Dozed-Off : IOT Based Sleep Inducer for Post Traumatic ,Stress , Panic and Psychiatric Disorder

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Abstract

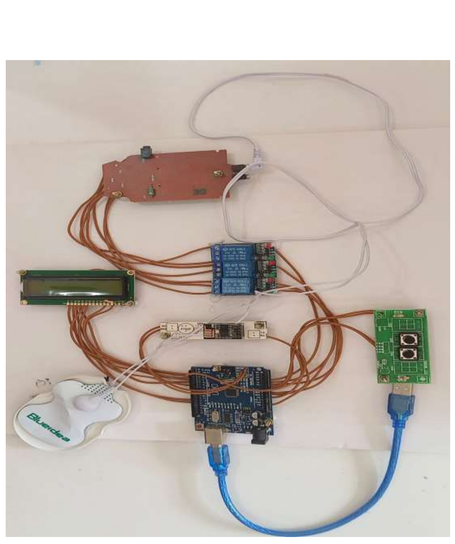
When a human being wakes up in the middle of the night, they are paralyzed. Despite the fact that most episodes are associated with extreme terror and some might cause clinically significant suffering, little is unwritten about the experience. This study will question existing research on the connection between sleep paralyses and sleep in general. Many studies have connected poor sleep quality to an increased risk of sleep paralysis. Awake yet unable to act, sleep paralysis occurs. This might happen between awake and sleeping. The problem is approached in three steps: Data collection, data storage, calculation and machine learning prediction of sleep paralysis. The data came from the Smart Device. The dataset has several (independent) and dependent variables (Outcome). This device has been put to the test. Each exam has its own set of features and predicted outcomes. To assess the system's validity, we executed a posture recognition accuracy test. The device was hidden on top of the bed. The controller is in charge of capacity and data collection. Experiments were conducted by collecting pressure data from a patient lying down. The person acted out his sleeping positions on a mat for a while. Machine learning has been used to predict sleep paralysis. By comparing sleep postures to the outcome, we were able to show the link between sleep qualities and sleep paralysis. Machine learning approaches have been used to predict sleep paralysis. Comparing sleeping positions with the results showed the link between sleep quality and sleep paralysis.

Product Description

- Arduino UNO Microcontroller.
- Piezo Electric Sensor
- 3 channel 5V Relay Module
- PCB board
- Wifi module
- Muscle Stimulator Pulse, Electric Acupuncture

Methods & Materials

RNN deep learning method is deployed in the kit and the algorithm yields 91% of accuracy



PCB (Printed Circuit Board):
It is a fundamental component in electronics and is commonly used to mechanically support and electrically connect electronic components using conductive pathways or tracks etched from copper sheets laminated onto a non-conductive substrate. PCBs provide a compact, reliable, and cost-effective solution for connecting various electronic components, reducing the complexity of wiring and assembly.

A Wi-Fi module,
it also known as a Wi-Fi adapter or Wi-Fi chip, is a hardware component that enables devices to connect to a wireless local area network (Wi-Fi network). It provides wireless communication capabilities, allowing devices to access the internet, transfer data, and communicate with other devices within the network without the need for physical cables.Wi-Fi modules are commonly used in various electronic devices, such as smartphones, tablets, laptops, smart home devices, IoT (Internet of Things) devices, and embedded systems. They are available in different form factors, including integrated chips, small circuit boards, and modules with pins for easy integration onto larger PCBs.

A piezoelectric sensor
It is a type of sensor that uses the piezoelectric effect to convert mechanical energy into an electrical signal or vice versa. The piezoelectric effect is a phenomenon observed in certain materials that generate an electric charge when subjected to mechanical stress, or conversely, change their shape when an electric field is applied.

Working Principle:
When mechanical stress or force is applied to the piezoelectric material, it causes the material to deform slightly, leading to the displacement of positive and negative charges within the material. This separation of charges creates a measurable voltage across the electrodes, which can be detected as an electrical signal.

Applications:
Piezoelectric sensors have a wide range of applications due to their sensitivity, reliability, and ability to convert mechanical energy into electrical signals. Some common applications include:

Data Collection

This information was obtained from the Smart Device. The dataset contains many (independent) variables as well as one (dependent) variable (Outcome). This device has been used in a variety of tests. The following is a list of each test's features and predicted outcome. Table 1. Dataset Attributes Feature Description Values Pressure When it comes to basic industrial pressure sensors, the range can be as low as zero to twenty-five pounds per square inch (psi) or as high as fifty pounds per square inch (psi), depending on the application. Decimal Value Force Force is the value strength or energy as a physical property of movement or action. Integer Value Limiting Switch It is the proximity of for the detection of an object 0 or 1 Unoccupied Unoccupied area during test 0 or 1 Face Up When a patient is in any one of these four different positions—Face Up, Face Down; Right Lateral; or Left Lateral—the prototype can identify the patient's position and alert the caregiver to the patient. 0 or 1 Face Down When a patient is in any one of these four different positions—Face Up, Face Down; Right Lateral; or Left Lateral—the prototype can identify the patient's position and alert the caregiver to the patient. 0 or 1 Left Lateral When a patient is in any one of these four different positions—Face Up, Face Down; Right Lateral; or Left Lateral—the prototype can identify the patient's position and alert the caregiver to the patient. 0 or 1 Right Lateral When a patient is in any one of these four different positions—Face Up, Face Down; Right Lateral; or Left Lateral—the prototype can identify the patient's position and alert the caregiver to the patient. 0 or 1 Edge When a patient is in any one of these four different positions—Face Up, Face Down; Right Lateral; or Left Lateral—the prototype can identify the patient's position and alert the caregiver to the patient. 0 or 1 Outcome On the basis of postures, the outcome will be predicted as having a normal posture or a patient with sleep paralysis. 0 (normal) or 1 (sleep paralysis) Figure 9. Data Attributes Visualization 3.3. Data Pre-processing Because it includes changing or eliminating data before it is used, data pre-processing is a critical step in the data mining process. The process of cleaning and organizing raw data before using it to develop and train machine learning models is known as data pre-processing in machine learning. Preprocessing is necessary for high-quality data. Data cleansing, data integration, and data reduction are the four phases of data pre-processing used to make the process easier. Preprocessing our data before feeding it into a machine learning model is crucial since our model's capacity to learn is dependent on the quality and usable information that can be gleaned from it

Results:

The prepared dozed off algorithm yields 91% accuracy with the IOT model examplified

Conclusion:

the IoT-based sleep inducer designed for individuals with post-traumatic stress, stress, panic, and psychiatric disorders presents a promising solution to address the sleep disturbances commonly experienced by those affected. By combining advanced IoT technology, cognitive behavioral therapy (CBT) principles, and personalized sleep environment control, this innovative system aims to improve sleep quality and overall well-being.[1:53 PM, 8/4/2023] Sallu💝✨: However, it is essential to acknowledge that building and deploying such a system requires collaboration with healthcare professionals, therapists, and psychiatric experts to ensure its safety, efficacy, and ethical considerations. Clinical trials and further research are necessary to validate the effectiveness of the IoT-based sleep inducer in real-world scenarios and various user populations.Despite the potential challenges, the IoT-based sleep inducer holds the promise of transforming the sleep experience for individuals suffering from post-traumatic stress, stress, panic, and psychiatric disorders, providing them with a supportive, personalized, and adaptive solution to improve their sleep and overall quality of life. With ongoing advancements in technology and the integration of medical expertise, this innovative approach could become an integral part of comprehensive care for sleep-related disorders in the future.

Reference:

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An IoT-BCI systems for Mental Trauma Detection and Methods Thereof,
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