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Real Time Brain Wave Tracking System using EEG

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A B S T R A C T

The Brain waves tracking system is a meditation tool, as it claims to help you focus on meditation, while also monitoring your heart rate, brainwave activity or EEG, and breathing.

This paper aims to address the issue of learning mind visual portrayals and to comprehend neural procedures behind human visual discernment, with a view towards imitating the equivalent into machines. The primary goal of learning positive introductions is the utilization of human neural exercises evoked by regular pictures as an oversight system for profound learning models. The multimodal approach, utilizing profound encoders for pictures and EEGs, prepared in a Siamese arrangement, to plan a typical complex that builds the size of a similarity between visual highlights and mind portrayals. The outcome of the paper is expected to assist the speech impaired, who are deaf and dumb. The prototype device converts the pixels (image) to text and then to the audible format, which in turn will be used by the speech impaired persons to express their feelings to the normal persons.

Design and development of embedded controller for identifying the functionality of Brain waves for speech impaired persons will vastly improve their ability in leading a comfortable life.

Keywords: Stress; Older adults; Cognitive impairment, Wireless headband,

Introduction

Real-time monitoring of environmental disasters are one of the prime necessity of the world. Different technologies have been developed for this purpose. IOT is one of the major technology,that can be used for real-time monitoring. EEG has the capability of large scale deployment, low maintenance,

scalability, adaptability for different scenarios etc. WSN has its own limitation such as low memory, power, bandwidth etc. but its capability to be deployed in hostile environment, and requirement made it one of the best technology. for real-time monitoring. The EEG is a measurement of the electrical activity of the waves over time, captured and externally recorded as measured by skin electrodes. The signals indicate the overall rhythm of the heart and weaknesses in different parts of the heart muscle. This technique is the best way to measure and diagnose abnormal rhythms of the heart, and is commonly used in hospitals all over the world. It is also used in sports and military environments for advanced diagnostics of healthy individuals.

Stress has been linked to a plethora of emotional and physical conditions such as depression, anxiety, heart attacks, stroke, hypertension, and immune system disturbances that increase susceptibility to infections. Further, stress can exacerbate memory and thinking issues. This is particularly of concerns

for older Individuals who may have other medical concerns that affect memory and thinking. For example, older individuals often take multiple medications that may produce cognitive effects .Currently available biofeedback systems report that they can help patients reduce stress, anxiety headaches, high blood pressure, and other conditions where emotional and behavioral changes may be involved. Although biofeedback using portable mobile devices and apps has been used to treat chronic pain and improve agility, and other conditions like stress in older adults, they have not yet been explored for stress reduction in older adults. EEG systems are commonly used in medical and research fields for stress detection. Buying an EEG system involves huge effort and money as well. Now a daysthere are some wearable EEG headsets which are portable, have similar capabilities and are affordable. In this paper we would like to outline some of the wearable EEG headset available in the market that could be useful for the stress detection in older adults. These head set devices have EEG sensors that detect neurological activity and the data can be transferred to a smartphone via Bluetooth or wireless internet. With neurological activity the headset can detect attention, focus, engagement, interest, excitement, affinity, and relaxation and stress levels of the person. While there are several existing EEG headsets, in this investigation we have explored four EEG headset devices, Emotive Epoch, Emotive. insight, Interior Muse and EEG headset for their applicability in cognitive research

1.1 Problem Statement

The EEG signals are typically in the millivolt range, and are hence susceptible to large amounts of interference ,from a variety of sources. The interference sources can be divided into 3 distinct groups:

- Noise originating from sources external to the patient.
- Interference originating from the patient unwanted potentials.
- Interference originating from patient-electrode contact.

1.2 LITERATURE SURVEY

[1] Frehill .P, Chambers D, Rotariu C, "Using Zigbee to Integrate Medical Devices", Engineering in Medicine and Biology Society, 29th Annual International Conference of the IEEE. Aug. 2007. In this context they present how Zigbee meets the requirements for bandwidth, power, security and mobility. The data throughputs has been examined for various medical devices, the requirement of data frequency, security of patient data and the logistics of moving patients while connected to devices. This paper describes a new tested architecture that allows this data to be seamlessly integrated into a User Interface or Healthcare Information System (HIS). In

[2]. Lamei C, Mohamed S , Shakshuk M, Badreldin I , ElBab I , "A ZigBee-based tele cardiology system for remote healthcare service delivery)," IEEE Trans. 978-1-4244- 7000-6/11/$26.00 ©2011 IEEE. This paper describes the design and implementation of a tele cardiology system using Zig Bee. The proposed system will provide doctors with the ability to monitor, and diagnose their patients remotely over the Internet. This system is capable of receiving a serial stream of data and extracting relevant packets from the measurements of the patient's vital signs. The implemented software allows patients to easily connect with their doctors and to send their data via Internet. The ECG signal is monitored in a real-time mode with the ability of keeping records through SCP-ECG (Standard Communication Protocol) standard.

1.2 Relevant Theory (Existing System) :

Transforming Brain Signals Into Real-time Feedback:

Muse detects a range of brain electrical activity and transforms it into easily understandable experiences. The Muse app transforms raw brain signals into many different components - noise, oscillations, non-periodic characteristics, and transient and event-related brain events. Signal processing and machine learning techniques are applied to the brain signal components to control the experience in real time.

Muse is a state-of-the-art EEG system that uses advanced signal processing algorithms to train beginner and intermediate meditators at controlling their focus. Muse detects a range of brain electrical activity and transforms it into easily understandable experiences.

The Muse app decomposes raw brainwave signals into their component oscillations, non-periodic characteristics, transient brain events, and noise, and uses techniques developed through machine learning tomake the experience responsive, in real time.[9]

Active:

Wandering attention.

This is time spent with a distracted mind where attention was fluctuating**.**

Neutral:

Your mind in it is natural resting state.

Attention isn't fluctuating, but there is also no deep focus present.

Calm:

Deep restful focus on your breath.

These are moments when you've been fully focused on your breath..

System architecture (Proposed System)

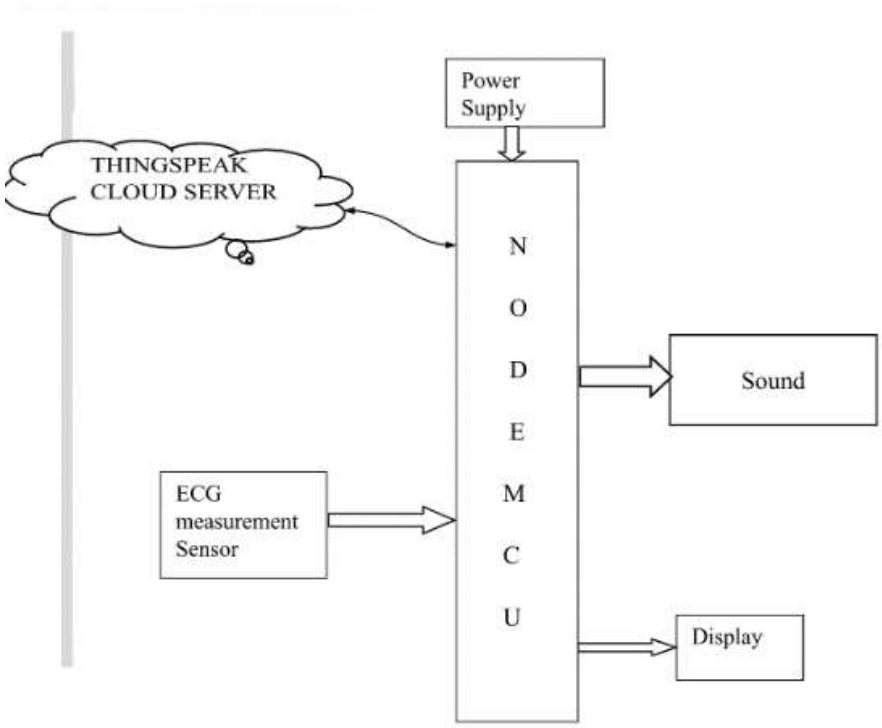

Fig. 1 - (a) Block Diagram

Working Of Proposed System

Brain-sensing headband that can give you real-time feedback on your brain activity using wearable EEG technology that is normally only found in laboratories. Together with the accompanying music app (which offers music), you can use headband for meditation and sleep tracking. The data captured by the device then provides actionable insights for improving your sleep and optimizing your meditation sessions. In addition to guided meditation, the app also offers dedicated sessions focused on the whole body, the mind, the heart and breath, and you can do them either with or without instructions. If you just want to meditate on your own in complete silence and without worrying about putting on your headband, you can do that too (using the app's timer function).[7]

The device will helps for:

- Reduces stress. More specifically, meditation can reduce the inflammation response caused by stress.
- Controls anxiety, especially in those who suffer from high levels of anxiety.
- Promotes emotional health, generates kindness, increases compassion and lessensthe symptoms of depression.
- Enhances self-awareness and reduces feelings of loneliness.
- Lengthens attention span because meditation literally trains you to focus and pay attention.
- Improves sleep by helping you stay asleep longer.

Conclusion

We implemented a device named as "Real time brain wave tracking system". Which is all about to tracking brain waves. These brainwaves later converted to find concentration level of patient and to increase concentration level. In this project, we use music to increase concentration. This device also helps to improve sleep.

References

[1] J. K. Kiecolt-Glaser, R. Glaser, S. Gravenstein, W. B. Malarkey, and J. Sheridan, "Chronic stress alters the immune response to influenza virus vaccine in older adults," Proceedings of the National Academy of Sciences, vol. 93, no. 7, pp. 3043–3047, 1996..

[2] F. G. Miskelly, "Assistive technology in elderly care," Age and ageing, vol. 30, no. 6, pp. 455–458, 2001

[3] N. Krause, "Social support, stress, and well-being among older adults," Journal of gerontology, vol. 41, no. 4, pp. 512–519, 1986.

[4] Emotiv EPOC Research Edition SDK. https://emotiv.com/store/sdk/eegbci/research-edition-sdk/[accessed 20.5.2011].

[5] http://neurogadget.com , " One of the first independent website dedicated to brain-computer-interfaces thought control application"

[6]http://gerontechnologyresource.blogspot.com

[7]http://www.medgadget.com/2012/10/new-wireless-eeg-system-formobile-brain-wave-monitoring-video.html

[9] http://www.choosemuse.com, "Muse headband which uses realtime bio feedback."

[10]http://www.medicalelectronicsdesign.com/article/flexible-eeg-headsetpermits-home-based-diagnosis-and-care