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Artificial Intelligence in Wearable Sensors for Monitoring Health

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ABSTRACT: Wearable sensor technology continues to advance and provide significant opportunities for improving personalized healthcare. In recent years, advances in flexible electronics, smart materials, and low-power computing and networking have reduced barriers to technology accessibility, integration, and cost, unleashing the potential for ubiquitous monitoring. In this project, here discover a system which discusses recent advances in wearable sensors and system that monitor emotional mood and current health position of human. They can provide accurate and reliable information on people's health condition. Wearable sensors detect abnormal and/or unforeseen situations by monitoring physiological parameters Application of wearable sensor includes stroke management, head and neck injuries etc. This project discusses recent advances in wearable sensors and systems that monitor movement physiology, and environment, with a focus on applications for Parkinson's disease. In this project, analysis of mood of patient for detecting the intensity of disease is occurred along with heart beat analysis.

KEYWORDS: Wearable sensor, monitoring system, Parkinson's disease.

I.INTRODUCTION

Recent advances in telecommunications, microelectronics, sensor manufacturing and data analysis techniques have opened up new possibilities for using wearable technology in the digital health ecosystem to achieve a range of health outcomes. In the past, the size of sensors and front-end electronics made it too difficult to use them in wearable tech to gather physiological and movement data. Now, with miniature circuits, microcontroller functions, front-end amplification and wireless data transmission, wearable sensors can now be deployed in digital health monitoring systems.

These disruptive technologies also form the basis for ubiquitous healthcare. Ubiquitous healthcare (UHC) is currently understood to encompass healthcare services that are available to everyone, independent of time and location. Systems that can fulfill the promise of delivering healthcare services at any time and any location will have significant implications for the treatment of chronic disease conditions as well as maintaining and encouraging healthy and independent living. Ubiquitous healthcare systems take advantage of a large number of hardware and software components, including Wireless Body Area. Personal monitoring technologies have exploded over the past five years, with Google GlassTM, FitBitTM and The Nike+ FuelBandTM representative of the movement, and part of the bigger move towards an "internet of things". The most accurate sensors under ideal circumstances, and calibrated for healthy adults, are typically accurate to +/−3%.

II.SYSTEM MODEL AND ASSUMPTIONS

Wearable sensors have become very popular in many applications such as medical, entertainment, security, and commercial fields. They can be extremely useful in providing accurate and reliable information on people's activities and behaviours, thereby ensuring a safe and sound living environment. It may be that the smart wearable sensors technology will revolutionize our life, social interaction and activities very much in the same way that personal computers have done a few decades back. An increase in world population along with a significant aging portion is forcing rapid rises in healthcare costs. The healthcare system is going through a transformation in which continuous monitoring of inhabitants is possible even without hospitalization.

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Wearable sensors detect abnormal and/or unforeseen situations by monitoring physiological parameters along with other symptoms. Therefore, necessary help can be provided in times of dire need. Wearable sensor technology continues to advance and provide significant opportunities for improving personalized healthcare. In recent years, advances in flexible electronics, smart materials, and low-power computing and networking have reduced barriers to technology accessibility, integration, and cost, unleashing the potential for ubiquitous monitoring. There have been several successful cases where technologies have moved out of the clinic to monitor patients going about their day-to-day life over extended periods. Perhaps the most notable of these is the ECG monitor for detecting disease like Arrhythmias. Wearable sensor systems are progressively becoming less obtrusive and more powerful, permitting monitoring of patients for longer periods of time in their normal environment. Current commercially available systems are compact, enclosed in durable packaging, and utilize either portable local storage or low-power radios to transmit data to remote servers. The development and refinement of novel fabrication techniques, sustainable power sources, inexpensive storage capacity and more efficient communication strategies are critical to continue this trend towards wear and forget.

III.HEALTH MONITORING

For many healthcare use cases, it is highly desirable to have sensors capable of directly monitoring the physiology of the wearer in real-time. These sensors can measure biological, chemical or physical phenomena to assess physiology when in contact with the skin. The technology challenge is how to maintain consistent contact for extended periods and under different conditions, while the healthcare challenges are how to achieve a high sensitivity and specificity for detecting abnormal events in real-time. Maintaining consistent contact with the body is a significant challenge when exposed to the varying conditions of daily life, and there are different strategies to trying to achieve this. When a sensor is in long-term contact with the body, a number of physical and electrical measurements can be made, including heart rate, breathing rate, blood pressure, electroencephalography (EEG), electrocardiography (ECG), electromyography (EMG) and skin temperature. For EEG, ECG and EMG capacitive sensors are typically used to measure bio potentials, while for vital sign measurements such as heart rate, respiration rate and blood pressure, optical detection techniques such as photoplethysmography or piezoelectric strain sensors are generally used.

IV. RESULT AND DISCUSSION

The electric signal collected from human body may undergoes various process and finally fed to microcontroller. If a signal greater than 10 µV is detected, it is said to be a brain wave signal. For processing a brain wave signal 1 to 30 Hz frequency range is required. If the brain wave voltage level detected is greater than seven hundred and fifty six mV then it is said that patient is in bad situation or in critical situation. When the brain wave voltage level is less than seven fifty six and greater than five hundred and twelve, then the patient is said to be in meditation. If the brain wave voltage level is less than or equal to five hundred and twelve and also greater than two fifty six, the patient is said to be in good condition. Similarly when the brain wave voltage level is less than or equal to two fifty six and greater than one twenty eight, the patient will be in attention level. Also the patient will be in normal level when the brain wave voltage is less than or equal to one twenty eight.

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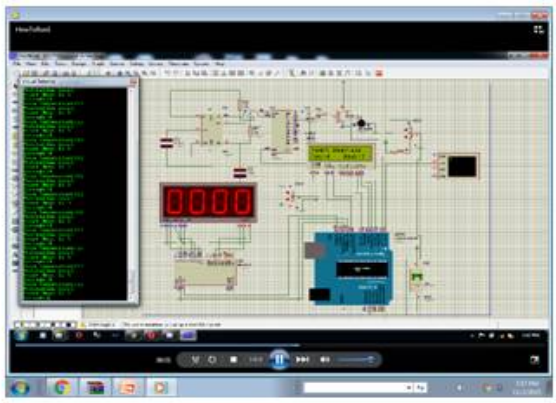

Fig. 1 Simulation of brain wave sensor

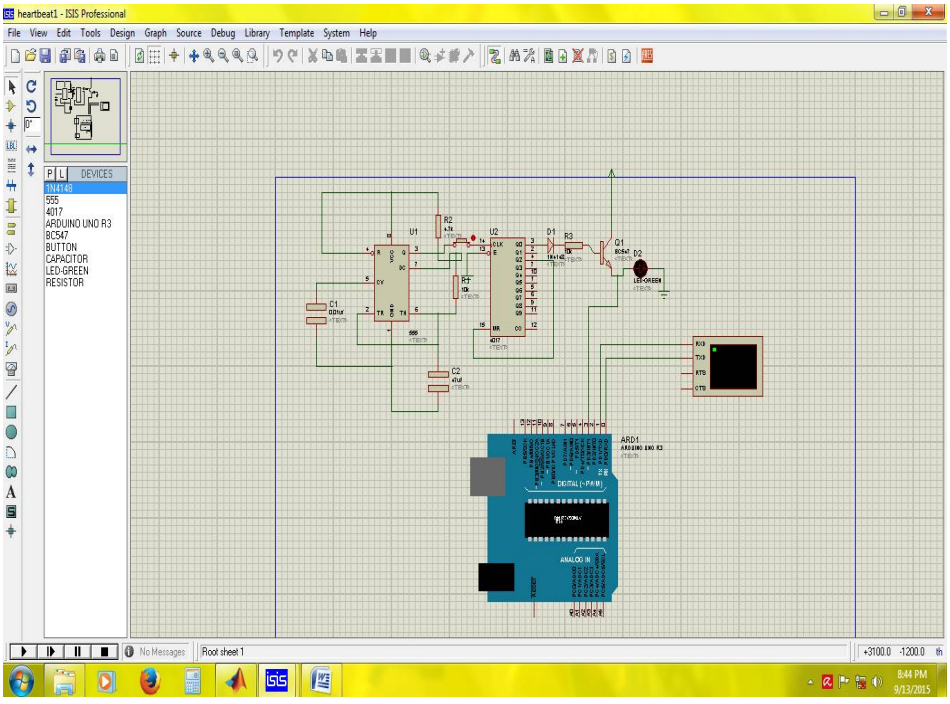

Fig. 2 simulation output of heart beat sensor.

The figure above shows the simulation of heart beat sensing. When the heart beat level is grater than hundred beats per minute then LCD display shows high heart rate. Similarly when heart beat is less than sixty beats per minute, then there exibit low heart beat. The heart beat is measured when corresponding electric signal is measured from finger tip.

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V.CONCLUSION

In this project the mood of patient is analyzed and corresponding disease condition is detected. As the signal voltage exceeds the value seven hundred and fifty six the patient is in dangerous situation. In this condition message must be sent to the number which is already provided in the sensing system. Similarly heart beat may also analyzed and corresponding conditions must be checked out. When the detected output is greater than hundred beats per minute then the patient is said to be in bad situation. Also when the beat value is less than sixty beats per minute there also the signal is in bad situation.

REFERENCES

1. F. Butte, U. Ekelund, and K. R. Westerterp(2012), "A ring sensor: A new ambulatory sensor for twenty four hour monitoring," Med. Sci. Sports Exerc., vol. 44, pp. S5–S12, Jan. 2012.
2. P. Bonato(2003), "Wearable sensors/systems and their impact on biomedical engineering D. J. Lipomi et al., "Skin-like pressure and strain sensors based on transparent elastic," IEEE Eng. Med. Biol. Mag., vol. 22, no. 3, pp. 18–20.
3. P. Bonato(2010), " Wearable sensors and systems," IEEE Eng. Med. Biol. Mag., vol. 29, no. 3, pp.
4. J. Cancela, M. Pastorino, M. T. Arredondo, N. S. Konstantina, F. Villagra, and M. A(2014) "Feasibility study of a wearable systembased on a wireless body area network for gait assessment in Parkinson' disease patients," Sensors, vol. 14, no. 3, pp. 4618–4633.
5. Che-Chang Yang and Yeh-Liang Hsu(2010) "A Review of Accelerometry-Based Wearable Motion Detectors for Physical Activity Monitoring.
6. Daniela De Venuto (2003), " Sensors and Interfaces forMobile Healthcare '' . IEEE Eng med. mag.
7. Ekta Madhyan(2004), "Activity recognition using wearable sensor for health care".vol 34, no 2.