

EEG BASED EMPLOYEE WELFARE SYSTEM

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Abstract –Working for long hours in different shifts, combined together will lead to stress or physically challenging work, leads to reduction in sleep timings and extreme fatigue. The stress and fatigue will deteriorate the employees’ health leading to illnesses, mental and physical health disorders which increases the risk of imperfection in work, leading to low quality of product development, decreased productivity and also might lead to accidents at work space. By monitoring the employee’s status by designing an EEG based system to measure the stress and fatigue of persons working for long hours will reduce the risk in deteriorating their health and accidents.

Key Words : Data acquisition, Data Peprocessing, Feature extraction, Arduino, GSM SIM900A, Matlab and Alert system are some of the terms used in this paper.

1.INTRODUCTION

Stress is a compound varied concept that is the result of untimely or demanding occurrence. Job holders, extremely health protection workers, bear crucially from affliction, burnout, and other physical disorder such as angina and diabetes caused by strain. Countless stress detection systems are discern but they only help in detecting the stress in prior stages, and, for legalize it, these organization employ other means. These systems dearth any built in aspect for regularization of stress. In contributing toward this aim, a novel system “EEG - Based Employee Welfare System”. This paper presents detail layered architecture, implementation details, and outcomes of the proposed novel system. Blending of this system in work places will help supervisors in taking advantage of the human resource more appropriately and will help in synchronize stress related issues with enhancement in overall performance.

2.EXISTING SYSTEM

Many demonstration have been carry out till now by just chopping explored EEG signals and using optic networks to categorize emotions based on emotional ability and titillation or by heeding on using facial expressions and speech. ,Even so it is easy to fake facial expressions or alter quality of address and these gesture are not constantly

obtainable, and they vary from using physiological signals, which showing continuously and are hard to screen.

3. PROPOSED SYSTEM

Electroencephalogram (EEG) based employee welfare system is introduced. In order to achieve EEG signals, electrodes are placed on the scalp following standard Electrode 10–20 system .The collected data through EEG signals is preprocessed to remove noise and the data is analyzed and classified based on the frequency waveforms. Alert system is used to send information through a message.

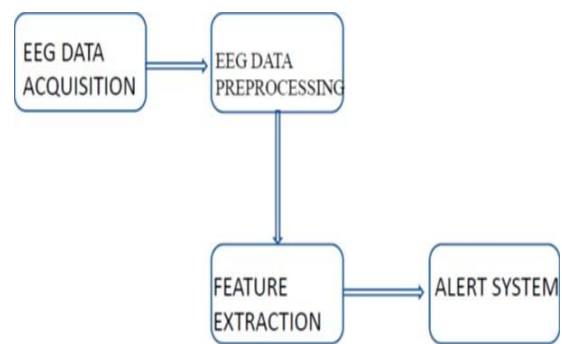


Fig: Block diagram

3.1 DATA ACQUISITION

Data is obtained using electrodes positioned on the scalps based on the 10-20 System of electrode placement. The setup is based on the correspondence between the bearing of an electrode and the underlying domain of the brain. The EEG is a evidence of brain task. The pattern of activity swap with the plane of a person's arousal.If a person is moderate, then the EEG has many low waves.If a person is eager, then the EEG has many high waves. The EEG is used to evidence of brain data for many processes including sleep diligent and to help in the detection of brain disorders such as epilepsy, emotion, stress detection etc.

3.2 DATA PREPROCESSING

The raw signals are hardly used since they may contain DC offsets and coast, electromagnetic noise, and artifacts that need to be sift out. Signal processing is used to remove noise, filter out or isolate an improved version of the signal. In many cases, the brain functioning under study are located in a isolated frequency band, such as the P300 induce feedback that arise in the Theta band (4-7 Hz) or the reformation of the sensor motor or mu flows, which bring out between 8 and 15 Hz. The simplest method is to use filters for filtering frequencies, such as band-pass or low filters, to set apart the bands of interest and remove those frequencies of no interest.

3.3 FEATURE EXTRACTION

Feature extraction is related to dimensionality reduction. When the load data to an encryption is too large to be handled and it is distrust to be needless(e.g. the matching computation in both feet and meters, or the ceaseless of images exposed as pixels), then it can be transfigure into a decrease set of trait (also named as feature vector). Resolving a subset of the inceptive features is called feature selection. The sort out features are anticipate to hold the applicable information from the input data, so that the exacted chore can be performed by using this decreased representation instead of the total initial statistics. In machine learning, pattern recognition, and image processing, feature extraction starts from an initial set of measured data and raise a acquire values (features) deliberate to be informative and inordinate, extricate the subsequent learning and abstract steps, and in some cases prime to better human expounding.

4. EXPERIMENTAL SETUP

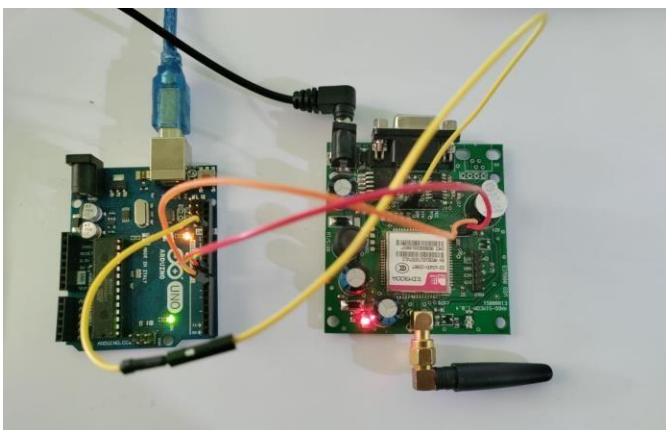


Fig: External Structure Model

The proposed methodology made up of the following sections:

1. **ARDUINO UNO:** ATmega328 Arduino Uno micro

controller board consists of 14 pins to permit influx and outflux of feeding(it is possible to use 6 pins as PWM signal outputs), 6 continuous signal with time commute group,16 megahertz electronic oscillator,USB port connector,a non-board voltage regulator, ICSP header, and a reset button. The arduino Atmega328 has 32 KB flash memory, 2 KB Static random access memory and 1 KB electronically erasable programmable read-only memory.Arduino is a low-cost and easy-to-use programmable open-source microcontroller board that can be unified into a different electronic projects. It is used to bridge software and hardware modules of the device.

2. **GSM SIM900A:** This is an ultra compact reliable wireless module. The SIM900A is a complete dual band GSM/General packet radio service solution which can be installed in the customer applications authorizing you to assistance from small proportion and cost effective solutions. Stimulating an industry standard circuitry, the SIM900A handover Global system for mobile communication/GPRS900/1800MHz performance for voice, SMS, statistics, and Fax in a small form element and with low power consumption. With a pocket sorting of 24mm x 24mm x 3 mm, SIM900A can suitable close to all the area requirements in the applications, especially for slight and dense wearing of design. This module sends message about the occupancy of stress.

5. RESULTS AND DISCUSSION

In this paper, the data set imported in matlab is classified and the signals are separated into different frequency bands namely delta, alpha, beta, theta and gamma which is shown in the figure below. The power spectral density values of each signals appear in the workspace .When the power spectral density is greater than the threshold value then message is sent as an alert indicating the presence of stress.

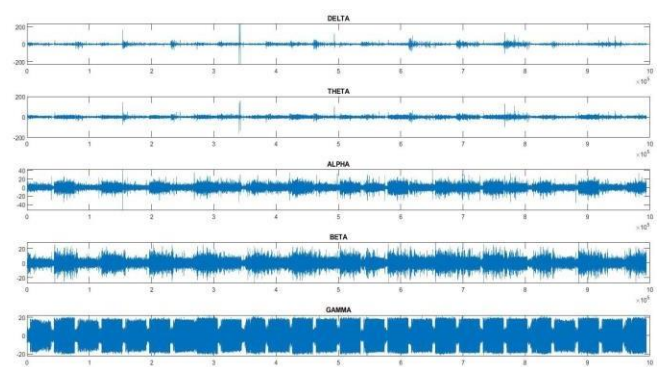


Fig: Frequency bands

The below figure displays the message that will be sent if the stress has been detected. The arduino communicates with the GSM module and the alert is made by sending a message.



Fig: Alert message

6. CONCLUSION

EEG based stress detection and alert system for the welfare of the employees was proposed by obtaining the dataset and then extracting them into different frequency band signals namely delta(<4 Hz), Theta(4-7 Hz), Alpha (8-15 Hz), Beta(16-31 Hz), Gamma(>32 Hz). The power spectral density helps in identifying the presence of stress in the EEG signal and when the stress is detected the alert is made with help of a message with help of gsm module and Arduino connected together and interfaced with matlab software.

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