HOME ASSISTANT USING ARTIFICIAL INTELLIGENCE

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ABSTRACT
Artificial Intelligence (AI) is a field that has a long history but is still constantly growing and changing. AI is bifurcated into many sub-divisions and this paper deals with a small part of the AI technology. This paper mainly deals with brain-driven technology and its control of an individual's house. "Home Assistant" would majorly help the physically disabled and eventually make them able to their own work. This paper relies on an individual's own thought process and it will not require any physical work from an individual's side. This paper elaborates a system which integrates a variety of signals and sensors like image sensors, video sensors etc. It has an automated caller ID system in case of any emergency cases. This system works on the principle of asynchronous mechanism of AI. Advancement in this sector of technology will be a giant leap forward in the science world, which would make the disabled, able.

Keywords:- *Artificial Intelligence (AI), Brain-Computer Interface (BCI), EEG, Bio Control System, Spatiotemporal Electroencephalograms Etc.*

INTRODUCTION

The idea of AI emerged when human beings felt the need of actually building a machine which will reduce the human effort and would be able to perform human tasks automatically with the help of logic and useful reasoning. This idea was portrayed by Ramon Llull (1300CE). Gottfried Leibniz further extended the concept of calculating machines with the invention of Calculus Rationator. The field of AI research was founded at a conference at Dartmouth College in 1956. The attendees included John McCarthy, Marvin Minsky, Allen Newell, Arthur Samuel and Herbert Simon who became the leaders of AI research [1]. John McCarthy, the father of AI, defined AI as "The science and engineering of making intelligent machines, especially intelligent computer programs" [2]. AI primarily uses a brain-computer interface (BCI), also known as direct neutral interface. BCI is defined as a direct communication pathway between a human or animal brain and an external device. AI has many applications in various sectors of science and technology such as Gaming, Expert Systems, Vision Systems, and Speech Recognition etc. [2] Like every debated research topic in science, AI has its advantages as well as its disadvantages.

Problem Identification
Existing Problem
It has been observed that the current procedure of helping a disabled person is tedious and manual. The disabled person requires assistance from other human beings or they are machine-dependent. Here we try to solve this problem by introducing the topic of "Home Assistant" which would be an amalgamation of various principles such as Artificial Intelligence (AI), Software and Hardware Technologies.

METHODOLOGY
The approach towards building an AI based "Home Assistant" system includes many components which are as following:

1. Bio control System.
2. Brain-Computer Interface.
3. Automatic Security System.
4. Automatic Calling System.

Bio Control System
The Bio Control system integrates signals from various systems and compares them with originals in the Database.
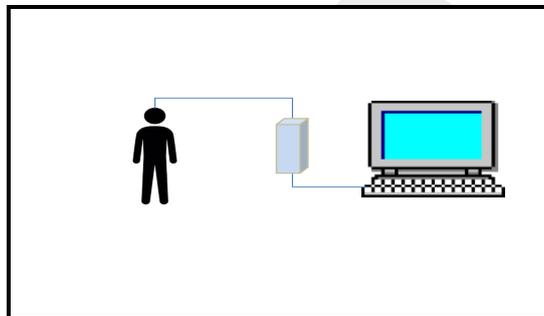
Fig 1: Bio-control system

Brain-Computer Interface
BCI is a communication pathway between humans or animals and an external device[6]. BCI will increase acceptance by offering customized, intelligent help and training to all its users. The research team in this field has developed a single-position, brain-controlled switch that responds to specific patterns detected in spatiotemporal electroencephalograms (EEG) measured from the human scalp. In one-way BCIs the computer system either will accept the command from the brain or send signals to it, but it cannot perform both the functions simultaneously. Two-way BCIs allows the brain and external devices to exchange information in both the directions. Two-way BCIs are yet to be successfully implemented in Humans or Animals.
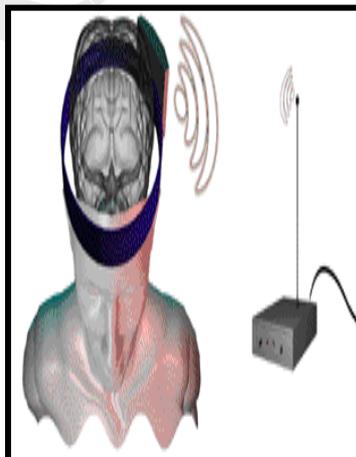

Fig 2: Electroencephalography (EEG)

Electroencephalography (EEG) is an electrophysiological monitoring technique which records the electrical activity of the human brain. EEG records the brain's spontaneous electrical activity over a certain period of time by placing several number of electrodes on the human scalp[3].

In Electroencephalography, the brain activity is recorded by capturing certain patterns formed in the human scalp. The nerve cells primarily use electricity to transmit information[4].

EEG is a very useful and powerful tool which tracks the brain activity changes during the various different phases of life[5].
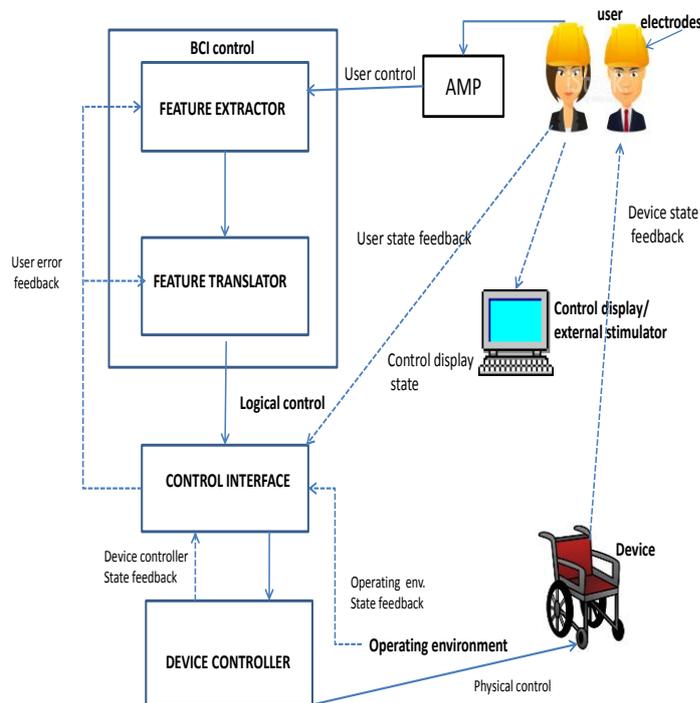
Fig 3: Electromechanical control unit

Electromechanical control unit: Operating environment used in home assistant system to aid the disabled person by capturing the user's brain activity.

Automatic Security System

The Automatic Security System starts playing its role in Home Assistant system when the disabled person reaches near the entrance door of the House. The security system in the house will be activated immediately. The images as well as the thermo graphic results of an individual are entered into the Database of the computer. If the entered image matches with the existing Database entries then the security system advances to the next stage. Now the thermo graphic image verification is done with the help of the Database. Once an individual passes this stage, the entrance door is unlocked. As soon as the person gets inside the house, the EEG headset attached to the top of the door is lowered and then it is suitably placed on the person's head. The person enters the house and then the door is closed immediately. A wide screen of the computer is placed in the living room and all the other rooms for monitoring. Each program in Home Assistant can be controlled either directly by a mouse or by voice recognition.

Automatic Calling System

The EEG of the person is monitored continually. When it drops less than 4 Hz then the person is in an unstable state. A message is sent to the emergency contacts that had been already saved into the database of the system. A confirmed reply by the emergency contact activates the program for restoring the security system. If the person does not reply then the computer prompts the emergency contact to come to the disabled person's house for their rescue.

EXPECTED OUTCOMES

Provides more security:- Home assistant system would provide more safety and security to the disabled person's home.

Less time consuming:- The suggested system would consume less time.

More efficiency:- The proposed system is very effective and efficient in its mechanism.

Fewer machines dependent:- The proposed system is dependent on only few machines.

No human effort:- As the home assistant system is dependent on only few machines, so no human effort is required.

CONCLUSION

Home assistant is a technology that would aid and abet the physically handicapped and actually provide read time solutions to their problems. The physically handicapped would not be dependent on any other person's mercy and will be self sufficient. Home assistant integrated with artificial intelligence can save and secure the future of the disabled people. Today's science and technology sector integrated with AI is the way to move forward to a more advanced future.

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