SMART CONTROLLED ELECTRONIC DEVICES USING BRAIN FUNCTIONAL CONDUCTIVITY

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Abstract--Envision a future where everything can be controlled with simply our brain. With the development of humankind on the utilization of various electronic gadgets in everyday life, man needs to have simple dealing with to these electronic gadgets and most straightforward one is the conceivable mind wave command to electronic devices. As the technology getting advances mode of interacting with the electronic devices also getting advancement day by day. Beginning with a mechanical switch based controlling of electronic devices got IoT based wireless controlling facility. The currently proposed method is making the provision of controlling of devices just with a thought in the brain. We will be having an EEG sensor mounted on the head to capture the signal which in turn processed and used for triggering the relay to control the device.

1. Introduction

A. Brain-computer interface

A brain computer interface (BCI), now and then called a mind-machine interface (MMI), direct neural interface (DNI), or brain–machine interface (BMI), is an immediate correspondence pathway between an improved or wired brain and an external gadget. Brain computer interface is coordinated effort between a mind and an electronic gadget that empowers signals from the brain to guide some outer action, for example, control of a cursor or a prosthetic appendage. At the point when neurons in the brain communicate by means of chemical reactions, quantifiable flows called mind waves are made. According to the classification of brainwave patterns we have four types namely theta, beta, alpha and delta and these patterns are detected and explicated and sent to the device to control it. This interface would enable a direct communication between brain and controlled device. There are four main types of brainwave patterns which are created from different types of brain lobes which are hippocampus and frontal lobes which are responsible for different brainwaves which are sleep and other sleep related things. These will be recognized and comprehended and signals sent to gadgets with no physical association with oversee them. The interface allows a prompt interchanges between the brainwave and furthermore the pathway between the mind and furthermore the article to be controlled. BCI (brain–computer interface) has been a favourite of sci-fi movies because of their elusive nature of them. However, some early BCI products are already for sale which measure part of the brain functions of the brain. These products are unrefined, uncertain and some of the time frustratingly non-responsive—that is the manner in which it keeps running with EEG-based headsets, which get only the faintest electroencephalographic echoes of neural activity through the skull and therefore, these are not reliable and hence, these are not made to record human brain waves more accurately. To achieve this, we chose that the least intrusive technique for estimating brain waves would utilize electroencephalography (EEG) to record micro volt-range potential varieties crosswise over areas on the client’s scalp and hence the question of accuracy and effectiveness is solved. The Electroencephalogram signal itself has many parts separated by frequency. Theta waves happen between the 4-8 Hz recurrence bands all through reflection, or temporary state and these states could be easily measured by our device. Alpha waves have
recurrence differ 8-14 Hz and happen while unwinding or reflecting and these alpha waves also occur when there is a sleep induced. Another way to boost alpha waves is to shut the eyes and calm down and rest ourselves. Beta waves live inside the 13-30 Hz frequency band and are normal for the client being caution or dynamic and when the user is most active within the conscious part of the brain. They become present while the client is concentrating. Gamma waves inside the 8-13 Hz recurrence differs while engine neurons are very still. Mu concealment happens when the client envisions moving or truly moves body parts. Two methods that imperative the nature and applications of BCI. In that the primary one is to concentrate on a specific thing or instance. For a common example, the letters initiate occasion in P300s was clearly explained about the EEG of its composing of its letters and alphabet from a progression of choices by a variety of letters by the emission of EEG Signals from the perpetual engine from the BCI

B. INTERNET OF THINGS (IOT)

Now days the internet of things (IOT) is using in every aspect of technology, industry, home lines and engineering areas. This has become new invention based area in popular media. This technology has been consolidated in a wide range of network, sensor systems etc., which can be used in many fields like power computing, electronics miniaturization, and network interconnections to made new inventions. Many conferences, reports and news articles publish make discussions and debates on the prospective impact of the "IOT revolution". IOT is using to concerns about security, privacy, and technical make-use such as data exchange.

The large scale of IOT is to make changes in many aspects of human life. New IOT products like internet connected devices and appliances, automatic system in homes are leading us to a vision of the "SMART HOME", which leads to save more energy efficiency and security. The IOT is a rising subject of social, monetary hugeness and specialized. Buyer items, modern and utility parts, vehicles and trucks, sensors, shopper products, and other ordinary objects are being joined with amazing information diagnostic abilities that guarantee to change the manner in which we need to work, live, and play and Internet network. IOT is also using to build other personal devices like fitness band and health monitoring devices. These also help in network switched medical devices which are transforming the way of human health care services.

This kind of devices improves the usage for people with disabilities and the elderly through this technology we can improve quality of life and level of independence at low cost. IOT system in vehicles, traffic signals and roads (sensors embedded) and bridges makes city smarter, which helps to decrease energy consumption. This technology even had great scope in agriculture, industry, production and distribution of energy by increasing the awareness about the esteem chain of generation. Notwithstanding, IoT raises various issues and incites that ought to be considered and kept an eye on all together for potential points of interest to be made sense of it. Projections for the impact of IoT on the Internet and economy are spectacular, with some foreseeing upwards of hundred billion related IoT contraptions and a worldwide monetary impact of more than $11 trillion by 2025.

2. NODE MCU BOARD

The NodeMCU (Node Microcontroller Unit) is an open source programming equipment improvement condition that is worked around a reasonable System-on-a-Chip (SoC) called the Esp8266. The Esp8266, planned and produced by Express if Systems, contains all the essential components of the cutting edge PC: CPU, RAM, organizing (Wi-Fi), and even an advanced working framework and SDK.

The NodeMCU venture intends to improve ESP8266 advancement. It has two key segments.

An open source ESP8266 firmware that is based over the chip producer's restrictive SDK. The firmware gives a straightforward programming condition dependent on eLua (embeddedLua).
This whole process is divided into 4 steps. They are
1. Arrangement of sensor
2. Conversion to EEG transmitter
3. EEG data to Android application
4. Working of the IOT module

A. Arrangement of sensor:

It was even called as signal acquisition method. In this placement of sensor we require 3 sensors C1, C2, C3. They are placed on the forehead to help the EEG transmitter to collect its require data. These sensors are directly in contact with band and at the same time they are directly contact with the forehead where every human being concentration calculates.

B. Conversion to EEG transmitter:

This is the step that mainly functions with the EEG Transmitter and the sensors placed. The data received from the Sensor is collected and been calculated by the EEG device connected. And this data is being translated in the EEG form of evaluation of a person in his various moods like sleeping, meditating, etc....But then all this moods we only extract the level of concentration of a person connected to the sensor.

C. EEG data to Android application:

It has a two types of connection enabled inside this step. In that one is the developed Android application is connected to the EEG sensor via Bluetooth. And the second one is this Android application is connected to the Wi-Fi that was emitted by the IoT module.

In this step we create the bridge between through our EEG sensor and IOT Module. The data collected is transferred into numerical and be shown to us in the android application. It even enabled to show the all the moods of the person at his different times of mood swings in his daily life.
D. Working of the IOT module:

In this step the IoT module acts as the main role. The data received through the Bluetooth of EEG device is shown in android application as said. And from Android application the data is transferred to the IoT module through Wi-Fi. Here it only works 2 conditions

a) The data shown is above 50 of the concentration level in the device, then the IoT module instructs to ON the light.

b) If the data from the concentrating levels of the connected device decreases 50, then the IoT module instructs directly to switch OFF the light

All these conditions are expected then the time we think in a fraction of seconds can control the device.

3. Android Application

After the process of Sensor placement and Feature extraction of the EEG recorded by the brain module is transferred from the brain EEG module to the Android application (EEG Signal Calculation) via Bluetooth or Wi-Fi. The Signal recorded is calculated automatically and sends back the recorded values to the EEG module. If the recorded is up to the mark, the light will on automatically.

4. Conclusion

A Brain Computer Interface (BCI) develops a very new way of connection for Brain of a person with the artificial intelligence. It creates a major link between a critical thinking of a person. These are also responsible for the reading of cognitive research which is for reading the mental state of human mind. An Evolution of new type of world, where we can control all the things with just concentrating on it with our mind words. It is a counterfeit framework that sidesteps the body's ordinary effective pathways, which are the neuromuscular yield channels. Diverse mind states are the consequence of various examples of neural association. These examples lead to waves portrayed by various amplitudes and frequencies. This neural collaboration is finished with different neurons. Each cooperation between neurons makes a microscopic electrical release. This task manages the signs from brain. Diverse brain states are the aftereffect of various examples of neural connection. These examples lead to waves described by various amplitudes and frequencies. The flag created by brain was gotten by the mind sensor and it will separate into parcels and the bundle information transmitted to remote medium (blue tooth), the wave estimating unit will get the brain wave crude information and it will change over into flag utilizing android code. At that point the guidelines will send the home area to work the modules (globule, fan). The undertaking worked with human mind supposition and the ON/OFF state of home machine depends on changing the muscle development with simply focusing on the gadget.

5. References

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