

Time to Change the World around You “Intellectual Controller

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Abstract: — Brain computer interface is a system that allows direct communication between a computer and a human brain, bypassing the body’s normal neuromuscular pathways. Instead of depending on peripheral nerves and muscles, a Brain computer interface directly measures brain activity associated with the user’s intent and translates the recorded brain activity into corresponding control signals for certain applications. The signals recorded by the system are processed and classified to recognize the intent of the user. Though the main application for Intellectual controller is in rehabilitation of disabled people, they are increasingly being used in other application scenarios as well. One such application is physically disabled person can able to control the home appliances (I.e home automation) and can access of computer.

Independent mobility is core to being able to perform activities of daily living by oneself. Millions of physically challenged people are their around of us, for some people they can manage the things without getting third person help and there are some people for those people third person is necessary to complete the work. Here our aim is to reduce getting third person help to complete the desired work.

In this project we have developed a cost effective INTELLECTUAL CONTROLLER that will help the physically challenged to lead an independent life with the help of their brain signals using non-invasive techniques.

Index Terms— Mind wave device, Brain waves, Bluetooth, Application, Zigbee, Raspberry Pi2, Relay Board

I. INTRODUCTION

The human brain is made up of billions of interconnected neurons, the patterns of interaction between these neurons are represented as thoughts and emotional states. Every interaction between neurons creates a minuscule electrical discharge; alone these charges are impossible to measure from outside the skull. However, the activity created by hundreds of thousands concurrent discharges aggregates into waves which can be measured.

Different brain states are the result of different patterns of neural interaction. These patterns lead to waves characterized by different amplitudes and frequencies; for example waves between 12 and 30 hertz, Beta Waves, are associated with concentration while waves between 8 and 12 hertz, Alpha Waves, are associated with relaxation and a state of mental calm. (The contraction of muscles is also associated with unique wave patterns, isolating these patterns is how some Neuro-Sky devices detect blinks.)

All electrical activity produces these waves (even light bulbs), thus all electrical devices create some level of ambient noise this noise interferes with the waves emanating from the brain, and this is why most EEG devices will pick

up readings even if they are not on a person’s head. Measuring mental activity through these waves is like trying to eavesdrop on a conversation at a loud concert. In the past, EEG devices circumvented this problem by measuring these signals in environments where electrical activity is strictly controlled and increasing the signal strength of the data coming from the brain through the application of a conductive solution.

With this application we can easily find out the necessary action should be performed by the user automatically with the help of mind wave sensor and we can give input or command to the particular application or devices to do specific task.

II. PROPOSED DESIGN

In order to make disabled person’s life more independent and easier and to provide cost effective product the following design is proposed Fig.I, which shows this project mainly consists of parts namely Mind wave device with EEG sensors, Raspberry Pi2 with Zigbee Module, Relay Board

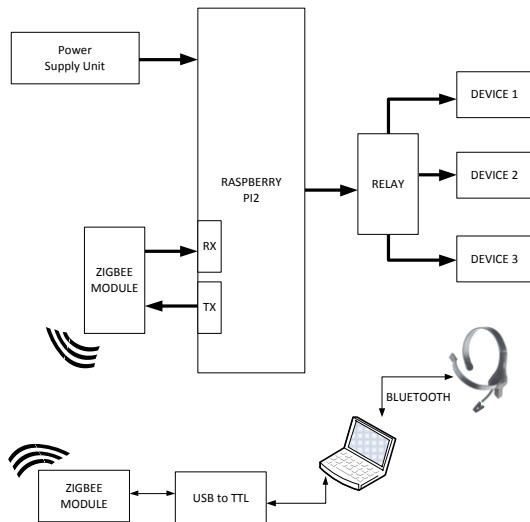


Fig 1. Block Diagram of Intellectual Controller

A. Mind wave Device:

In order to capture brain waves from a human brain we use this mind wave device. Human brain produces 3 types of waves such as Alpha, Beta, Gamma. Where Mind wave device uses EEG sensors in order to capture these brain waves. Mind wave sensors are used in order to detect these signals and send to our system through Bluetooth. There are three modes of operations used those are Meditation, Attention and Eye Blinking. In this device we use Think Gear technology to initialize connection and data transfer between the mind wave and the computer. Think Gear technology of the neurosky can determine the value of concentration and attention. Here EEG sensors are used collect electrical signals but not the actual thoughts to translate brain activity into action. As in whole, Mind wave device is used to capture the brain waves and translate into the electrical signals and provide it to the system through Bluetooth where these brain waves are depicted using the waveform on the system in order to show the captured data, this depiction is done using C# programming language. In this we are developing an application in the system to showcase the mouse interactions in the system using mind wave device. Captured brain waves can perform eight operations, where in this project we are using seven operations in order to control the self built application on the system to show the working of the computer mouse.

B. Raspberry Pi2:

This Raspberry Pi2 is used to accept the brain wave signals as input in order to control different electronic based devices. Here we are using Zigbee Module. Zigbee is mainly used for wireless transmission in order to transfer the signals to the Raspberry Pi2 in order to control different electronic based devices. Zigbee is mainly used in low data rate applications that require long battery life and secure networking. Zigbee can be operated in the range of 600-800 meters. A 5V of power supply is connected to Raspberry Pi2. Raspberry Pi2 is used to accept the signals through zigbee module to control the devices. The output of the application that is developed in the system is also displayed on the Raspberry Pi2 display using waveforms which is designed using Qt programming on an Embedded Linux platform.

C. Relay Board:

An Relay is an electrically operated switch which uses electro magnet to mechanically operate the switch. Relays are used when a circuit has to be controlled by low power signal. This relay board is used in the project to control the electronic devices. Where Raspberry Pi2 is connected to relay board using connecting wires which transfers the control signals from Raspberry Pi2 to electronic devices. This relay board consists of three points indicating power unit of 5V, input unit to accept signals and ground.

III. WORKING PRINCIPLE

In our project we are using Raspberry Pi2 module as intellectual controller, to control the home appliances. The Raspberry Pi2 model has Broadcom BCM2836 Arm7 Quad Core Processor powered Single Board Computer and it runs at 900MHz, it has 1GB RAM so you can now run bigger and more powerful applications, and it has 40 GPIO pins to interact with real time world.

The first step is to provide communication between MINDWAVE sensor and Raspberry Pi2, first step we are going to read the raw data from mind wave sensor, the mind wave will be connected to the laptop using the Bluetooth connectivity. We read the data from sensor to segregate the readings where written code is in C#, here we are keeping some reference values based on the reference value we are going to perform the action, these actions are of two type,

one is we can control the device and other one is we can access the things in computer.

For to control the device we need communicate with the raspberry pi2 module, so We are using ZigBee module establish connection between Raspberry and the laptop which is connected with mind wave sensor. The ZigBee uses the RF transmission to communicate with one device to other device. This ZigBee will works on UART protocol.

And in other case the person can access the computer for that we created an application and the code is written in C#, whenever the mind wave sensor value reaches reference value, then particular operation will be taken like Navigation and many more.

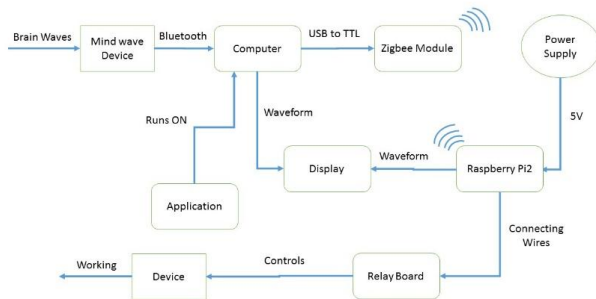


Fig II. Data Flow Diagram of Intellectual Controller

ADVANTAGES

- 1) Low design time.
- 2) Low production cost.
- 3) This system is applicable for both the indoor and outdoor environment.
- 4) Setting the destination is very easy.
- 5) It is dynamic system.
- 6) Less space.
- 7) Low power consumption.
- 8) Easy monitoring of appliances, instead of manual approach.
- 9) Easily portable

SCOPE OF THE WORK

- 1) More number operations can be performed
- 2) Keyboard interactions can be done
- 3) Work on distance using different technologies
- 4) Work on Authentication

IV. CONCLUSION

This project proposed the design and architecture of a new concept of Intellectual Controller for the physically disabled persons . A simple, cheap, configurable, easy to handle electronic guidance system is proposed to provide constructive assistant and support for disabled persons. The system will be efficient and unique in its capability in controlling the electronic based devices. With the proposed architecture, if constructed with at most accuracy, the disables will be able to lead their life independently.

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