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Smart Home Control with Brain and Computer Interface

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Introduction:

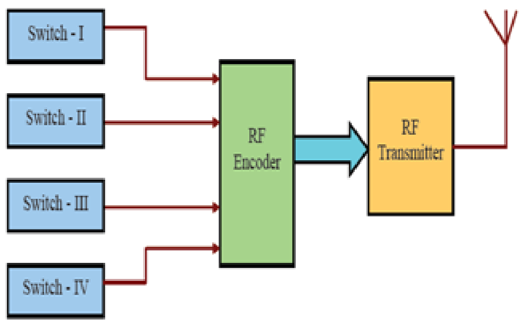
Paralysis is one amongst the major neural disorder that causes loss of motion of one or more muscles of the body, wherein depending on the cause, it may affect a specific muscle group or region of the body, or a larger area may be involved. In pursuit of rehabilitation, the eye can be regarded as one of the organs that can help a paralyzed person to communicate suitably. Eye movement can be used by the paralysis patients and armless persons to perform simple tasks.

Existing method:

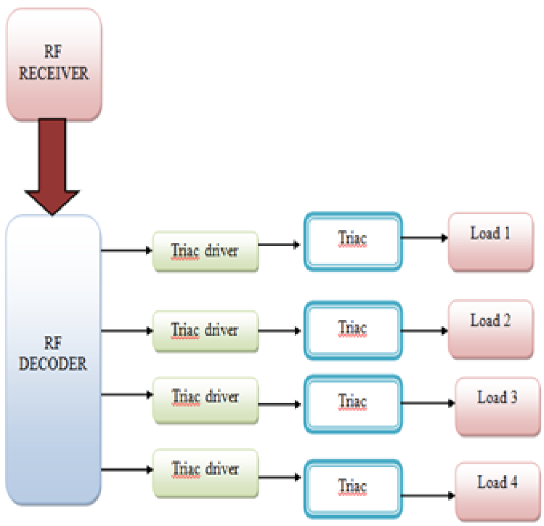
Controlling industrial / home appliances is a very interesting and useful project. This project is designed to control up to four electrical appliances. This project used popular RF encoder and decoder IC's. Four Switches are connected to the RF Encoder. This encoded data is transmitted through a RF transmitter module. In the receiver side, the RF receiver module receives the encoded data and decodes using an RF Decoder. This decoded output data is given to triac driver. Loads are driven through triacs. Up to 7A load can be connected to these loads.

Block diagram

TRANSMITTER



RECEIVER:



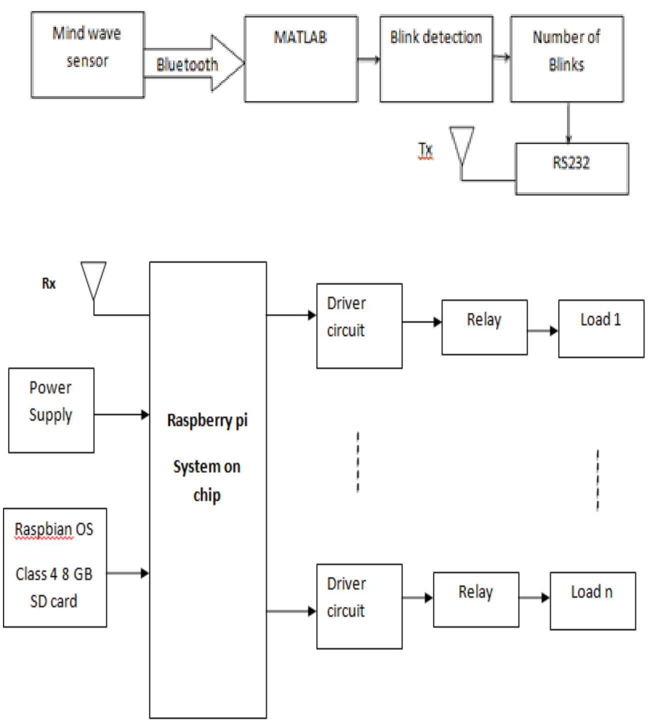
Draw backs

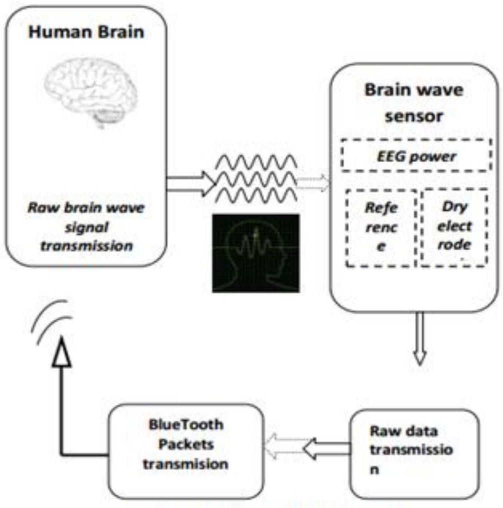
Few patients who are unable to move their hands cannot operate the loads through above mentioned procedure.

Proposed method

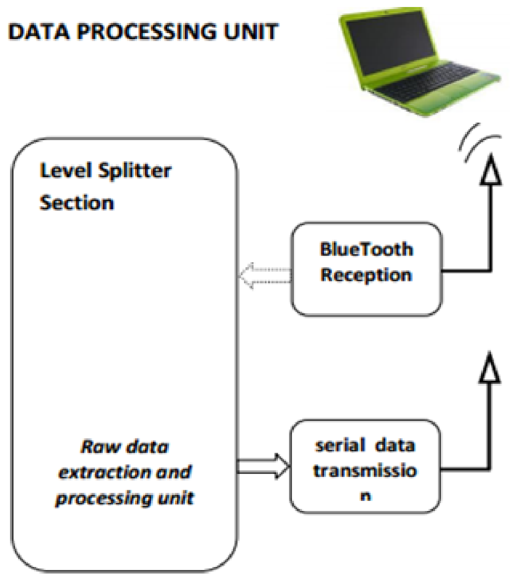
This project describes the acquisition and analysis of Eye blink signals for activation of home appliances for paralysis patients. The proposed method here uses a minimum number of electrodes for signal acquisition thereby reducing the occurrence of artifacts, further following a simple circuitry for implementation of signal conditioning which is also cost effective from the user point of view. The standing potentials in the eye can be estimated by measuring the voltage induced across a system of electrode placed middle the eyes as the eye-gaze changes, thus obtaining the blinks. And this blink signal can be used as an input for a MATLAB in PC and perform classification and interfacing to microcontroller in order to control home appliances through RS232.Here we are using Raspberry pi as heart of entire system.

Block Diagram:





Brain computer interface section



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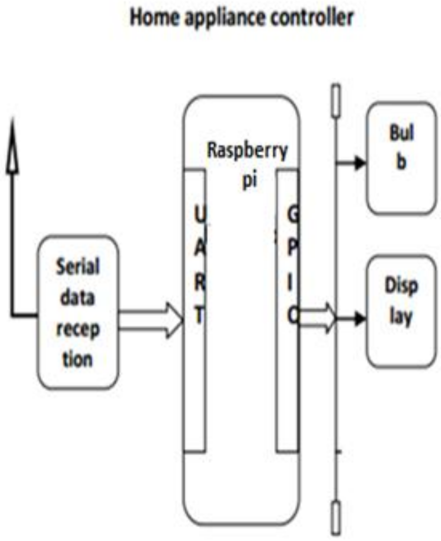
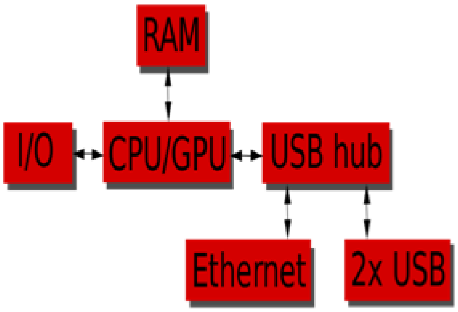


Raspberry Pi

The **Raspberry Pi** has a Broadcom **BCM2836** system on a chip (SoC), which includes an a quad-core Cortex-A7 cluster. The Cortex-A7 MP Core processor is a high-performance, low-power processor that implements the ARMv7-A architecture. The Cortex-A7 MPCore processor has one to four processors in a single multiprocessor device with a L1 cache subsystem, an optional integrated GIC, and an optional L2 cache controller.The Raspberry Pi foundation has finally released an upgraded version of the Raspberry Pi. Raspberry Pi 2 model B features much of the same ports and form factor as Raspberry Pi Model B+, by replaces Broadcom BCM2835 ARM11 processor @ 700 MHz with a much faster Broadcom BCM2836 quad core ARMv7 processor @ 900 MHz, and with an upgrade to 1GB RAM.

Basic Hardware of Raspberry-PI



OS used in Raspberry pi is Linux

Mind wave sensor (EEG)

Electroencephalography (EEG) is the recording of electrical activity along the scalp. EEG measures voltage fluctuations resulting from ionic current flows within the neurons of the brain. In clinical contexts, EEG refers to the recording of the brain's spontaneous electrical activity over a short period of time, usually 20–40 minutes, as recorded from multiple electrodes placed on the scalp. Diagnostic applications generally focus on the spectral content of EEG, that is, the type of neural oscillations that can be observed in EEG signals.

Coding will be done in python language

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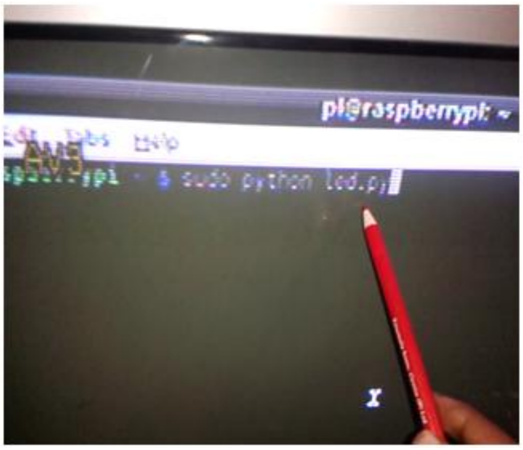

Advantages:

- Ease of operation
- Low maintenance cost
- Fit and forget system
- No wastage of time
- Durability
- Accuracy

Applications

- Hospitals
- Local monitoring applications
- Designed for Home and Clinical *Applications*

CONCLUSION

By using sensor, automation is being achieved. Experimental work is done carefully. This project is implemented using advanced microcontroller.

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