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Review of Health Monitoring System on Chair

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ABSTRACT

Heart is muscular organ of human body which pumps blood through circulatory system. Heart attack means fails to pump sufficient blood to human body. Now a day heart attack is becomes major issues of human burdens, because of number of heart attack patient increase among the population of INDIA. So to reduce the number of patient health monitoring system is introduced. Most of the people mainly spend their time by sitting on chair so chair is the location where health monitoring system is fixed. The person who sit on chair, sensor sense his signals of body and process this signal using signal processing technique and shows his electrocardiograph on screen, also alert the patient in case of abnormal condition appears.

Keywords:— ECG, heart attack detection on chair, health chair.

I.   INTRODUCTION

Heart is internal and muscular part of human body. Heart has function to circulate blood in body. Myocardial infarction is also refer as heart attack. It causes due to lack of blood flow in heart. Human needs oxygen to survive. Heart attack occurs when blockage in blood flow and heart does not get oxygen and heart muscles begin to die. Obesity, high blood pressure, high cholesterol these are reasons for heart attack. Chest pain, short breath, excessive sweating, vomiting are the symptoms for heart attack. Electrocardiography method is used to diagnosis heart attack. The method which record tiny activity of heart using electrodes placed on skin is called as Electrocardiography.

From the recent years the technologies are used for monitoring health care like remote monitoring technologies, home based screening test which are used to monitor patient health activity. So, our proposed system is developed to monitor real time health information of patient. Mostly people interact with chair, so we choose chair to perform our system. Heart rate, body temperature along with Electrocardiograph is general health sign of human can be easily monitor using this chair.

II.   RELATED WORKS

"Health Chair implicitly sensing heart and respiratory rate" paper of author Erin Griffith tells that he measured heart rate and respiratory rate. To measure heart rate he determine EKG by using three contact electrodes two are placed at both armrest position on chair and last one used as ground. To

measure respiratory rate he used pressure sensor which placed at backrest position of chair when patient inhale, the chest of patient swells and pressure increase at back of patient which is sense by sensor. According to my search, the ford is developing a car seat which measures heart rate through cloths without any physical body contact. The sensor placed on car seat collects signal without any skin contact when human sit on car seat in position of backrest. Toyota is also developing on car steering wheel which detects Electrocardiography and will be displayed on car navigation screen. Continuously monitor heart activity using contact sensor are placed on the steering wheel.

Alexander M. Chan told in his paper "Wireless Patch sensor monitoring of heart rate, respiration, activity, and falls" that wireless Bluetooth low energy patch sensor is used consisting two electrocardiography electrodes and sensor measure heart rate, respiratory rate, posture and falls. In paper, heart attack is detected by smart phone. First Process is to place the index figure on mobile camera then it will detect peak of blood then calculate average distance between adjacent peaks for heart rate calculation. Second Process is to heart sound recording, in this 3-10 heart sound are record and compared with stored data. If the recorded sound does not match with normal sound, then phone display Abnormal heart condition, else display normal heart condition.

III. BLOCK DIAGRAM

A. *Temperature Sensor*

The amount of heat observes is sensed using sensor called temperature sensor. Mostly, there are two types of temperature sensor contact and noncontact. Examples of contact sensor are thermocouple, RTD, thermistor, thermometer, diodes, etc.
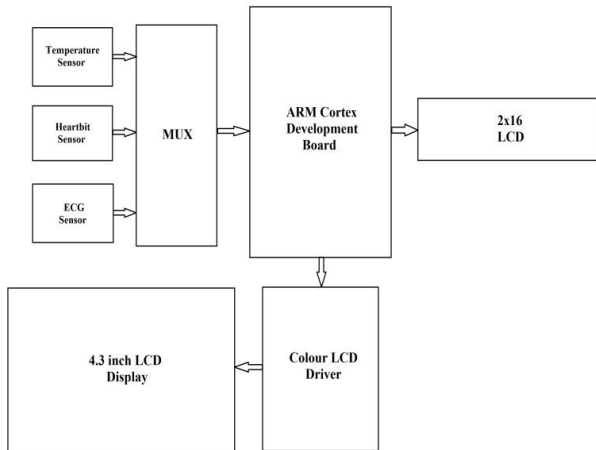

Figure 1 Block diagram of system

And examples of noncontact sensors are radiation and pyrometers. The output of temperature sensor is smaller in amplitude as well as low signal power so amplifier is used to amplify weak signal.

We have used here LM35 series temperature sensor. LM35 series sensor is an integrated circuit whose output is linearly proportional to centigrade or Celsius temperature. Because of we get directly output of LM35 series sensor in centigrade it becomes its advantage as compared to linear temperature sensor calibrated in kelvin. Accuracy is easily achieved without any external calibration or trimming. LM35 series sensor is easily interface with readout and control circuitry because of its advantages like low output impedance, linear output and precise inherent calibration. Operating range of LM35 series sensor is -55º to +150ºC.

B. *Heart Beat Sensor*

LED or LDR are used to measure heartbeat of human body. The finger should be placed in between LED and LDR and a continuous light from LED should be fall on LDR. LED used is super bright red LED with maximum light must pass through finger and detected by LDR. When the heart pumps, the finger becomes slightly more opaque and so less light reached the detector. Now, LDR reads the slight variation in the skin due each to heartbeat. This variation is converted to electrical pulse.The output signal is also indicated by a LED which blinks on each heartbeat. The output from LDR amplified to digital level using operational amplifier.

C. *ECG Sensor*

In hospital, traditionally conductive type electrodes are used with wet or dry gel. Because of disadvantages of traditional electrocardiography like electrodes metal allergy can causes skin irritation, short term use, too much expensive and single use electrodes can be replaced by noncontact Electrocardiography sensor. EPIC (Electric potential Integrated Circuit) sensor is noncontact Electrocardiography sensor. EPIC sensor detect without any physical contact with body which is discovered in UK. The electrical signal which generated while pumping action of heart without any direct physical contact with body detect by EPIC sensor. EPIC sensors collect electrical signal which has amplitude about 2mV for length of 20ms with bandwidth 50Hz.

D. *MUX*

The device which selects one of several digital or analog input and forward selected input into single line called as multiplexer or MUX. It is also called as data selector. In another word multiplexer has multiple input and single output. Mainly, Multiplexer used increase amount of data to be transfer within certain amount of time and bandwidth. Also can be used to implement Boolean functions of multiple variables. The schematic symbol for a multiplexer is an isosceles trapezoid with the longer parallel side containing the input pins and the short parallel side containing the output pin.

E. *ARM CORTEX*

A microcontroller is nothing but small computer. The microcontroller consists of programmable input/output, memory and peripherals. Microcontrollers are used for embedded applications. Microcontrollers are used in office machines, automatically controlled products, remote controls, medical devices and toys. ARM cortex is 32-bit RISC (reduced instruction set computer) ARM (Advanced RISC Machines) controller is used. This microcontroller take input depending upon input and program generates output. In the above block diagram it takes input from all sensor and depending on it generates the output.

F. *Display Driver*

A display driver is a semiconductor integrated circuit. Display driver provides an interface function between microcontroller and a particular type of display device, e.g. LCD, OLED, LED, CRT and ePaper. The display driver will take commands and data using an industry standard

general purpose serial or parallel interface, such as RS232, TTL, CMOS, etc. and generate signals with desired voltage, current, timing and demultiplexing to make the display show the required text or image.

G. *LCD DISPLAY*

The full for of LCD is Liquid Crystal Display. LCD is alphanumeric display. Alphanumeric display means it can show Numbers, Alphabets and also some special symbols. LCD can be used for showing various messages on display. Seven segment displays is similar to LCD display. Seven segment display show only some of the alphabets and numbers. Seven segment can be visualized from a longer distance than LCD display. Here we have used 16 x 2 Alphanumeric Display which means on this display we can display two lines with maximum of 16 characters in one line.

IV. RESULT AND DISCUSSION

In the system, when the victim sits on chair all sensor senses. The temperature sensor detects the temperature of victim body and show on 16x2 display.
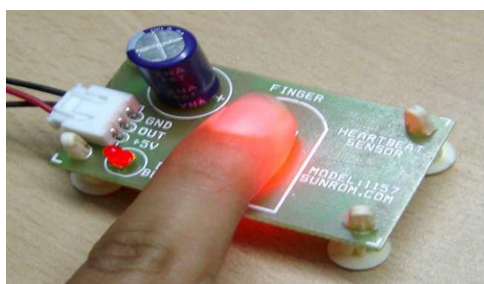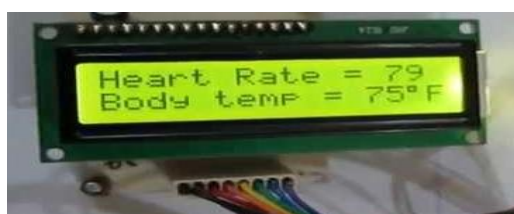

Figure 2 Heat rate sensor

Figure 3 Display of heart rate and body temperature

Heart rate is also detected when finger of victim is placed between LED and LDR. When heart pump blood light slightly varies which reaches to LDR. In this way heart rate is measured and show on 16x2 display. Using EPIC sensor all

activity is record in electric form and show on LCD display in the form of graph.

Figure 4 ECG on display

If in any case abnormality detected the alarm is become ON to alert all near person to victim sitting on chair to take any helpful action to save victim.

V. CONCLUSION

The purposed system in the paper is system which continuously monitoring Electrocardiograph of patient without any direct contact of a patient who sits on chair. This system is real time health monitoring system. Also heart rate and body temperature is also measured in this system.

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