



BRAIN CONTROLLED CAR FOR DISABLED USING ARTIFICIAL INTELLIGENCE

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1. ABSTRACT

This paper considers the development of a brain driven car, which would be of great help to the physically disabled people. Since these cars will rely only on what the individual is thinking they will hence not require any physical movement on the part of the individual. The car integrates signals from a variety of sensors like video, weather monitor, anticollision etc. it also has an automatic navigation system in case of emergency. The car works on the asynchronous mechanism of artificial intelligence. It's a great advance of technology which will make the disabled,

able. In the 40s and 50s, a number of researchers explored the connection between neurology, information theory, and cybernetics. Some of them electronic networks to exhibit rudimentary intelligence, such as W. Grey Walter's turtles and the Johns Hopkins Beast. Most researchers hope that their work will eventually be incorporated into a machine with general intelligence (known as strong AI), combining all the skills above and exceeding human abilities at most or all of them. A few believe that anthropomorphic features like artificial consciousness or an artificial brain may be required for such a project.



2. INTRODUCTION

The video and thermo gram analyzer continuously monitor activities outside the car.

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

anorganic 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 thermo graphic 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 thermo graphic 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 EEG (electroencephalogram) helmet, attached to the top of the seat, is lowered and suitably



placed on the driver's 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.

3. BIOCONTROL SYSTEM

The bio control 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

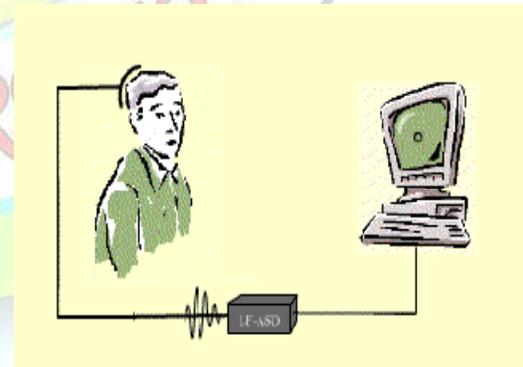
Now let us discuss each system in detail.

3.1. 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.

Asynchronous Switch Design (LF-ASD)



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.

Full image capture and playback control; configurable; user



Fig. 2: EEG Transmission

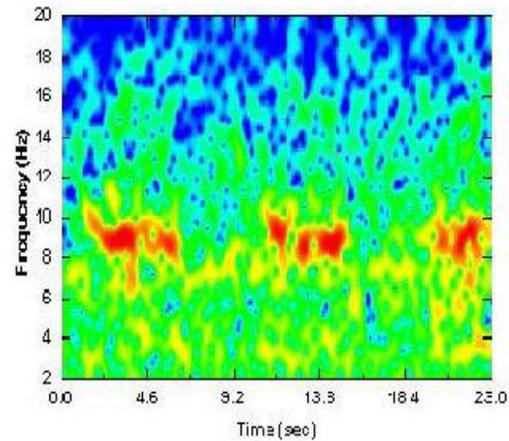


Fig. 3 EEG

3.1.1. TEST RESULTS COMPARING DRIVER ACCURACY WITH/WITHOUT BCI

1. Able-bodied subjects using imaginary movements could attain equal or better control accuracies than able-bodied subjects using real movements.
2. Subjects demonstrated activation accuracies in the range of 70-82% with false activations below 2%.
3. Accuracies using actual finger movements were observed in the range 36-83%
4. The average classification accuracy of imaginary movements was over 99%.

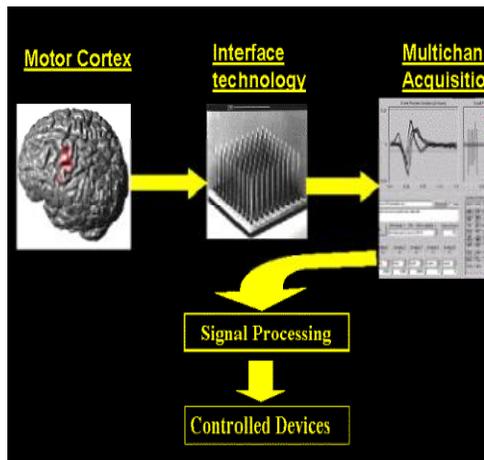


Fig.4 Brain-to- Machine

Mechanism The principle behind the whole mechanism is that the impulse of the human brain can be tracked and even decoded. The Low-Frequency Asynchronous Switch Design traces the motor neurons in the brain. When the driver attempts for a physical movement, he/she sends an impulse to the motor neuron. These motor neurons carry the signal to the physical components such as hands or legs. Hence we decode the message at the motor neuron to obtain maximum accuracy. By observing the sensory neurons we can monitor the eye movement of the driver.

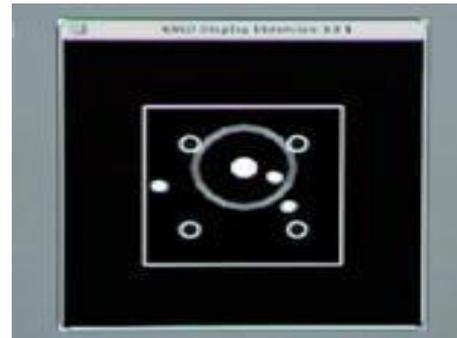


Fig.5 Eyeball Tracking

As the eye moves, the cursor on the screen also moves and is also brightened when the driver concentrates on one particular point in his environment. The sensors, which are placed at the front and rear ends of the car, send a live feedback of the environment to the computer. The steering wheel is turned through a specific angle by electromechanical actuators. The angle of turn is calibrated from the distance moved by the dot on the screen.

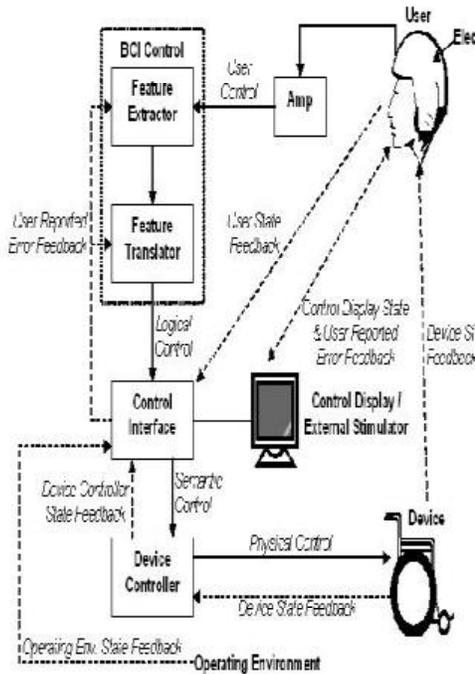


Fig.6 Electromechanical Control Unit



Fig.7 Sensors and Their Range

3.2. 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.

3.3. AUTOMATIC NAVIGATION SYSTEM

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 xmsatellite radio the computer drives the car automatically. Video and anticollision sensors mainly assist this drive by providing continuous live feed of the environment up to 180 m, which is sufficient for the purpose.

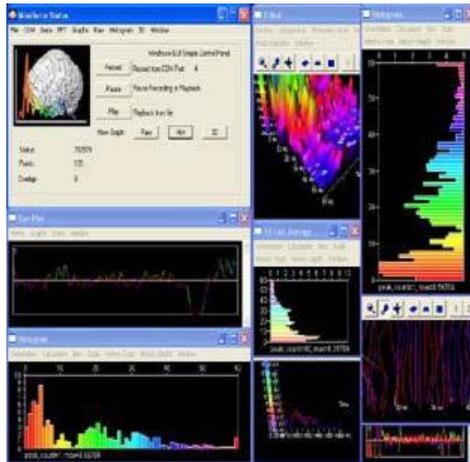


Fig.8 EEG Analysis Window

4. CONCLUSION

When the above requirements are satisfied and if this can become cost effective then we shall witness a revolutionary change in the society where the demarcation between the able and the disabled vanishes. Thus the integration of bioelectronics with automotive systems is essential to develop efficient and futuristic vehicles, which shall be witnessed soon helping the disabled in every manner in the field of transportation.

5. REFERENCE

1. seminarprojects.com/Thread-braincontrolled-car-for-disabled.
2. www.google.com
3. www.wikipedia.com