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CARDIOPULMONARY AND BLOOD PRESSURE MONITORING IN CASE OF EMERGENCY

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ABSTRACT

'Cardio pulmonary and Blood Pressure monitoring in case of emergency' which is able to monitor several vital signals and physiological parameter in order to determine the cardiopulmonary activity during emergencies. The system which consists of three electrodes and has different sensors such as NTC, infrared and red LED, and pressure sensitive resistor to find temperature, heart rate, and SpO_2. In this project, temperature, heart rate, oxygen saturation (SpO_2) and ECG are the parameters assigned to the system to monitor. An advanced electronic control unit, floating power supply, and wireless communication support make it suitable for portable monitoring during critical cardiopulmonary failures. The monitoring system will trace the signals which will able to find the condition of the heart in emergency. In this system PIC16F877 has been used as microcontroller. A Zigbee device has been used for transmission of signals; it can transmit and receive signals within a distance of 10-20m and also in one sec 9600 bits of data can be sending and received.

Keywords: Cardio pulmonary, electronic control unit, vital signals, piezoelectric sensor

I INTRODUCTION:

This paper is anxious with a new wearable system, which is able to monitor several vital parameter and physiological variables in order to determine the cardiopulmonary activities during emergency. The innovative system consists of a multimodal broadband piezoelectric transducer based on polyvinylidene fluoride polymer integrated into a textile belt wrapped around the chest. An advanced electronic control unit, floating power supply, and wireless communication support make it suitable for portable monitoring during serious cardiopulmonary failures. The multimodal transducer is innovative in that only one sensitive element is employed to work as either an ultrasound (US) transceiver or piezoelectric sensor. The piezoelectric sensor works at low frequency and acquires both signals generated by heart apex movements and the mechanical

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movement of the chest induced by respiration. If jointly used along with an ECG wearable Holter, this transducer can be used to provide an exhaustive picture of the health status of the subject in the diagnostic and prognostic domains.

II BLOCK DIAGRAM

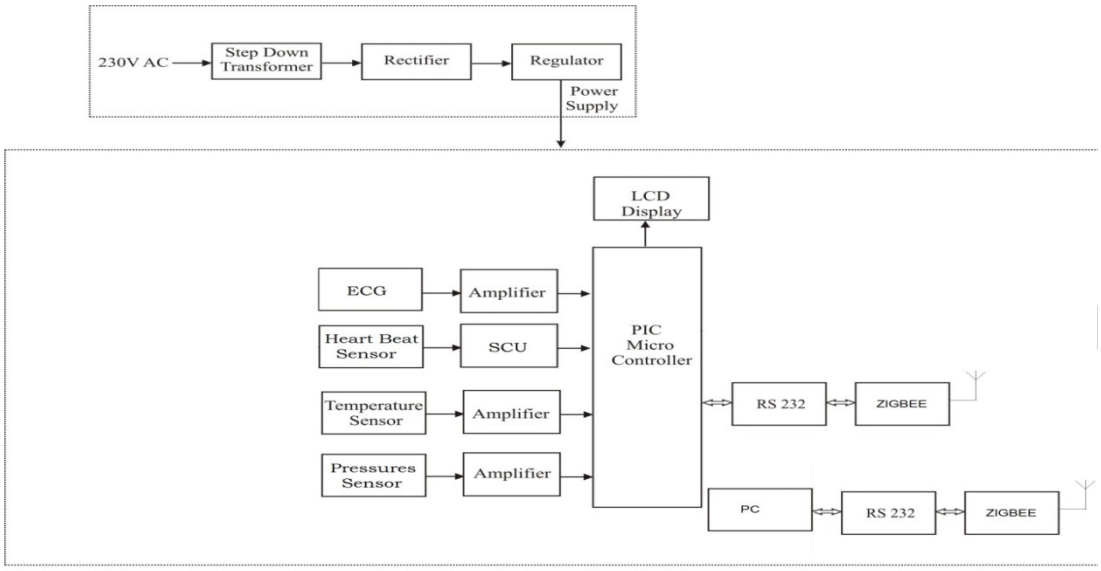

Fig 2.1 Cardiopulmonary And Blood Pressure Monitoring In Case Of Emergency

TEMPERATURE SENSOR:

A thermistor is a type of resistor whose resistance varies with temperature. Thermistor are widely used as temperature sensors, self-resetting over current protectors, and self-regulating heating elements.

Thermistor differ from resistance temperature detectors (RTD) in that the material used in a thermistor is generally a ceramic or polymer, while RTDs use pure metals. The temperature response is also different; RTDs are useful over larger temperature ranges, while thermistor typically achieve a higher precision within a limited temperature range [usually –90 °C to 130 °C].

HEART BEAT SENSOR:

Infrared sensor (IR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall.

All objects emit what is known as black body radiation. It is usually infrared radiation that is invisible to the human eye but can be detected by electronic devices designed for such a purpose. “Infra” meaning below our ability to detect it visually, and “Red” because this color represents the lowest energy level that our eyes can sense before it becomes invisible. Thus, infrared means below the energy level of the color red, and applies to many sources of invisible energy. Infrared transmitter is one type of LED which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is

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used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other. The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting it passes the IR rays to the receiver.

When receiver receives the signal from the transmitter it resistance value is low. Resistance values become high when the signal was cut. By this type of sensor sense the value. It involves the averaging the EEG activity time-locked to the presentation of a stimulus of some sort. Event-related potentials refer to averaged EEG responses that are time-locked to more complex processing of stimuli; this technique is used in cognitive science, cognitive psychology.

ECG:

An interpretation of the electrical activity of the heart over time captured and externally recorded by skin electrodes. It is a noninvasive recording produced by an electrocardiographic device. The ECG works mostly by detecting and amplifying the tiny electrical changes on the skin that are caused when the heart muscle "depolarises" during each heart beat. At rest, each heart muscle cell has a charge across its outer wall, or cell membrane. Reducing this charge towards zero is called depolarisation, which activates the mechanisms in the cell that cause it to contract. During each heartbeat a healthy heart will have an orderly progression of a wave of depolarization that is triggered by the cells in the sinoatrial node, spreads out through the atrium, passes through "intrinsic conduction pathways" and then spreads all over the ventricles. This is detected as tiny rises and falls in the voltage between two electrodes placed either side of the heart which is displayed as a wavy line either on a screen or on paper. This display indicates the overall rhythm of the heart and weaknesses in different parts of the heart muscle.

Usually more than 2 electrodes are used and they can be combined into a number of pairs (For example: Left arm (LA), right arm (RA) and left leg (LL) electrodes form the pairs: LA+RA, LA+LL, RA+LL). The output from each pair is known as a **lead**. Each lead is said to look at the heart from a different angle. Different types of ECGs can be referred to by the number of leads that are recorded, for example 3-lead, 5-lead or 12-lead ECGs (sometimes simply "a 12-lead"). There may, or may not be any permanent record of a 3- or 5-lead ECG depending on the equipment used.

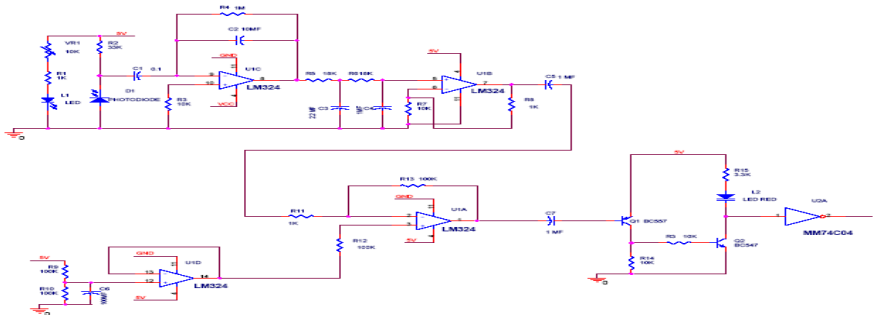

Figure 2.2 Heart Beat Circuit

Measuring of Heart Rate:

- The pulse rate (which in most people is identical to the heart rate) can be measured at any point on the body where an artery is close to the surface.

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Such places are wrist (radial artery), neck (carotid artery), elbow (brachial artery), and groin (femoral artery). The pulse can also be felt directly over the heart. NOTE: The thumb should never be used for measuring heart rate.

Measuring Pulse Rate from Wrist

- Producing an electrocardiogram, or ECG (also abbreviated EKG), is one of the most precise methods of heart rate measurement. Continuous electrocardiographic monitoring of the heart is routinely done in many clinical settings, especially in critical care medicine. Commercial heart rate monitors are also available, consisting of a chest strap with electrodes. The signal is transmitted to a wrist receiver for display. Heart rate monitors allow accurate measurements to be taken continuously and can be used during exercise when manual measurement would be difficult or impossible (such as when the hands are being used).
- It is also common to find heart rate by listening, via a stethoscope, to the movement created by the heart as it contracts within the chest.

III CONCLUSION

The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

The system based on Atmel microcontroller is found to be more compact, user friendly and less complex, which can readily be used in order to perform. Several tedious and repetitive tasks. Though it is designed keeping in mind about the need for industry, it can extended for other purposes such as commercial & research applications. Due to the probability of high technology (Atmel microcontroller) used this fully software controlled with less hardware circuit. The feature makes this system is the base for future systems.

The principle of the development of science is that "nothing is impossible". So we shall look forward to a bright & sophisticated world.

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