BRAIN CONTROLLED CAR FOR DISABLED USING ARTIFICIAL INTELLIGENCE (NEURO CAR)

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ABSTRACT

This paper features about brain controlled car that uses asynchronous mechanism of artificial intelligence. This is of prime use to the physically disabled as it does not rely on any physical movements on the part of the individual. The car integrates signals from a variety of sensors like video sensor, weather monitor sensor, anti collision sensor, steering sensor ,Global postioning sensor among the others. Automatic navigation system ensures that the route to all the areas are mentioned in the database for selection by the driver. Automatic security system ensures the safety of the driver from the other autonomous vehicle. This system ensures that the handicapped is able to thrive individually without needing to depend on others for monitoring.

Key Word: *Artificial intelligence , Application of AI, Bio control system , Brain computer interface , Automatic security system , Automatic navigation , Electroencephalography , Sequential montage , Refrential montage , Average reference montage , Laplacian montage .*

I. INTRODUCTION

A brain computer interface (BCI), sometimes called a direct neural interface or a brain-machine interface – is a direct communication pathway between a human or animal brain (or brain cell culture) and an external device. In one-way BCIs, computers either accept commands from the brain or send signals to it (for example, to restore vision) but not both. Two-way BCIs would allow brains and external devices to exchange information in both directions but have yet to be successfully implanted in animals or humans.

In this definition, the word brain means the brain or nervous system of an organic life form rather than the mind. Computer means any processing or computational device from simple circuits to silicon chips (including hypothetical future technologies such as quantum computing).

Once the driver (disabled) nears the car. The security system of the car is activated. Images, as well as thermographic results of the driver, are previously fed into the database of the computer. If the video images match with the database entries then the security system advances to the next stage. Here the thermographic image verification is done with the database. Once the driver passes this stage the door slides to the sides and a ramp is lowered from its floor. The ramp has flip actuators in its lower end. Once the driver enters the ramp, the flip actuates the ramp to be lifted horizontally. Then robotic arms assist the driver to his seat. As soon as the driver is seated the EEG (electroencephalogram) helmet, attached to the top of the seat, is lowered and suitably placed on the drivers head. A wide screen of the computer is placed at an angle aesthetically suitable to the driver. Each program can be controlled either directly by a mouse or by a shortcut. For starting the car, the start button is clicked. Accordingly, the computer switches ON the circuit from the battery to the A.C.Series Induction motors.

II.ARTIFICIAL INTELLIGENCE

Affective computing is the study and development of systems that can recognize, interpret, process, and simulate human affects. It is an interdisciplinary field spanning computer sciences, psychology, and cognitive science. While the origins of the field may be traced as far back as the early philosophical inquiries into emotion the more modern branch of computer science originated with Rosalind Picard’s1995 paper on "affective computing". A motivation for the research is the ability to simulate empathy, where the machine would be able to interpret human *emotions and adapts its behavior to give an appropriate response to those emotions.*

III.APPLICATIONS OF AI

One main factor that influences the ability for a driver-less automobile to function is mapping. In general, the vehicle would be pre-programmed with a map of the area being driven. This map would include data on the approximations of street light and curb heights in order for the vehicle to be aware of its surroundings. However, Google has been working on an algorithm with the purpose of eliminating the need for pre-programmed maps and instead, creating a device that would be able to adjust to a variety of new surroundings. Some self-driving cars are not equipped with steering wheels or brakes, so there has also been research focused on creating an algorithm that is capable of maintaining a safe environment for the passengers in the vehicle through awareness of speed and driving conditions.

Another factor that is influencing the ability for a driver-less automobile is the safety of the passenger. To make a driver-less automobile, engineers must program it to handle high risk situations. These situations could include a head on collision with pedestrians. The car's main goal should be to make a decision that would avoid hitting the pedestrians and saving the passengers in the car. But there is a possibility the car would need to make a decision that would put someone in danger. In other words, the car would need to decide to save the pedestrians or the passengers. The programing of the car in these situations is crucial to a successful driver-less automobile.

IV.BIOCONTROLSYSTEM

The biocontrol system integrates signals from various other systems and compares them with originals in the database. It comprises of the following systems:

- Brain-computer interface
- Automatic security system
- Automatic navigation system

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1)BRAIN COMPUTER INTERFACE

Brain-computer interfaces will increase acceptance by offering customized, intelligent help and training, especially for the non-expert user. Development of such a flexible interface paradigm raises several challenges in the areas of machine perception and automatic explanation. The teams doing research in this field have developed a single-position, brain-controlled switch that responds to specific patterns detected in spatiotemporal electroencephalograms (EEG) measured from the human scalp. We refer to this initial design as the Low-Frequency.

The EEG is then filtered and run through a fast Fourier transform before being displayed as a three-dimensional graphic. The data can then be piped into MIDI compatible music programs. Furthermore, MIDI can be adjusted to control other external processes, such as robotics. The experimental control system is configured for the particular task being used in the evaluation. Real Time Workshop generates all the control programs from Simulink models and C/C++ using MS Visual C++ 6.0. Analysis of data is mostly done within Mat lab environment.

V. AUTOMATIC SECURITY SYSTEM

The EEG of the driver is monitored continually. When it drops less than 4 Hz then the driver is in an unstable state. A message is given to the driver for confirmation and waits for sometime, to continue the drive. A confirmed reply activates the program for automatic drive .If the driver is doesn’t give reply then the computer prompts the driver for the destination before the drive.

VI. AUTOMATIC NAVIGATIONSYSTEM

As the computer is based on artificial intelligence it automatically monitors every route the car travels and stores it in its map database for future use .The map database is analyzed and the shortest route to the destination is chosen. With traffic monitoring system provided by satellite radio the computer drives the car automatically. Video and anti collision sensors mainly assist this drive by providing continuous live feed of the environment up to 180 m, which is sufficient for the purpose.

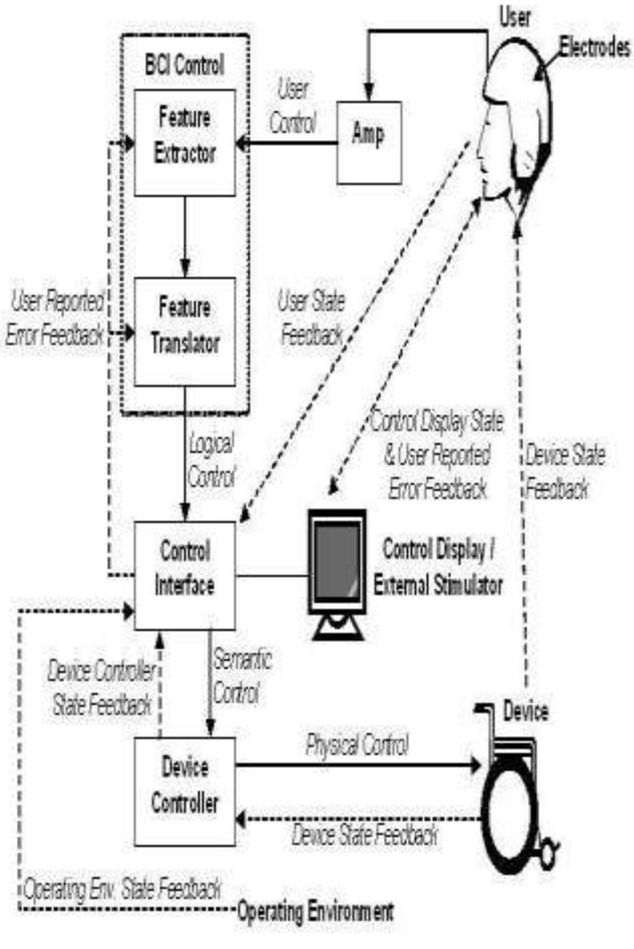

FIG 1. BLOCK DIAGRAM

VII. ELECTROENCEPHALOGRAPHY

In conventional scalp EEG, the recording is obtained by placing electrodes on the scalp with a conductive gel or paste, usually after preparing the scalp area by light abrasion to reduce impedance due to dead skin cells. Many systems typically use electrodes, each of which is attached to an individual wire. Some systems use caps or nets into which electrodes are embedded; this is particularly common when high-density arrays of electrodes are needed.

Electrode locations and names are specified by the International 10–20 system for most clinical and research applications (except when high-density arrays are used). This system ensures that the naming of electrodes is consistent across laboratories. In most clinical applications, 19 recording electrodes (plus ground and system reference) are used.[38] A smaller number of electrodes are typically used when recording EEG from neonates. Additional electrodes can be added to the standard set-up when a clinical or research application demands increased spatial resolution for a particular area of the brain. High-density arrays (typically via cap or net) can contain up to 256 electrodes more-or-less evenly spaced around the scalp. The EEG signals can be captured with opensource hardware such as OpenBCI and the signal can be processed by freely available EEG software such as EEGLAB or the Neurophysiological Biomarker Toolbox.

As part of an evaluation for epilepsy surgery, it may be necessary to insert electrodes near the surface of the brain, under the surface of the dura mater. This is accomplished via burr hole or craniotomy. This is referred to

variously as "electrocorticography (ECoG)", "intracranial EEG (I-EEG)" or "subdural EEG (SD-EEG)". Depth electrodes may also be placed into brain structures, such as the amygdala or hippocampus, structures, which are common epileptic foci and may not be "seen" clearly by scalp EEG. The electrocorticographic signal is processed in the same manner as digital scalp EEG (above), with a couple of caveats. ECoG is typically recorded at higher sampling rates than scalp EEG because of the requirements of Nyquist theorem—the subdural signal is composed of a higher predominance of higher frequency components. Also, many of the artifacts that affect scalp EEG do not impact ECoG, and therefore display filtering is often not needed.
A typical adult human EEG signal is about 10 µV to 100 µV in amplitude when measured from the scalp and is about 10–20 mV when measured from subdural electrodes.
Since an EEG voltage signal represents a difference between the voltages at two electrodes, the display of the EEG for the reading encephalographer may be set up in one of several ways. The representation of the EEG channels is referred to as a montage.

Sequential montage

Each channel (i.e., waveform) represents the difference between two adjacent electrodes. The entire montage consists of a series of these channels. For example, the channel "Fp1-F3" represents the difference in voltage between the Fp1 electrode and the F3 electrode. The next channel in the montage, "F3-C3", represents the voltage difference between F3 and C3, and so on through the entire array of electrodes.

Referential montage

Each channel represents the difference between a certain electrode and a designated reference electrode. There is no standard position for this reference; it is, however, at a different position than the "recording" electrodes. Midline positions are often used because they do not amplify the signal in one hemisphere vs. the other. Another popular reference is "linked ears", which is a physical or mathematical average of electrodes attached to both earlobes or mastoids.

Average reference montage

The outputs of all of the amplifiers are summed and averaged, and this averaged signal is used as the common reference for each channel.

Laplacian montage

Each channel represents the difference between an electrode and a weighted average of the surrounding electrodes.

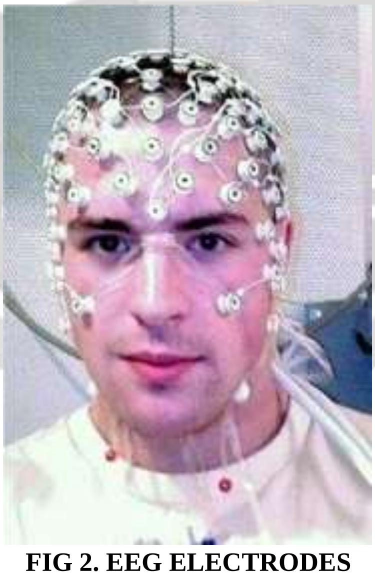

FIG 2. EEG ELECTRODES

VIII.CONCLUSION

This is an era of technology and artificial intelligence is going to conquer the globe in the years to come.With a few modifications to the existing system and an unanimous support from the government and the society , this project can be used to serve the disabled in greter ways and bring about a revolutionary change in the society .Thus the integration of bioelectronics with the automatic system is going to be the hour of the need for all futuristic vechicles.

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