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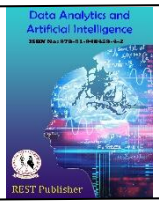

A Survey on Stress relief device

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Abstract: In recent days there may tremendous changes in the medical devices production to screen pressure and emotional wellness as means for speeding up recognition and resulting the board of these circumstances. Sometime very high stress levels can end to be dangerous for certain individuals who are not able to express mounting levels of stress before it goes to a full anxiety attack. The main motto of this review is to recognize and break down the shrewd clinical gadgets used to distinguish sorrow, tension and stress and physiological cycle connected to their location and help.

1. Introduction

The expression "stress" alludes to the actual response of an individual in light of an unsavory/hazardous ecological condition or improvements as proposed by Selye . Moreover, over-stress has shown to be one of the central points adding to a few serious medical conditions, for example, hypertension, fits of anxiety and so on. Then again, chemical imbalance range jumble is a summed up term for various complex problems that share normal side effects, like unfortunate relational abilities and absence of social connection. Mental imbalance is a neuro-organic confusion which is much of the time portrayed by redundant way of behaving, absence of relational abilities and unfortunate social connection. It is a formative handicap influencing practically 1.5 million individuals in the US. Different contextual analyses show that chemical imbalance patient's experience outrageous fit ways of behaving rest troubles, unfortunate fine and gross coordinated movements. Besides, medically introverted kids experience seizures and fits of rage when under a specific measure of pressure. In any case, before any assault there are no apparent signs or side effects for the parent or watchman to distinguish whether the youngster is under pressure. According to Bakker, there are three types of stress: acute, episodic acute, and chronic. The first two make individuals uneasy and anxious, but they are not harmful since they pass quickly treatable. Contrarily, the duration of chronic stress is greater than that of the first two forms of stress. Depending on the patient, it can result in severe problems. Stress-response hormones are obviously involved in this condition, as are several well-known mental illnesses including despair and anxiety. At present, more people are able to manage with stress and that was the focus of this study and the issues it brought about were exclusive to children with autism.

Behnam, told that any one will suffer out of 166 births suffers from Autism Spectrum Disorder.

Additionally, persistent stress can result in some well-known psychiatric conditions like anxiety and despair. When stressed, autistic kids may experience seizures, panic attacks, try suicide or murder, and be detrimental to their surroundings. According to a study, stress-related aberrant brain development during foetal process may contribute to autistic condition. There isn't a commercially available tool to identify stress right now. However, there are gadgets that specifically track changes in respiration, heart rate, and body temperature. But not even such sophisticated tools can identify stress. For example, heart rate variation by itself cannot identify stress. Therefore, there is a necessary for a standalone device that can detect stress using a few physiological signals and then process them to determine whether or not the user is experiencing stress. As a result, the technology suggested in this study can non-invasively detect stress levels in autistic kids by monitoring physiological signals like skin sweat and heart rate that are recorded with the aid of electronic sensors. Monitoring and diagnostic uses exist for wearable sensors. Physiological, biochemical, and motion sensing are now among their skills. It is impossible to emphasise the breadth of the problems that these technologies may help solve. Physiological monitoring may be helpful for both initial diagnosis and ongoing therapy in a large number of patients with neurological, cardiovascular, and pulmonary conditions such seizures, hypertension, dysrhythmias, and asthma. A person's independence and community participation may enhance, falls may be prevented, and house-based motion sensing may aid.

2. Applications Health wellnesss monitoring

In many countries are motivating "ageing in place" development programmes , which let older adults and people with chronic conditions stay in their shelter while being remotely monitored for safety and to make it easier to implement clinical interventions, as the world's population is ageing and health care costs are rising. As a result, significant research has been done to evaluate the efficacy of wearable sensors in categorising daily life activities. Long-term physiological monitoring can aid in the detection and management of illnesses including cardiovascular problems. With commercially available technology, it is possible to acquire long-term monitoring of the heart rate, blood pressure, oxygen saturation, respiration rate, body temperature,

and galvanic skin reaction. Clinical research is presently evaluating and validating the ability of sensor systems to monitor physiological data over prolonged times and improve clinical treatment for patients, such as those with congestive heart failure.

Anxiety: An unpleasant emotional reaction that is out of proportion to a specific stressor (or even in the absence of one) is known as anxiety. This reaction, which may or may not last for a long time, causes tension and physical symptoms. The hypothalamic-pituitary-adrenal axis, which increases the sympathetic limb of the autonomic nervous system while simultaneously suppressing the parasympathetic limb, causes anxiety episodes, which include both psychological and physiological symptoms. The sympathetic nervous system is demonstrated by variations in heart rate, breathing rate, and electro dermal activity. Heart rate variability, which is derived from the R-R interval, has also been demonstrated in the past to be a useful indicator of autonomic nervous system activity.

Stress: Numerous studies that demonstrate how emotion impacts the autonomic nervous system demonstrate the bidirectional relationship between emotion and stress. On the other side, persistent stress is known to encourage a number of physical and mental health conditions, which has a substantial cost impact. The body usually takes precautions when under a lot of stress. New methods for identifying and tracking stress are constantly being developed by researchers. The physiological reactions caused by the sympathetic nervous system, such as fluctuations in heart rate, heart rate variability, skin temperature, and conductance, are widely used in these procedures. The use of various wearable technology and delicate clothing. Algorithms created based on these well investigated criteria show remarkable accuracy in experimental settings for identifying stress levels more than 90. Heart rate variability has been studied the most out of all physiological variables, according to a recent study. This study's investigation of more than 60 wearable technologies covers a wide variety of physiological indicators, including those described in this review, in a reasonably brief way with the addition of sleep and cognitive performance. In the review, just 5% of the wearable devices were shown to be capable of accurately identifying health features. In addition, this review study assesses which wearables have received official validation for use in stress research (10%). It has also gained favour as a marker because of the growing neuro physiological relationship between electrodermal activity and sympathetic nerve activity. Reactions to skin conductance are connected to the involved ventromedial.

Depression: It is a mental illness that affects more than 280 million people worldwide, or around 3.5% of the total population. Depression is characterised by a sad mood and a lack of desire. Motivation, thoughts, behaviour, feelings, and a sense of being whole are all impacted by depression, which is classified medically as a mental and behavioural condition. The primary indicator of depression is anhedonia, which is defined as a loss of interest or enjoyment in things that often make people happy. A depressed state of mind can be a symptom of some mood disorders, such as major depressive disorder or dysthymia, as well as a common, temporary reaction to different life events, such the death of a loved one or certain physical illnesses. A few examples of life events and changes that may affect depressed moods include childbirth, menopause, financial difficulty, unemployment, stress (from work, education, family, living conditions, etc.), a medical diagnosis (cancer, HIV, etc.), bullying, loss of a loved one, natural disasters, social isolation, rape, relationship problems, jealousy, separation, or catastrophic injury. Teenagers may be more susceptible to depression after being bullied, experiencing social rejection, or succumbing to peer pressure. The global COVID-19 outbreak has had a serious impact on many people's mental health and has sharply increased the prevalence of depression. Between fall 2019 and May/June 2020, the University of Surrey looked into how COVID-19 affects young people's mental health. Depression levels might change depending on personality changes or alterations in one's social surroundings. This is connected with poor extraversion, and high personality domain neuroticism scores increase the likelihood of developing depressive symptoms as well as all types of depression diagnoses. Other signs of personality include: brief but abrupt mood swings, short-term despondency, lack of interest in once-familiar pursuits, disturbed sleep, retreat from former social interactions, changes in eating, and trouble focusing.

3. Components

ArduinoNano Based on an ATmega328P or ATmega628 CPU, the Arduino Nano board uses the same connector as the Arduino UNO board. A durable, adaptable, compact, and environmentally friendly microcontroller board is the Nano board. When compared to the UNO board, it is rather little. The Arduino (IDE), which is available for many platforms, is used to configure the Arduino Nano. An Integrated Development Environment is mentioned in this sentence. The Arduino IDE and micro USB are the tools needed to get our projects running on the Arduino Nano board. On the aforementioned laptop or desktop, the Arduino IDE application has to be installed. The Arduino Nano board's technical specs are as follows: The Nano board's operational voltage ranges from 5V to 12V. Nano has a total of 22 input/output pins. There are 8 analogue pins and 14 digital pins. The 14 digital pins include 6 PWM (Pulse Width Modulation) pins. The Arduino Nano's 6 PWM pins are used to translate digital signals into analogue impulses. The conversion is accomplished by changing the pulse's width. The Arduino Nano's crystal oscillator operates at a 16MHz frequency. Numerous applications, including robotics, control systems, instrumentation, automation, and embedded systems, employ the Arduino Nano. QR Code Scanner, DIY Arduino Pedometer, and more projects were developed using Arduino Nano as shown in figure 3.1.

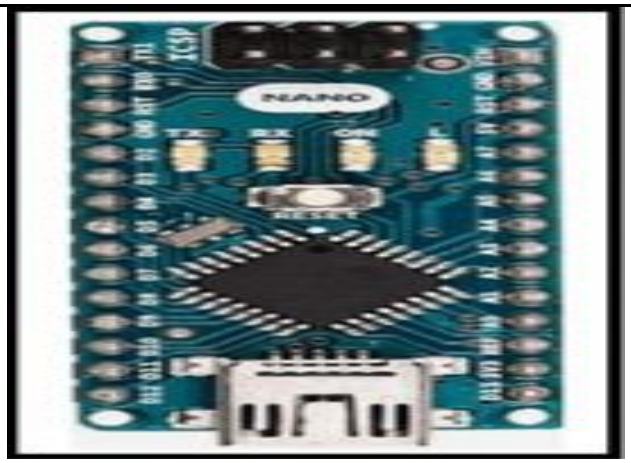

FIGURE1. ArduinoNano

LM35: The LM35 temperature sensor generates an analogue signal that is proportional to the current temperature as shown in figure 3.2. The output voltage may be easily converted to a temperature value in Celsius. The advantage of Lm35 over thermostat is that it doesn't need any external calibration. Additionally, the covering keeps it from overheating. Due to its inexpensive cost (around $0.95) and higher precision, it is popular by hobbyists, students, and DIY circuit designers. The LM35's inexpensive cost, increased accuracy, and application in their designs benefit many low-end items. More than 15 years later, the sensor is still in use and may be found in a wide variety of devices. Pulse Sensor**:** Every time the volume of a blood artery changes while the heart beats, a pulse wave is created. A pulse sensor is a detector that keeps track of this volume change as shown in figure 3.3. Electrocardiography (ECG), photoelectric pulse wave, blood pressure measurement, and phonocardiography are the four primary methods for calculating heart rate. Photoelectric is the method used by pulse sensors. Depending on the measuring techniques of transmission and reflection, there are two different kinds of pulse sensors that use photoelectric pulse wave technology. Transmission types use differences in the quantity of light travelling through the body during heartbeats and illuminate the surface of the body with red or infrared light to compute pulse waves.

FIGURE 2. LM35TemperatureSensor

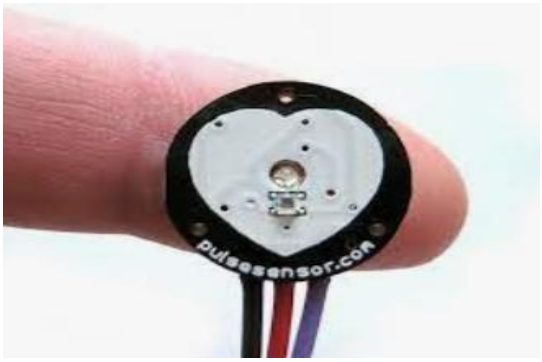

FIGURE 4. Pulse Sensor

Vibration Motor: A small integrated vibration motor module is what it is made of. After supplying 5V power, you may control the motor's ON/OFF status or vibration strength via a digital signal or a PWM signal. The module makes use of a premium mobile phone vibration motor to provide a functional, loud, enhanced vibration effect. The intensity of the motor's vibration may be changed using PWM. The module may quickly complete the process of transforming an electrical signal to mechanical vibration. A small vibration motor that may be used as a quiet alarm is activated when an intelligent device shakes. Similar to how your phone vibrates in silent mode, the engine shakes when the input is excessive as shown in figure 3.4 .

FIGURE 5.VibrationMotor

4. Conclusion

Only two physiological signals—heart rate and skin conductance—are required for the method suggested in this survey to effectively monitor stress levels. The device can detect even the smallest shift in stress levels and employs vibration motors to produce a calming sensation, making it a helpful tool for medical experts to monitor stress fluctuations in patients. Additionally, in the future, the system's size may be decreased to the point where it may be worn as a neckband or some other type of wearable device to comfortably and effectively measure stress levels. To further improve accuracy, a few other physiological markers may be researched and used.

References

1. Chiauzzi, E.; Rodarte, C.; DasMahapatra, P. Patient-centered activity monitoring in the self-managementofchronichealthconditions.BMCMed.2015,13,1–6.
2. Chan,M.;Estève,D.;Fourniols,J.-Y.;Escriba,C.;Campo,E.Smart wearable systems: Current status and future-challenges.Artif.Intell.Med.2012,56,137–156.
3. Motion Metrics Partners with Vandrico to Develop Smartglass Application for Mining—MotionMetrics.Availableonline:http://www.motionmetrics.com/press/motion-metrics-partners-with-vandrico-to-develop-smartglass-application-for-mining/(accessedon1october2022).
4. Hazarika, P.Implement ation of smart safetyhelmet for coalmine workers. In Proceedings of the1st IEEE International Conference on Power Electronics, Intelligent Control and Energy Systems, Delhi, India,4–6July2016;pp.1-3.
5. Fatigue-Monitoring Solution Implemented at Anglo Coal.Available online:http://www.miningweekly.com/article/fatigue-monitoring-solution-implemented-at-anglo-coal-2017-07-07/repid:3650(accessedon1october2022).
6. Haas, E.J.; Cecala, A.B.; Hoebbel, C.L. Using Dust Assessment Technology to Leverage Mine SiteManager-Worker Communication and Health Behavior: A Longitudinal Case Study. J. Progress.Res.Soc.Sci.2016,3,154–167.
7. Chatterjee, A.; Aceves, A.; Dungca, R.; Flores, H.; Giddens, K. Classification of wearable com-puting: A survey of electronic assistive technology and future design. In Proceedings of the 2016Second International Conference on Research in Computational Intelligence and CommunicationNetworks(ICRCICN),Kolkata,India,23–25September2016;pp.22–27.
8. Khoa, T.V.A. Wearable Smart Technologies: New Era of Technology. Master's Thesis, LaplandUniversityofAppliedSciences, Lapland, Finland, 2015.
9. Parate,A.;Ganesan,D.Detecting Eating and Smoking Behaviors Using Smartwatches. InMobile-Health;Springer:Cham, Switzerland,2017;pp.175–201.ISBN978-3-319-51393-5.
10. arate,A.;Ganesan,D.Detecting Eating and Smoking Behaviors Using Smart watches. In Mobile-Health;Springer:Cham, Switzerland,2017;pp.175–201.ISBN978-3-319-51393-5.
11. Fokkema,T.;Kooiman,T.J.M.;Krijnen,W.P.;VanDerSchans,C.P.;DeGroot,M.Reliabilityand validity of ten consumer activity trackers depend on walking speed. Med. Sci. Sports Exerc.2017,49,793–800.
12. Hanuska, A.;Chandramohan, B.;Bellamy, L.;Burke, P.;Ramanathan, R.; Balakrishnan, V.Smart Clothing Market Analysis, 2016. Smart-Clothing-Market-Analysis-Report.pdf. Available online:http://scet.berkeley.edu/wp-content/uploads/Smart-Clothing-Market-Analysis-Report.pdf
13. Futuristic Firefighter Suit Has Sensors, Head-up Display—IEEE Spectrum. Available online:https://spectrum.ieee.org/consumer-electronics/portable-devices/futuristic-firefighter-suit-has-sensors-headup-display

14. Ozcan, K.; Velipasalar, S. Wearable Camera- and Accelerometer-Based Fall Detection on PortableDevices.IEEEEmbed.Syst.Lett.2016,8,6–9.
15. Wild, G.; Hinckley, S. Acousto-ultrasonic optical fiber sensors: Overview and state-of-the-art.IEEESens.J.2008,8,1184–1193.
16. Wahlström,N.;Gustafsson,F.Magne to meter modeling and validation for tracking metallic targets.IEEETrans.SignalProcess.2014,62,545–556.
17. Baek,J.;Choi,Y.;Lee,C.;Suh,J.;Lee,S. BBUNS: Bluetooth Beacon-Based UndergroundNavigationSystemto-SupportMineHaulageOperations.Minerals2017,7,228.
18. Worrall, R.; Neil, D.; Brereton, D.; Mulligan, D. Towards sustainability criteria and indicatorsframework-forlegacymineland.J.Clean.Prod.2009, 17, 1426–1434.
19. Verma, D.K.; Rajhans, G.S.; Malik, O.P.; Des Tombe, K. Respirable dust and respirable silicaexposurei-nOntariogoldmines.J.Occup.Environ.Hyg.2014,11,111–116.
20. Baek,J.;Choi,Y.;Lee,C.;Suh,J.;Lee,S. BBUNS: Bluetooth Beacon-Based Underground Navigation Systemto Support MineHaulageOperations.Minerals2017,7,228.
21. Fatigue-Monitoring Solution Implemented at Anglo Coal.Available online:http://www.miningweekly.com/article/fatigue-monitoring-solution-implemented-at-anglo-coal-2017-07-07/repid:3650(accessedon1october2022).
22. Haas,E.J.;Cecala,A.B.;Hoebbel,C.L.Using Dust Assessment Technology to Leverage Mine Site Manager-Worker Communication and Health Behavior: A Longitudinal Case Study. J. Progress. Res.Soc.Sci.2016, 3,154–167.
23. Chatterjee, A.; Aceves, A.; Dungca, R.; Flores, H.; Giddens, K. Classification of wearable com-puting: A survey of electronic assistive technology and future design. In Proceedings of the 2016Second International Conference on Research in Computational Intelligence and CommunicationNetworks(ICRCICN),Kolkata,India,23–25September2016;pp.22–27.

