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Heartbeat Monitoring System Using Arduino

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ABSTRACT: A heartbeat sensor is an electronic device that is used to measure the heart rate which is the speed of the heartbeat. Checking body heart rate, temperature, and blood pressure are the basic necessary things that we do in our routine checkup or to keep us updated about any possible health concerns. Heart rate is generally measured in two ways one way is a physical way and the other is a digital way. In the old physical way, we check the pulse at the wrists or neck. And digitally, we use a Heartbeat Sensor. Where in order to measure the body temperature and Blood Pressure we use thermometers and a sphygmomanometer respectively. In this project to detect the heartbeat using fingers, we are using a heartbeat sensor. When the heart pumps the blood to other organs amount of blood inside the fingertip increases and when the heart contracts the amount of blood inside the fingertip decreases. The continuous pulsing of blood inside the represents heart rate and counting the number of pulses in one minute gives us heart rate in beats per minute (bpm).

KEYWORDS: Heart, Heartbeat, Pulse, Pulse sensor, monitor, Heart rate.

I. INTRODUCTION

Monitoring heart rate is very important as it determines the condition of the heart. There are so many ways to measure, but the easiest way to check the heart rate is using a Heartbeat Sensor. Heartbeat Sensor is nowadays used in Smart Watches, Smart Phones, etc. The heartbeat is measured in bpm, which shows the number of times the heart is expanding and contracting in a minute. For an extended time, scientists and researchers are using this method for the correct measurement of the heartbeat. In earlier days to measure the heartbeat, there used to be a conductor medium that was placed within the chest of a patient. However today, by use of the pulse sensor on one's fingers we can measure the heart rate of a person in a fraction of a second. The conventional human heart rate is 72 beats per minute. For youngsters, the heart rate is somewhat close to 90 beats per minute. The esp8266 wifi module plays a significant role in the heartbeat monitoring system. The pulse senses the state of the heart that it is expanding or contracting. When there is a low heart rate, scientifically it is called bradycardia. The lower heartbeat can be a risky thing. To make your heart rate normal, regular exercises are needed. The heart rate monitoring system is programmed by using Arduino Uno. In this project, the data that is heart rate is displayed over connected display module.

II. LITURATURE SURVEY

Every researcher uses different methods and technologies to carry out the process of heart-rate monitoring. Some of the important researches are reviewed in this paper. In this research paper, we are going to make a Heart Beat Detection and Monitoring System using Arduino that will detect the heartbeat using the Pulse Sensor and will display the reading in 16x2 LCD in BPM (Beats Per Minute). The Heartbeat Sensor works on a principle called a Photoplethysmograph. The results obtained from this process and the result obtained from the manual test that involves the counting of heart rate were found similar. However, this system needs further investigation to upgrade from time to time and can be updated with new technologies which may be useful to reduce the cost and errors as well. Most monitoring systems work in offline mode but our system has been designed that a patient can be monitored remotely in real-time. This system consists of sensors that measure the heart rate i.e. speed of the heartbeat. Monitoring body temperature, heart rate, and blood pressure are the basic things that we do to keep ourselves healthy. Parameters are displayed on the LCD monitor. The transmitted data is wireless and is sent through a microcontroller. Heartbeat is counted through pulse sensor in Beats per Minute and the data are sent to the microcontroller for

transmission to receiving end. Finally, the data are displayed on a computer screen and LCD module. This system could be made available at a reasonable cost with great effect accuracy.

III. HEART RATE MONITORING SYSTEM

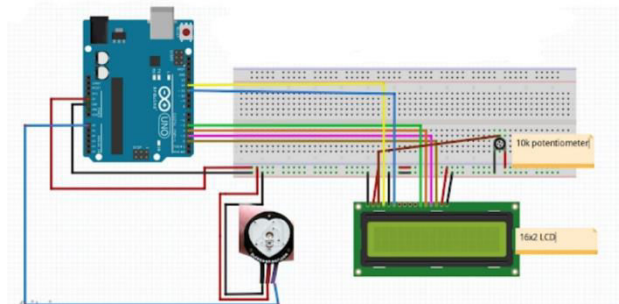


Figure 1: Circuit diagram of Heart rate monitoring system

1. SIGNIFICANCE OF HEART RATE MONITORING SYSTEM.

A heart rate monitoring system is a system that allows us to measure and display heart rates in real-time. It can be used to check heart rate in a low cost and efficient way. Keeping an eye on your heart rate regularly assures you that your heart is in good condition and with a normal bpm. A heart rate monitor can indicate if you are exercising too hard and maybe you need to slow down.

2. PULSE SENSOR



Figure 2: Pulse Sensor

Pulse Sensor is a simple sensor used in many devices. It has three pins ground, Vcc, and the input signal. This sensor is mostly used with Arduino. This sensor is generally placed on the fingertip and plugged into Arduino using some jumper cables. It can also include a monitoring app that converts your heartbeat data into graphical format.

3. 16*2 LCD module



Figure 3: 16*2 LCD module

The 16*2 LCD module is an Alphanumeric LCD display module which means it can display alphabets and numbers. The required Operating Voltage for the display is 4.7V to 5.3V. It consumes 1mA current without a backlight. the display Consists of two rows each row can print 16 characters. It can work on both 8-bit and 4-bit mode.

IV. PROPOSED FRAME WORK

Heartbeat sensor/Pulse sensor is connected to Arduino using pins. The signal pin is connected to A0 pin, VCC is connected to 5v, and the ground(GND) pin is connected to the ground (GND) pin of Arduino. After this connection, the Arduino is connected to the laptop, the software Arduino IDE is used to upload the Arduino code from the laptop to the Arduino board. After this connection, some random values will be displayed on the screen. After Completion, to check the heart rate putting a finger on the sensor will display the heart rate in bpm format. After this, the 16*2 LCD module is connected to Arduino to display heart rate. The LCD module is connected to Arduino using a breadboard. After this code for the display module is uploaded to Arduino using Arduino IDE. Once all the connections are arranged a finger is placed on the sensor. And the heart rate is displayed on the LCD module connected to it.

V. EXPERIMENTAL RESULT

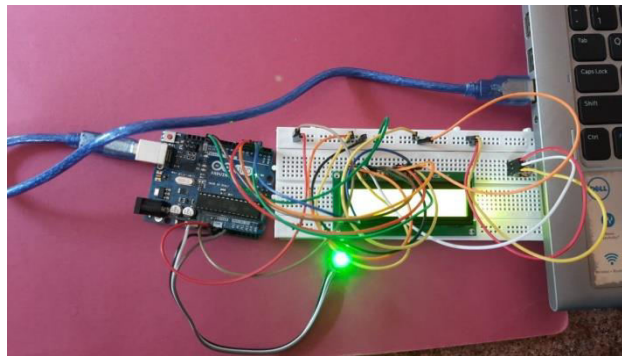


Figure 4: Connection

The above figure shows the connection between Arduino, LCD module and heartbeat sensor. The programming code is transferred to an Arduino board using Arduino IDE software. Arduino is connected to pc to get the heart rate on pc as well as on the LCD module.

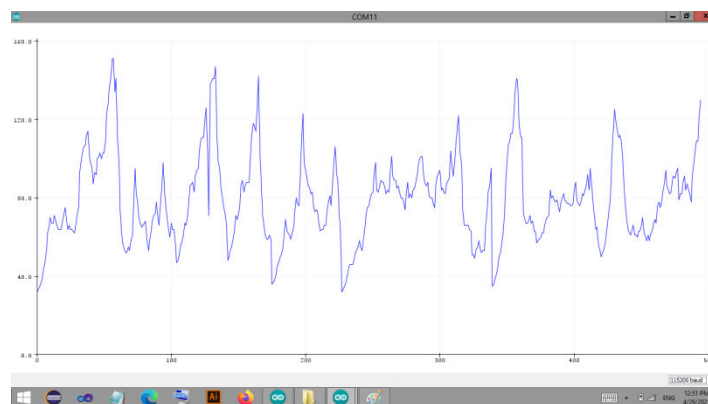


Figure 5: Heart rate graph



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