HC-05 Bluetooth Module.

C. Arduino UNO

The Arduino UNO is a microcontroller board based on the Microchip ATmega328P microcontroller. The board consists of 14 digital pin (6 pin can used as PWM) and 6 analog pin, these pin support microcontroller to interface with various electronic components.

Fig 4: Arduino UNO.

D. L293D

A motor driver is an integrated circuit chip which is usually used to control various types of motors. Motor driver work as a current amplifier it take low current for rotating motor. This IC is used to control 2 DC motors simultaneously. L293D consist of two inbuilt H-bridge. H-bridge is simple H shape structure which is responsible for controlling a low current rated motor.
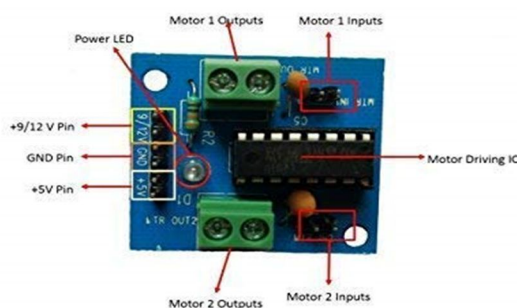

Fig 5: Motor driver L293D

IV. IMPLEMENTATION

EEG values from the brain signal sensor is utilized to create a Brain-Computer Interface (BCI) that gives means to controls robot vehicle through Bluetooth HC-05. We use Neurosky headset which gives digitized values for attention and meditation. The sensor reads brain waves with electrode placed on the front side arm just above the eye, as displayed in the Figure 2.The mind wave sensor not only acquires the attention values but also digitizes it. These attention values are transmitted by the interior Bluetooth remote module of the EEG headset to the HC 05 Bluetooth module which is further transmitted to the microcontroller hardware (Arduino UNO). The microcontroller is programmed to make the robotic vehicle to perform movements on the basis of these values. For example when the average of four consecutive attention values is above 40 the vehicle moves forward and if this value is below 10 then the vehicle ceases to move.For the output we have to build up a robot vehicle, this incorporates four 9v dc motors which are driven by motor driver circuit as they require considerable measure of current, which the Arduino is unfit to give. Therefore some source is expected to supply the required current. For making the robot vehicle absolutely remote we have to put that outer source on the body of the vehicle and the Arduino is to be provided from a similar supply source. There are two types of voltage supply (5V and 9V) utilized for Arduino and motor driver, Arduino is driven by 5V and motor driver IC is driven by 9V. L293D accepts low current and gives high current for motor.
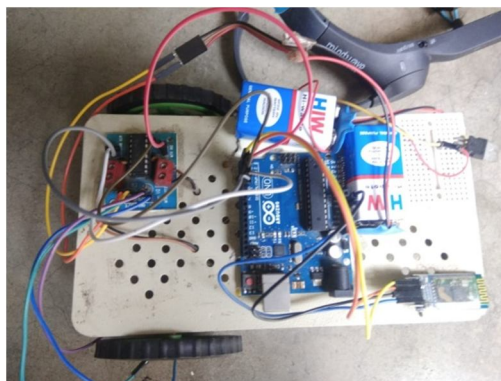
Fig 6

V. CONCLUSION

This paper incorporates the utilization of EEG waves for controlling a robot vehicle through BCI by utilizing mechanism of Arduino and Bluetooth HC-05. Further it incorporates the programming of Arduino, while demonstrating the HC 05 with AT commands for the programmed matching of the headset and the HC-05 module. It is proposed that this paper clarifies an individual about the EEG waves and how to get them utilizing a Bluetooth module over to the Arduino and control the movements of a robot vehicle.

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