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A Survey Based on Smart Medical Diagnosis for Epilepsypeople

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ABSTRACT: An electroencephalogram (EEG) based brain-computer interface was connected with a Virtual Reality system in order to realize smart bio medical application. It offers an alternative to natural communication and control. It is an artificial system that bypasses the body's normal efficient pathways, which are the neuromuscular output channels. This work deals with the signals from brain.

KEYWORDS: Epilepsy, EEG, Brain potential, extraction, wireless communication

1. INTRODUCTION

At the root of all our thoughts, emotions and behaviors is the communication between neurons within our brains. Brainwaves are produced by synchronized electrical pulses from masses of neurons communicating with each other. Brain activity can be recorded either by measuring the Blood flow in the brain or by measuring the neurons' electrical activity. To the first category belong approaches like functional magnetic resonance imaging (fMRI), which measures the concentration of oxygenated and deoxygenated hemoglobin in response to magnetic fields; near-infrared spectroscopy (NIRS), which measures the concentration of oxygenated and deoxygenated hemoglobin by means of the reflection of infrared light by the brain cortex through the skull; positron emission tomography (PET), which measures neuron metabolism through the injection of a radioactive substance in the subject.Magnetoencephalography (MEG) is a functional neuro imaging technique for mapping brain activity by recording magnetic fields produced by electrical currents occurring naturally in the brain, using very sensitive magnetometers.

Electroencephalography (EEG), which is sensitive to the electrical field generated by the electric currents in the brain [8, 10, 14]. EEG recordings are acquired with portable and relatively inexpensive devices when compared to the other brain imaging techniques. Healthy human brain has its own intrinsic rhythms falling in the range of 0.5−40Hz. EEG based brain imaging techniques present a limited spatial resolution due to the physical dimension, in the range of several millimeters, of the surface electrodes usually employed in the acquisition setup, which limits the possible number of the electrodes covering the whole scalp.EEG signals as human distinctive traits which can be potentially used in a biometric system [6]. In fact the way the brain regions are organized and coordinated during specific cognitive functions or mental states, such as the response to audio or visual stimuli, during real or imagined body movements, imagined speech, resting states, etc., or during emotional states, can provide relevant information about the brain conditions which, in the studies conducted so far, have shown to have some discriminated capabilities among subjects. Therefore the aim of this paper is to provide the interested researchers and practitioners with an overview of the approaches currently employed in EEG based cognitive biometrics as well as to establish a correlation between the recognition capabilities of the state of the art approaches and neurophysiologic evidences. The different modeling approaches suitable for the several scenarios considered to elicit brain responses are reviewed and evaluated according to the specific application. We will try to report, whenever possible, also a physiological interpretation of the extracted features by correlating them to the anatomical traits and functional organization of the brain structures during specific mental tasks. The paper is organized as follows.

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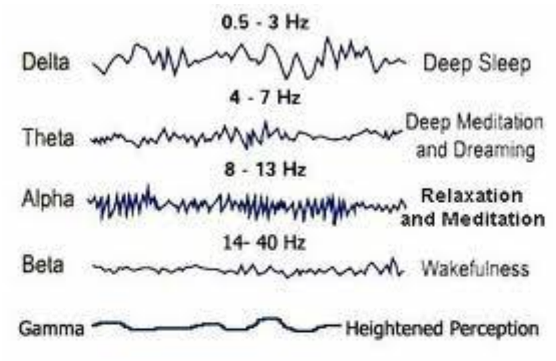
II. PROBLEM AND SOLUTION

Different brain states are the result of different patterns of neural interaction. These patterns lead to waves characterized by different amplitudes and frequencies. The signal generated by brain was received by the brain sensor and it will divide into packets and the packet data transmitted to wireless medium. The wave measuring unit will receive the brain wave raw data and it will convert into signal using MATLAB platform. Then the instructions will be compare the threshold level then indicate the mentally disorder and corresponding to serve as an adjunct test of brain death to prognosticate, in certain instances, in patients with coma, to determine whether to wean anti-epileptic medications then diagnosis this problem.

III. CLASSIFICATION OF BRAIN WAVES

Brainwaves are detected using sensors placed on the scalp. They are divided into bandwidths to describe their functions (below), but are best thought of as a continuous spectrum of consciousness; Delta being slow, loud and functional - to Gamma being fast, subtle, and complex. It is a handy analogy to think of Brainwaves as musical notes - the low frequency waves like a deeply penetrating drum beat, while the higher frequency brainwaves are like a subtle high pitched flute.
Our brainwaves change according to what we're doing and feeling. When slower brainwaves are dominant we can feel tired, slow, sluggish, or dreamy. The higher frequencies are dominant when we feel wired, or hyper-alert. Brainwave speed is measured in Hertz (cycles per second) and they are dived into following types



ALPHA WAVES (8 TO 12 HZ)
Alpha brainwaves are present during quietly flowing thoughts, but not quite meditation. Alpha is 'the power of now', being here, in the present. Alpha is the resting state for the brain. Alpha waves aid overall mental coordination, calmness, alertness, mind/body integration and learning.[23]

BETA WAVES (14 TO 40 HZ)
Beta brainwaves dominate our normal waking state of consciousness when attention is directed towards the outside world. Beta is a 'fast' activity, present when we are alert, attentive, engaged in problem solving, judgment, decision making, and engaged in focused mental activity. Beta brainwaves are further divided into three bands; Low Beta (Beta1, 12-15Hz) can be thought of as a 'fast idle, or musing. Beta (aka.Beta2, 15-22Hz) as high engagement. Hi-Beta (Beta3, 22-38Hz) is highly complex thought, integrating new experiences, high anxiety, or excitement. Continual high frequency processing is not a very efficient way to run the brain, as it takes a tremendous amount of energy. [25-26]

GAMMA WAVES (38 TO 42 HZ)
Gamma brainwaves are the fastest of brain waves (high frequency, like a flute), and relate to simultaneous processing of information from different brain areas. It passes information rapidly, and as the most subtle of the brainwave frequencies, the mind has to be quiet to access it. Gamma rhythms modulate perception and consciousness, disappearing under anaesthesia. The presence of Gamma relates to expanded consciousness and spiritual emergence.

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DELTA WAVES (.5 TO 3 HZ)

Delta brainwaves are the slowest but loudest brainwaves (low frequency and deeply penetrating, like a drum beat). They are generated in deepest meditation and dreamless sleep. Delta waves suspend external awareness and are the source of empathy. Healing and regeneration are stimulated in this state, and that is why deep restorative sleep is so essential to the healing process.

THETA WAVE (4-7.5HZ)

Theta brain waves are present during deep meditation and light sleep, including the all-important REM dream state. It is the realm of your sub consciousness and only experienced momentarily as you drift off to sleep from Alpha and wake from deep sleep (from Delta).It is said that a sense of deep spiritual connection and unity with the universe can be experienced at Theta. Your mind's most deep-seated programs are at Theta and it is where you experience vivid visualizations, great inspiration, profound creativity and exceptional insight. Unlike your other brain waves, the elusive voice of Theta is a silent voice. It is at the Alpha-Theta border, from 7Hz to 8Hz, where the optimal range for visualization, mind programming and using the creative power of your mind begins. It's the mental state which you consciously create your reality. At this frequency, you are conscious of your surroundings however your body is in deep relaxation.[24]

Probes are implanted in the brain to tap neural signals. Depending upon the type of signals to be tapped and analyzed, probe location is decided. Probe will boost circuit to strengthen the weak neural signals and transfer them to neural processor. Processor will extract the different information from the signals. It is a means of communication between brain and machine, with the help of brain peripherals interfacing. Information of neural activities of brain can be exchanged with the machine. [27]The computer can in turn use the information to control variety of devices or exchange the information with another BMI. Thus BMI extracts electrophysiological signal from suitable components of brain (motor cortices) and process them to generate control signals for machine. It involves neurology, mathematics, electronic engineering and material science with intelligent and (and emotional) devices all around us, it will become possible to just think about a task to be done and it will be done [2,3, 6].

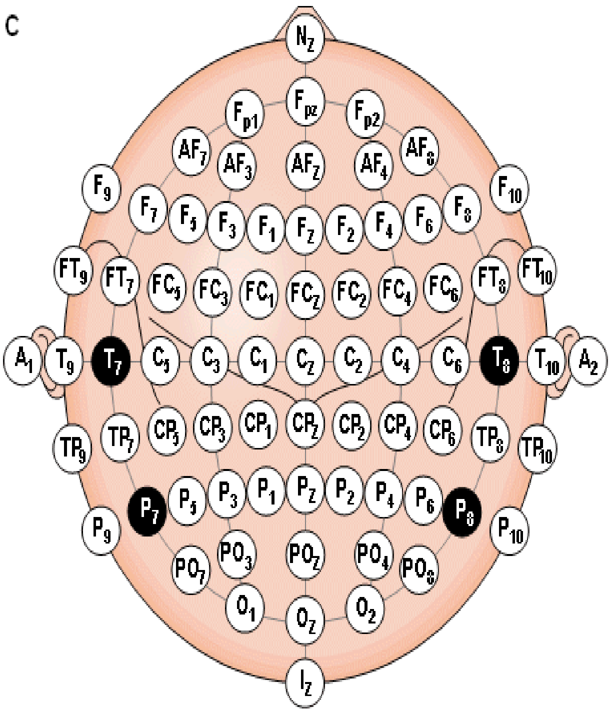

Fig1.Brain points

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Signal Extractor the material chosen for the probe has to have suitable properties depending upon whether invasive or non-invasive technique is employed. In non-invasive technique Design of Numerically Controlled Oscillator 247 the probes are directly implanted into the brain to connect to neurons. The noninvasive technique lets the probes to be fixed on the outer surface of the skull. Very sensitive probes are required for non-invasive technique, while tissue-friendly probes are more important for invasive techniques.

IV. CONCLUSION

This work dealing with the signals from brain. Different brain states are the result of different patterns of neural interaction. These patterns lead to waves characterized by different amplitudes and frequencies. The signal generated by brain was received by the brain sensor and it will divide into packets and the packet data transmitted to wireless medium .The wave measuring unit will receive the brain wave raw data and it will convert into signal using MATLAB GUI platform and also which is holding signal for 2ms.

V. FUTURE ENHANCEMENT

In real time prediction and analysis of exact brain point and its nature is very complex. This problem may be solved.

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