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Overview of Heart Attack Detection System on Office Chair

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ABSTRACT

Among all the diseases, Heart disease becomes more popular in INDIA. Earlier, the Factors like family disease, age and gender was responsible for heart diseases but nowadays factor like stress, physical inactivity and diet are responsible for heart diseases. And soon in the world INDIA will become top in the order of cardiovascular disease due to stress, lack of physical activity and unhealthy eating habits. Sitting on chair for long time is also one of the reasons for heart attack. So this system heart attack detection on office chair will detect person electrocardiograph and in case of abnormal, alert the victim and live of victim can be saved.

Keywords:- Electrocardiography, heart rate

I. INTRODUCTION

Heart Attack is plain in chest also called as myocardial infraction. It causes due to lack of blood flow in heart. Heart muscles needs oxygen to survive. When heart attack occurs, because of blockage in blood flow, heart cannot get oxygen and heart muscles begin to die. Main reasons for heart attack are obesity, high blood pressure, high cholesterol. Symptoms for heart attack are chest pain, short breath, excessive sweating, vomiting. Heart attack can be diagnosis by Electrocardiography method. Electrocardiography is the method which record tiny activity of heart using electrodes placed on skin.

From the recent years the technologies are used for health care like home based screening test, remote monitoring technologies which are used to observe patient health activity. So, our proposed system is also used to monitor real time health information. Mostly people interact with chair, so making chair a potential location to perform our system. So, the general health sign of human like heart rate, respiratory rate, and body temperature along with Electrocardiography can be easily monitor using this chair.

II. RELATED STUDIES

According to my search, the ford is working on car seat which measures heart rate through cloths without any body contact. When a human sit on car seat in position of backrest, the sensor placed on car seat collects signal without any skin contact. Toyota is also working on car steering wheel which detects Electrocardiography and will be displayed on car navigation screen. On the steering wheel contact sensor are placed which continuously monitor heart activity.

III. SYSTEM DESCRIPTION

As per study and experiments, understands normal sitting position of human on chair. Generally, there are two types of way of sitting on chair backrest and armrest. By understanding these choose location to placed Electrocardiography sensor on chair such that the human sitting on chair does not feel any disturbance by sitting on chair while carrying work in office.

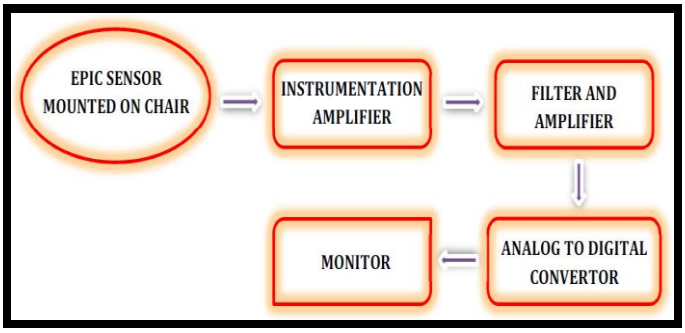

Fig. 1 Block Diagram of purposed system

Traditionally, Electrocardiography sensor used in hospitals is conductive type electrodes which are used along with dry or wet gel directly applied to patient body. There are many disadvantages of this traditional Electrocardiography electrodes are metal allergy can causes skin irritation, short term use, too much expensive and single use electrodes to overcome these disadvantages non-contact

Electrocardiography sensor are used here named as EPIC (Electric potential Integrated Circuit) sensor. EPIC sensor is discovered in UK which has specialty of sensing without any physical contact with body. EPIC sensor collects the electrical signal which generated while pumping action of heart without any direct physical contact with body. EPIC sensors collect Heart activity in the form of electrical signal which has amplitude about 2mV for length of 20ms with bandwidth 50Hz.

The electrical signal collected by EPIC sensor is applied to instrumentation amplifier which is used for greater stability, high accuracy and for long term application. The instrumentation amplifier collects the two input from EPIC sensor in which differences between two signals are amplified and all other signals are attenuated.

Amplifier is an electronic device, which increase the amplitude of signal as per further requirement. Collected signal by EPIC sensor may consist of noise from environment and signal generated by other muscles rather than heart muscles. To remove these unwanted signals we used here filter.

Analog to digital converter used to convert analog signal to digital signal. Analog to digital converter convert continuously amplitude signal to discrete amplitude signal. This conversion is necessary to understand signal by monitor. Monitor is used to display graphical representation of heart activity.

Electrocardiography is graphical representation of heart activity. Electrocardiography is repeated cycle of P wave, QRS complex and T wave.

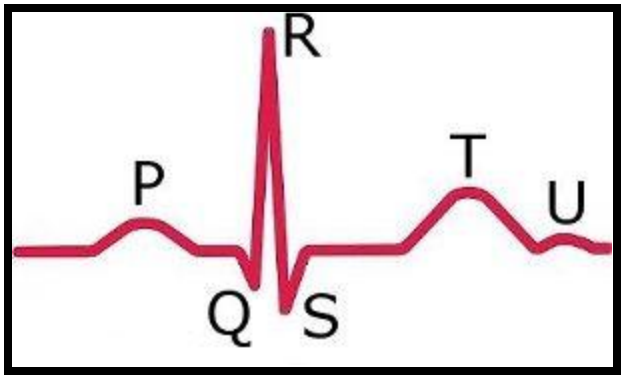

Fig. 2 Electrocardiography Waveform

Heart rate is measured by time difference between first R-peak to second R-peak. Measurement Heart rate by this method is quickest and accurate way.

IV. CONCLUSIONS

The system purposed in this paper is one of the real time health monitoring system which is capable of continuously monitoring Electrocardiography without any direct contact of a person who sits on chair.

REFERENCES

[1] Kaur, L., & Kumar, M. Predicting Heart Disease Symptoms Using Future Data Mining Trends.

[2] Dr. S.N. Pandey. B.Sc.MBBS, "PHYSIOLOGY SHIKSHA", 12 Edition, 1994.

[3] Health Chair: Implicitly Sensing Heart and Respiratory Rate UBICOMP '14, SEPTEMBER 13 - 17, 2014, SEATTLE, WA, USA.

[4] YG Lim, GS Chung, KS Park. "Capacitive Driven Right Leg Grounding in Indirect-contact ECG Measurement," *32nd Annual International Conference of the IEEE EMBS Buenos Aires, Argentina, August 31 - September 4, 2010 pp 1250-1253*

[5] KM Lee, SM Lee, KS Sim, KK Kim, KS Park "Noise Reduction for Non-Contact Electrocardiogram Measurement in Daily Life," *Computers in Cardiology 2009;36:pp 493−496*

[6] MM Laks, R Arzbaecher, JJ Bailey, DB Geselowitz, AS Berson. "Recommendations for Safe Current Limits for Electrocardiographs" *A Statement for Healthcare Professionals From the Committee on Electrocardiography, American Heart Association, 1996*

[7] R.F. Coughlin, F.F. Driscoll *Operational Amplifiers and Linear Integrated Circuits* (2nd Ed.1982. ISBN 0136377858)p.161.

[8] Patronis, Gene (1987). "Amplifiers". In Glen Ballou. *Handbook for Sound Engineers:The New Audio Cyclopedia*. Howard W. Sams & Co. p. 493. ISBN 0672219832.

[9] Toyota Demos ECG Sensing Steering Wheel, 2011. *http://mobihealthnews.com/12128/ toyota-demos-ecg-sensing-steering-wheel/.*

[10] ECG processing R-peaks Detection, 2011. *http://www.librow.com/cases/case-2.*

[11] Tanaka, S., Nogawa, M., and Yamakoshi, K. Fully Automatic System for Monitoring Blood Pressure from a Toilet-Seat Using the Volume-Oscillometric Method. Engineering in Medicine and Biology Society, 27th Annual International Conference (2006), 3939–3941.