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# Cardiac Health Monitoring System

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**Abstract**
When we hear about cardiac health heart rate and blood pressure comes up a lot. Both the heart rate and blood pressure indicate how well our heart is working and can signal potential cardiac problems. Heart related diseases are increasing day by day, and there are some situations where there is no doctor or clinic nearby for example in rural areas and the patients do not recognize their condition. In this project we implement heart rate measurement from the fingertip using Arduino uno microcontroller. The values from the microcontroller board will be saved in an excel sheet and in the database which are then sent to the doctor. The doctor checks the values online and sends them any medical advice and updates the user using a electronic mail.

**Introduction:**
With the advancement of technology, we are able to use Arduino in this project to digitally sense body temperature and heart rate. The primary reason Arduino is utilised is that it has the ability to detect its surroundings by receiving data from a variety of sensors and to influence them by controlling lights, motors, and other actuators. The Arduino programming language is used to programme the board's microcontroller. A fundamental metric for assessing and diagnosing human health is body temperature. The heart rate was determined using a heartbeat sensor. With this tool, one can test their mean artery pressure (MAP) in approximately a minute, and the Android will show their accurate body temperature. The device is capable of measuring physiological variables including heart rate (both systolic and diastolic), pulse rate, and others. In order to make the patients more comfortable, the project's goal is to assist the general population in taking care of their health in the convenience of their own homes. To that end, it is necessary to give them access to a portable health monitoring system that is affordable and simple to use and other actuators. The Arduino programming language is used to programme the board's microcontroller. A fundamental metric for assessing and diagnosing human health is body temperature. The heart rate was determined using a heartbeat sensor. With this gadget, you may test your mean artery pressure (MAP) in about a minute, and your precise body temperature will be shown on your Android mobile. More than 2 million people are having heart attack. If these people could keep an eye on their heartbeat, it would be beneficial. We have a difficulty. This is how our project concentrates on how to solve this issue and get through it. The number of heartbeats per unit of time, commonly expressed as beats per minute, is referred to as heart rate (bpm). Human heart beats rapidly to deliver oxygen-rich blood to muscles and remove waste materials from tissues. Heart rate can shift depending on how much oxygen and carbon dioxide the muscles need to absorb and expel, such as during activity or sleep. Based on fitness, age, and heredity, it also varies greatly amongst people. Therefore, a faster heartbeat is required to pump out more blood that is oxygenated. The heart rate throughout workout routines provides a clear indication of how well the practise is enhancing health. Adult males typically have a resting heart rate of 70 bpm, whereas adult females typically have a heart rate of 75 bpm.

A heart rate monitor is basically a gadget that computes the beats per minute from a sample of heartbeats in order to easily follow heart status. Heart rate monitoring is a common practise among medical practitioners.

By reducing expenses, this project enables healthcare authorities to maximise the quality and scope of healthcare services. This project enables the ability to maintain the standard and accessibility of care while skillfully managing financial and human resources as the population grows and the demand for services rises.

**Existing System**

The existing technology and the system is semi automatic which requires nurses to be present at the patients side to manually record the blood pressure and heart rate values. In, the medical field, now a days patient take actively part in collecting and reviewing their reports. But in the case of diseased, disabled and elderly people, it is highly impossible to collect those reposts by their own.

**Disadvantages**

1. Patients need to move to hospitals and have to take doctor appointment.
2. Needs to spend a lot of money.
3. They need to spend a lot of time waiting in queue

**Proposed System**

CARDIAC HEALTH MONITORING SYSTEM we are going to develop a prototype for measuring the heart rate and the blood pressure values because in hospitals they are using heavy electronics devices which cannot be afforded by people. The developed device must be able to monitorthe heart rate in a continuous interval of time and will it alert the patient if the readings are close to the critical level. It offers an advantage over portability over tape based recording systems.

**Advantages:**

- Provides more comfort to patients.
- Risk reduction.
- Affordable and easy to operate.
- It saves time as people need not to wait in the long queue to get the testing done or to get the reports.

**Literature Survey**

The term “Cardiovascular disease” includes a wide range of conditions that affect the heart and the blood vessels and the manner in which the blood is pumped and circulated throughout the body. Cardiovascular diseases (CVD) results in severe illness, disability and death.

According to the World Health Organization (WHO) there are over 12 million deaths that occurworldwide, every year due to cardiovascular diseases. Half of the deaths in the United States and other developing countries occur due to cardiovascular diseases and also the chief reason of deaths in numerous developing countries and is regarded as the primary reason behind deaths in adults.

**Paper:** ECG signal processing and heart rate frequency detection methods.
**Author:** J. Parak, J. Havlik
**Results:** The heart rate frequency algorithms and the digital filters that were created are relatively straightforward and have a modest order. It reduces computer time while processing the ECG signal very effectively. Because of this, these algorithms can be easily included into a microprocessor unit. It might be argued that differential computing techniques are preferable for real-time processing implementation based on the application of the computing algorithms to the digitally filtered ECG signal that was recorded during the stress test.

**Paper:** Measurement of heart rate using Photoplethysmography
**Author:** Ahmad, Nazmus Saquib, Md. Tarikul Islam Papon, Ishtiyaque AsNhikur Rahman
**Results:** Results from the device are within acceptable bounds. This heart rate monitoring option is more affordable than the alternatives. However, by making a few adjustments, the tool may be made a little more dependable.

**Paper:** Patient monitoring system
**Author:** sharad Srivastava, Dhamendra Pandit
**Results:** Working on a wireless display of temperature and heartbeat using an ATmega328 microcontroller is part of this paper (Arduino Uno). The majority of

monitoring systems in use today operate in offline mode, however our technology is set up to enable real-time remote patient monitoring. The sensors in this system, which are managed by a microprocessor, measure the patient's heart rate and body temperature. On the LCD monitor, both parameters are shown. Wireless transmission of the data is made possible by a microcontroller.
prospected routes and these serves

Figure.5. Arduino connected to laptop

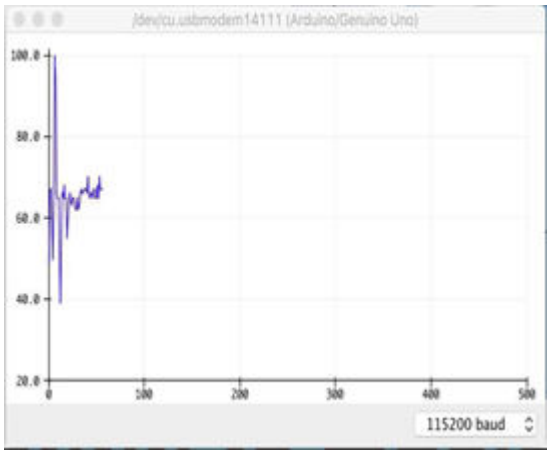
**Paper:** Design and development of patient monitoring system
**Author:** Azra hazwanie, radzi ambar
models
**Results:** The temperature and pulse rate sensors that were presented and assessed were used in low cost vital sign monitoring systems. The outcome of the experiment demonstrates the value of the chosen sensors for the suggested system. Temperature sensors have been put to the test to gauge a subject's body temperature in three different situations: freezing, normal, and hot. While measurements were made twice, once after jogging and once at rest, while the pulse sensor was tested by a participant.

**Problem Analysis**
A heartbeat sensor is a monitoring tool that enables users to either record their heart rate for subsequent analysis or measure their heart rate in real time. It offers a straightforward method for researching cardiac function.
When a finger is placed on this sensor, which tracks blood flow through the finger and is meant to provide a digital output of the heartbeat, it sends out information about the heartbeat. International Journal of Engineering Science and Computing, April 2017 6665 http://ijesc.org/ The beat LED flashes on in units with each heartbeat when the sensor is in operation. The Beats per Minute (BPM) rate can be measured by directly connecting this digital output to the microcontroller. It operates on the idea that each pulse causes a change in the amount of light that is modulated. An excellent plug-and-play heart rate sensor for Arduino is the Pulse Sensor. It also comes with a free monitoring app that displays a real-time graph of your pulse.

If you're developing an exercise regimen, researching your activities, or trying to understand your anxiety levels, heart rate data might be incredibly helpful. If you're developing an exercise regimen, researching your activities, or trying to understand your anxiety levels, heart rate data might be incredibly helpful. That issue can be resolved with Pulse Sensor Amped. A heart-rate sensor for Arduino that is plug-and-play is called the Pulse Sensor Amped. Students, artists, sportsmen, and game and mobile developers can use it to quickly incorporate real-time heart-rate information into their products. It simply combines a straightforward optical heart rate sensor with noise suppression circuitry for amplification, making it quick and simple to obtain accurate pulse readings. Additionally, it consumes less power, using only 4mA at 5V, making it ideal for mobile applications. You can read heart rate by simply attaching the Pulse Sensor to your earlobe or fingertip and connecting it to your 3 or 5 Volt Arduino.

There is no soldering necessary because the 24" cable on the pulse sensor is terminated with standard male headers. Of course, Processing sketches and example Arduino code are both accessible for visualising heart data.

Following the completion of the microcontroller and sensor setup, the Arduino board must be linked to a power source. This connection is depicted in the image above. The microcontroller is connected to the laptop via the USB connector because serial communication is used in this instance to display the result or the heartbeat that was detected. With the help of the Arduino compiler, the programme is now compiled and uploaded into the Arduino board, and the outcome is displayed in the serial monitor of the so-called compiler and also the bpm is calculated.




**Conclusion**

In our research proposal, we attempted to offer a comprehensive document for heart attack detection. We do, however, have a plan for this research. According to researchers in the US, a heart microeconomic microchip will be implanted in a human blood artery within the next ten years, according to the top daily in India, Time of India. The smartphone will gather data and transmit it to us. Researchers are working to put Microchip's specifications for using the technology in smartphones into practise. In the future, we'll try to use this technology. For hybrid networks, we suggest a distributed routing protocol (QOD) that is focused on providing QoS. If this technology advances, our project will be able to use it to identify heart blockages.

**Future Enhancements**

- EEG, ECG and other health parameters can also be monitored
- Continuous monitoring and future diagnosis can be performed via the same system (TELEMEDICINE).
- More than a single patient at different places can be monitored using single system.

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