ABSTRACT:

***Sleep apnea is a disorder of sleep that has created great trouble within some recent years due to its relative incident and death rate getting higher and causing adverse effects on quality of life. Some proposals have addressed sleep apnea disease in elderly people, but they have still some technical limitations.*** ***A device based for the examination purpose for the basic body parameters that include heart rate and temperature during the episode of sleep apnea is proposed. For which determination of therapeutically accessible analysis and emergency treatment of sleep apnea is discussed. Multilevel telemedicine system is introduced which is an important tool for identification of sleep apnea. Offers by physicians for formal sleep apnea testing is rare after stroke. Further there is also motion detection that will alarmed the household of the patient if any movement is detected. A CPAP device will provide oxygen to the patient during the alarming situation of obstructive sleep apnea episode.***

INTRODUCTION:

Throughout the years,many individuals experience changes in their bodies and lives. One of those progressions is sleep disturbances that happen with age, making it hard to rest. Sleep issue are influencing the great sleep stages which plays a key job in physical and emotional wellness, and sometimes, they can turn into a significant issue for older individuals.[1] Like along these lines, Obstructive sleep apnea disorder (OSAS) is a standout amongst the most hazardous and respiratory disorder that comes while sleeping. Sleep apnea at any age is a noteworthy concern in light of the medical issues it can prompt, however it's considerably increasing in old individuals who are bound to have issues with breathing around evening time. These breathing issues are more adverse to be analyzed (over ~80–90%) as OSAS or they are analyzed basically as snoring in some cases. Research demonstrates that somewhere in the range of 13 and 32% of old individuals (more than 65 years of age) having some rest apnea (experiencing it) [2]. Trouble falling and staying sleep joined with an absence of profound sleep results in a low quality of life (QoL) and expands wellbeing dangers for an old. For instance, sleep apnea produces the danger of traffic accidents brought about by the inordinate daytime drowsiness [3]. Hence, a home-based device framework to screen and support Sleep apnea patients will help the patients in related health risks of sleep apnea.

The abnormal state of death because of sleep apnea makes it important to enhance the analytic strategies. The basic technique used in its diagnosis is polysomonography that is also called a sleep study, is a test used to diagnose sleep disorders[4]. Also the study have should that screening for great side effects of SA, and formal testing for SA, are rare within the initial 90 days after stroke[5]. Mainly stroke patient suffering with sleep apnea shows their symptoms after stroke has occurred. This goal can be accomplished utilizing present day data and advance in computer technology and devices for diagnosis of sleep apnea using heart rate and blood flow, temperature, respiratory rate and much more in detecting it, which should be that much compatible that it can be used in hospitals and homes. The harmful impact of Sleep Apnea on man’s tendency and the development of various cardiovascular sickness make the issue of advancement of solid frameworks for its diagnosis which should be done as soon as possible.

**Temperature and motion detection in sleep apnea?**

**OBJECTIVE:**

The objective of this work was to choose therapeutically achievable criteria for determination of Sleep Apnea and to create basic microprocessor based indicative framework with the availability of emergency treatment to the patient by monitoring basic parameters like temperature and heart rate that has drastic change during the episode. Also for the patient suffering from stroke can use this device as its contain motion detector that alarms if paralyzed site of patient alarm some muscle stiffness or movement during episode.

METHODOLOGY:

Obstructive sleep apnea (OBS) is more likely the common sleep disease and 15% of the world is affected by it. Obstructive Sleep Apnea is because of blockage in the upper respiratory tract in infected person with complete breathing control elements of the central nervous system. The blended type of Sleep Apnea is a mixture of the basic and obstructive structures. Its growing ratio makes its important to work on its diagnosis. The first goal of this research paper is to discuss the diagnosis of SA episode through heart rate (HR), temperature and motion detection specially for stroke patients . OSA patients suffers with episodes of falling oxygen level because of this heart suffer variety of physiological changes among of which heart rate which simultaneously increase blood pressure results in increase of temperature, that are the most basic and easily accessible for analysis parameters. During these SA episodes heart contracts and HR is increased. Studies also show that continuously stress on heart can cause the enlargement of heart which causes the heart to malfunction and lead to cardiac diseases. According to several studies normal human adult heartbeat is in the range of 70-90 bpm so during SA episode heart beat is increased. Periodic interruptions in breathing causes the oxygen level to fall to the certain low level blood oxygen where there is very low level of oxygen in brain is left and brain finds difficulty to send the signals to the heart and other organs. OSA patients typically show higher than normal levels of blood carbon dioxide (PaCO2). When sufficient air doesn't get into a person's lungs, the level of oxygen in the blood falls and the level of carbon dioxide (a waste product of metabolism) rises. After a few minutes of not breathing, a person may die. Heart rate and temperature parameters are both linked with each other and thus if breathing is stopped back to back every organ will malfunction and if the SA episode remains of more than 5 minutes, a person can die. Rising in body temperature has normally seen by doctors of polysomonography during episode.

Optical heart rate sensors work via [pulse oximetry](https://en.wikipedia.org/wiki/Pulse_oximetry), a measurement technique that takes advantage of the fact that oxygenated and de-oxygenated hemoglobin have different optical properties.  With every heartbeat, there is a spike in arterial (oxygenated) blood, which is detected as a change in the absorbance and/or reflectance of red and/or infrared light.  They consist of a red LED and an optical detector which measures the reflectance of the red light from your skin (or more specifically, the blood under your skin).  The reflectance is a bit different during a heartbeat versus between heartbeats, so the detector will see a periodic signal for the duration of the measurement from which the heart rate is extracted. Generally made up of at least 2 LED’s that send light waves into the skin. Because of the wide differences in skin tone, thickness, and morphology associated with a diversity of people wearing the devices, most state-of-the-art OHRM’s in consumer wearables use multiple light wavelengths that interact differently with different levels of skin and tissue. The photodiode and the LEDs are on the same side. These photodiodes collects the light reflected from the blood in the arteries, veins and the skin tissue from various depths. The blood flowing in the arteries and veins is pulsatile in nature enabling changes in the reflected light w.r.t time. Thus this photodiode signal can read the instantaneous heartbeat of a person.

Temperature measurement is also an easy measurement technique can easily been done using LM35. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius temperature. The LM35 is operates at -55˚ to +120˚C. The basic centigrade temperature sensor +2˚C to +150˚C.It works on the principle that when the voltage increases then the temperature also rises.

**Motion detector sensor ?**

So basically through a user friendly handheld device two sensors that are optical sensor for heart rate monitoring, LM35 for temperature monitoring and motion detector sensor for detecting movement of paralyzed body will be attached to a patient’s body with a interfacing microprocessor unit. So when an OSA episode will occur the device will start sensing the slight changes in all above parameters and whenever they gets below or above the threshold level after which and automatic alarm will goes ON and simultaneously a CPAP machine will start providing the sufficient oxygen to patient, and to make it more easier for the doctor or guardian all the data can be transferred to them through RF channel WLANdevice.

REFERENCES:

[1] D. Yacchirema, D. Sarabia-Jácome, C. E. Palau, and M. Esteve, “System for monitoring and supporting the treatment of sleep apnea using IoT and big data,” *Pervasive Mob. Comput.*, vol. 50, pp. 25–40, Oct. 2018.

[2] M. Glasser, N. Bailey, A. McMillan, E. Goff, and M. Morrell, “Sleep apnoea in older people,” *Breathe*, vol. 7, pp. 248–256, Mar. 2011.

[3] J. Mar, J. R. Rueda, J. Durán-Cantolla, C. Schechter, and J. Chilcott, “The cost-effectiveness of nCPAP treatment in patients with moderate-to-severe obstructive sleep apnoea,” *Eur. Respir. J.*, vol. 21, no. 3, pp. 515–522, Mar. 2003.

[4] “Polysomnography in Patients With Obstructive Sleep Apnea,” *Ont. Health Technol. Assess. Ser.*, vol. 6, no. 13, pp. 1–38, Jun. 2006.

[5] D. L. Brown *et al.*, “Sleep apnea screening is uncommon after stroke,” *Sleep Med.*, p. S1389945718304544, Sep. 2018.