WEARABLE BIOSENSOR

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ABSTRACT-**This paper aims to review the various types of wearable biosensors. The theoretical foundation of this paper was formed by conducting a review on wearable biosensors. The 2 main types of biosensors and their working are explained in this paper as well as their upcoming application of wearable biosensors. Wearable biosensor has several clinical applications that make them one of the most important tools in the medical device industry. This paper illustrate that wearable biosensor have the capability to make significant impact on the medical industry because of their compact and diverse nature.**

*KEYWORD:***wearable biosensor, ring sensor, smart shirt, wearable sensor for preventing road accident, automatic stress recognition.**

1 INTRODUCTION

Wearable biosensors are gaining endless interest nowadays and today they promise to be one of the great developments in the sector of wearable health technology. WBS a main category of biosensors is best to use for healthcare, applications related to sports, military etc. Rapid growths of these devices are on the way which will help to provide bebefits like easy to use, low cost and providing real time information and interaction between doctors and patients.

1.1 WHAT IS WBS?

WBS are digital devices that can be worn on the body wearable systems or devices such as smart shirts, smart watches, thin bandages or tattoos allowing blood glucose levels, blood pressure, heart beat rate and other biometric data to be calculated continuouslyand constantly. This real time information is then sent wirelessly to healthcare providers or monitors.

1.2 WEARABLE BIOSENSORS: WEARABLE +BIOSENSOES

Wearable Biosensors is generally a combination of wearable and biosensors. Wearable are objects that can be worn on the body. For e.g. smart watches, clothes, bandages, rings etc. are some wearable.
While, Biological Sensors in short Biosensors is a device made up of transducer, biosensor reader device and a biological element.

Transducer:Itprovides the interaction between the device and body and help in conversion to electrical energy.

Biological element: For sensing the presence and concentration of a substance.

Wearable Biosensors creates a two way feedback between doctors and patients and most rapidly used now a day.

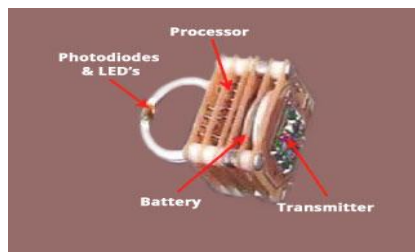**2 TYPES OF WEARABLE BIOSENSOR**

2.1RING SENSORS:

Figure 1: Diagramof ring sensor

Ring Sensor is a pulse oximetry sensor which permits monitoring heart rate and oxygen saturation. The device is shaped like a ring and it can be worn for extend period of time. Red LED, Infra-red LED and a photodiode are embedded in the ring. The whole process is planned and controlled by a single processor. The transmitted waves are sent through a digital wireless communication link which when received are analyzed by a home computer. Technology of beat oximetry is built into the computer for monitoring the patient's pulses and blood oxygen saturation. Now ring sensor is also used for different electronic projects. The ring sensor can be worn all the times. Due to this, continuous health monitoring is possible. The heart throb pulses shown are silent and hence this wearable biosensor is really useful. Each time heart muscles contracts, blood is ejected from the ventricles and a pulse of pressure is conveyed through the circulatory system. The pressure pulse when travel through the vessels causes the vessel wall displacement which is measurable at various points in order to detect pulse or beat blood volume changes by the photoelectric method. Photo conductors are used normally and photo resistors are used for amplification purpose photo transits or are used.
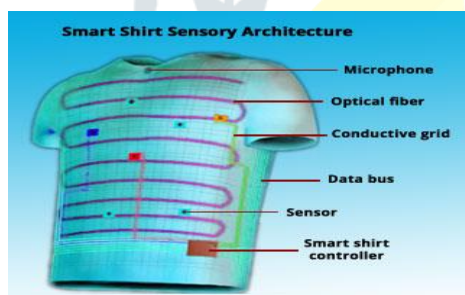
2.2 SMART SHIRT:

Figure 2: Diagram of smart shirt

Smart shirt developed at Georgia tech uses optical bears to identified wounds and special sensors and interconnects to monitor the body vital signs. This smart shirt provides a frame work for monitoring, information processing devices and sensing. The basic benefits of smart shirt as wearable biosensors are that it helps to provide a systematic way to monitor the vital signs of humans. Since the shapes and sizes of humans are different, the sensors can be positioned on the right places for all users. Moreover this smart shirt can be washed without any damage. It helps in monitoring the heart rate, respiratory rate and temperature.

In smart shirt, integrated sensors and conductive fiber grid are attached to a shirt that has shirt band connectors. The shirt band connector when detects any parameters send a signals to either a PDA with Bluetooth assistance or a personal controllers wireless system that carries out the further process of medical care.

3 UPCOMING APPLICATIONS OF WEARABLE BIOSENSORS

3.1 WEARABLE SENSOR FOR PREVENTING ROAD ACCIDENTS:

Road safety is the most important issue worldwide as it has led to the loss of important lives. To solve this query, different sensing techniques have been introduced like measuring of vehicles characteristics (steering wheel, breaks etc.), environmental conditions (fog, darkness etc.), and driver's behavioural pattern. Wearable computers has played a important factor in continuous monitoring of the safety measures for avoiding road accidents and these computers also helps in providing the information to the recovery agencies whenever a road accident takes place. The major cause for the road accidents is the consumption of alcohol by the driver, long driving hours, lack of sleep, drowsiness etc. However, Wearable devices are not the final solution for avoiding road accidents but other measures such as facial expression recognition, speech recognition for estimating the driver's emotional state.

3.2 AUTOMATIC STRESS RECOGNITION:

To anticipate the chronic physiological stress, the technologies are present to recognize the stress automatically that leads to the introduction of wearable biosensors that are more easy to wear. In this stress recognition technique, the loss function of support vector machines is advanced to encode an individual's ability to feel more or less stressed. This has been proved in a case study in which skin conductance of employees was monitored in nine call centers during one week of their ordinary work. This leads to the conclusion that employees in this type of environments are frequently interacting with angry and frustrated customers that leads to higher stress levels.

4 CONCLUSION

This paper is basically the detail view of most of the applications of wearable biosensors usually used in our daily life. As it consists of various applications such as ring sensor, smart shirt, stress recognition, preventing road accidents. For every individual's consideration, many applications and techniques of these sensors are introduced. We are pointing some challenges in this area. The Ring Sensor is further developed for other medical applications such as detection of Arthritis and Kidney Diagnosis. The smart shirt also has a great impact as it leads to the leading in quality of life thereby reducing the healthcare costs and lastly realizing the future healthcare systems. By using the MEMS technology, a feedback system can be integrated into the smart shirt so that the data acquisition capabilities can be used to detect the patient in a condition when a person has a temporary decline in the diabetic shock. So, we can conclude that wearable sensors have a great impact on the future care. The use of wearable biosensors brings a quote to line, "wearable healthcare: easy to use ,less costly, Anywhere,Anytime,Anyone.

REFERENCE

[1] Asada, H.H., et al., Mobile monitoring with wearable photo plethysmographic Biosensors. Engineering in Medicine and Biology Magazine.

[2] Ming-Zher, P., N.C. Swenson, and R.W. Picard, Motion-tolerant magnetic ear sensor and wireless earpiece for wearable photo plethysmography. Information Technology in Biomedicine.

[3]Fernandez,M.S., Hydrogel-based photonic sensor for a bio potential wearable recording system. Biosensors and Bioelectronics.

[4] Patel, S. A review of wearable sensors and systems with application inRehabilitation.Journal of neuro engineering and rehabilitation.

[5] Altini, M., J. Penders, and O. Amft. Personalizing energy expenditure estimation using a cardiorespiratory fitness predicate.In Pervasive Computing Technologies for Healthcare.