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EEG based mind controlled car.

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Abstract **---** *An* objective of this paper is to develop a mind control car . to design a functioning car that will respond to a users brain activity and respond accordingly. Being used will be an EEG headset to gather the necessary brain readings to drive the car. Using brain signal coming from EEG sensor headset mounting on brain skull. Analyze signal coming from different eeg electrode and eeg signal monitor the EYE BLINKS, ATTENTION MODE, and MEDITATION MODE. Analyzing the frequencies ranges of the certain level, every human being and create command to move car forward ,backward, stop, left, right.

Keywords- *Fingerprint authentication, Cygwin tool, Bozorth3, Biometric*

I . INTRODUCTION

The project that will be undertaken will be a small remote controlled car with an onboard computer that will interpret EEG (electroencephalography) readings from a headset worn by the user, and, depending on the type of brain activity detected, either move the car forward, backward, left, or right. The reason for incorporating EEG is to explore the emerging field of brain computer interface (BCI). Until recently the field of BCI has been primarily focused on that of neuroprosthetics applications that aim at restoring function to damaged parts of the body, but now, commercially available headsets make it possible for the field to broaden its view. Theses commercially available headsets are intended for use with videogames and integrating with the user's ordinary computer

allowing for endless possibilities. Application is that assist by the disabled people in their daily life to do some work independent on others and to bring this technique into the equipments which are used by the elders at homes.

Electrical waves will be sensed by the brain wave sensor and it will convert the raw data into packets and transmit through wireless medium. Level analyzer unit (LAU) will receive the brain wave raw data and it will extract and process the signal using PYTHON or arduino c platform. With this it's possible move a car in all directions (right, left, forward, backward) and can control devices, according to the human thoughts both at attention and meditation modes, by only keeping single electrode on the forehead it is possible to do, since it's a portable headset device it can be easily operated by the elders.

II.LITERATURE SURVEY

Mental Prosthesis: assessing the speed of P300- based brain computer interface P300 [1].In this paper authour has proposed an event related potential (ERP) which is bring out to make a decision. A technique positive potential typically occurs around 300 milliseconds after a rare event occurs. After several presentations of the items the target can be recognized with almost 100 percentage confidence. This setup has the advantage of requiring no training from the user and only a few minutes to train the P300 detecting system.

The author in the paper Design & implementation of brain controlled wheelchair.[2]. This paper presents Electroencephalography (EEG) technique deploys an electrode cap that is placed on the user's scalp for the acquisition of the EEG signals which are captured and translated into movement commands by the arduino microcontroller which in turn move the wheelchair.

Smart brain controlled wheelchair and device based on EEG in low cost for disabled person[3]. In this paper author has develop a wheelchair which is controlled by human thoughts that can assist by the disabled people in their daily life to do some work independent on others; this will be in less cost and comfortable for the society to in take these technologies at their homes.This paper presents a novel modular, portable and Low-power electroencephalography (EEG) acquisition system for a Brain-Computer Interface (BCI) application.

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III.PRAPOSED SYSTEM

To develop a interface between human mind and machine natural interface between mind and body & To restoring function to damaged parts of the body. To design a functioning car that will respond to a user's brain activity and respond accordingly. To practically solve a way to manipulate physical objects with your mind. To navigate the car using the headset through a simple obstacle course. This course will consist of left and right turns on a circular track.

3.1 Features of Proposed System

1. Allow paralyzes people to control prosthetic limbs and machine (car) with their mind.
2. Transmit visual images to the mind of blind person ,allowing them to see.
3. Allow gamers to control video game with their mind .
4. Allow a mute person to have their thoughts displayed and spoken by a computer.

IV.METHODOLOGY

System architecture includes different blocks like embedded devices, sensors, motherboard, EEG sensor,Microcontroller, RC car accesries, wireless module, Bluetooth. .

Emotive Neuro-headset gathers EEG signals and transmit the data to the Bluetooth dongle plugged into a USB port on the DH61AG motherboard .

The EEG signals are received and interpreted by custom written software that determines what kind of signals is being received and what that signals corresponds to . Another Program will be running in the background to convert the identified command into a 6 bit binary string to be sent out via and xbee series 1 plugged into another USB port.

The signal is received by another xbee onboard the car that is connected to the custom PCB which contains an Atmega 328 processor and a dual h-bridge motor driver. Depending on the 6 bit string received the car will move in the corresponding direction. .

figure 1 Proposed System Architecture

V. METHODS AND MODULES

Fig:- Arduino Mega 2560

The Arduino Mega 2560 is a microcontroller board based on the ATmega2560 (datasheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Mega is compatible with most shields designed for the Arduino Duemilanove or Diecimila.

A motor driver is a little current amplifier; the function of motor drivers is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor.The shield

contains two L293D motor drivers and one 74HC595 shift register. The shift register expands 3 pins of the Arduino to 8 pins to control the direction for the motor drivers. The output enable of the L293D is directly connected to PWM outputs of the Arduino.

Fig:- Motor Shield

The Motor Shield is able to drive 2 servo motors, and has 8 half-bridge outputs for 2 stepper motors or 4 full H-bridge motor outputs or 8 half-bridge drivers, or a combination..

Fig:- DC motor

A **DC motor** is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.

Fig:- Twin gear box

Gear Ratios: 58:1 207:1

- Motor:FA-130
- MotorRPM: 12300(9710MaximumEfficiency).
- MotorVoltage:1.5-3V(1.5VRecommended).
- MotorStallCurrent:2.1A .
- Free-runcurrent:150mA.

The **Tamiya Twin-Motor Gear Box** uses a two motor system to provide power and speed to turn the hex shaft. The gear box is made from high quality plastic. Use this gear box and motor set with other Tamiya Construction and Robotics products. Two FA-130 motors are included.

Fig:- IR Sensor

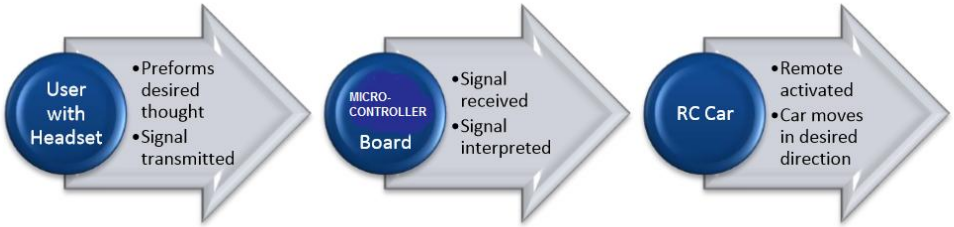
IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the

sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold.

VI. ALGORITHM

The Robot Car with arduino is controlled by the eeg signals from the brain using Brainsense (built up with EEG sensor & Bluetooth).

You could drive the Robot in different directions by modulating your brain signals. unless like other human machine interfaces,BCI does not use muscle activity so it could be used for paralyzed pepole to navigate the robot in different directions without depending upon anyone.



When you focus on something, your attention level(0-100%) goes up. You can do some math, read something,or just concentrate on your fingertip. When you relax your meditation level goes up. For example,you can close your eyes and take deep breaths. If you can calm and focus your mind at the same time,both attention and meditation can go up to 100%.

Mathematical model:-

A={S,I,O,F,DD,NDD,Fc,Sc,NP-Complete}

- I: Set of inputs.
- O:Set of outputs.
- F:Set of functions.
- Fc:Set of failure cases.
- Sc:Set of success cases.

Input:-

I: (EEG Channel data, Command)

EEG channel reading:{AF3,F7,F3FC5,I7,P7,01,02,P8}

Command:(Right,Left,Forward,Backward,Stop)

Output:-

O:Output of Program

O: (Movements)

Movement: (Right,Left,Forward,Backward,Stop)

Functions:-

Connection.

Sensing.

Moves:- Forward, backward, Turn left, Turn right, Stop.

Failure cases:-

Hardware non-responsive.

No operation performed.

Connection not established.

Reading can be noisy.

Success cases:-

Car Moves:- Forward, backward, Turn left, Turn right, Stop.

DD:- It is deterministic.

NDD:- If reading from EEG senson is noisy then it is hard to determine.

NP-Complete:- This project is NP Complete.

VII. FUTURE WORK AND CONCLUSION

The mind controlled Car is a project that will combine the efforts of both computer software and hardware components. Both areas of study will work together in this project in order to control a remote control car by reading and interpreting EEG waves from the human mind as well as facial expressions. The final functionality of this project will be to be able to run the developed software

and control the car without having to use any remote controls or having any other human interaction with the car.

In future work we are trying to implement machine learning on raw EEG signal data.Using machine learning algorithm we can reduce the dimensionality of EEG signal data,feture extraction and implement machine learning algorithms. To nevermind thinking of the human brain

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