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C A R A S

Full Length Research Article

Disease Prevention and Patient Health Development Biometric Heart Rate Sensor

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A B S T R A C T

Technological innovations in the field of disease prevention and patient health have contributed to the development of areas such as the surveillance system. Heart rate is an important health parameter that is directly related to the sound of the human cardiovascular system. The heart rate reflects various physiological conditions, such as the number of heart beats per minute, biological workload, stress at work, and concentration on tasks, drowsiness and active state of the autonomic nervous system. It can be measured by ECG waveform or by pulse sensing - rhythm expansion and contraction through the artery in the form of blood through the normal contraction of the heart. The pulse can be felt from areas close to the arterial skin. This paper describes a technique for measuring heart rate through fingerprint and arduino. It is based on the core of photopeltismography (PPG), an invasive method for measuring blood volume variability in tissues using a light source and detector. When the heart is beating, it actually pumps blood throughout the body and also changes the amount of blood inside the finger artery. These fluctuations of blood can be detected by the optical sensing mechanism placed around the fingers. The signal can be extended and sent to Arduino with the help of serial port communication. With the help of processing software heartrate monitoring and counting is performed.

Key words: Arduino, Heartbeat, Heart rate sensor, Fingerprint sensor

The human heart is the most significant organ which makes the human body framework to work appropriately and constantly. The heart siphons the blood to all organs like lungs, kidney, etc. The ordinary pulse ranges from 60 to 100 beats for each moment. In the event that an individual has pulse more prominent than 100 beats for each moment it is known as tachycardia. It is likewise broke down that in the event that the individual has higher pulse, at that point the working effectiveness of the heart will be diminished soon lastly causes cardiovascular ailments like respiratory failure. So as to lessen the danger of cardiovascular sickness the heart's condition ought to be checked as often as possible. This paper manages heart beat checking by using a heartbeat sensor and a fingerprint module. The heart beat sensor detects the heart beat and the finger print module identifies the user's finger so that it displays the user's name along with the heart beat on the display screen.

Components used
- ARDUINO UNO (MICROCONTROLER-ATmega328P)
- KY-039 Heartbeat Detector
- POWER CIRCUIT

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- Fingerprint Module R305
- LCD

MATERIALS AND METHODS

It is based on the principal of photoplethysmography (PPG) which is non-invasive method of measuring the variation in blood volume in tissue using a light source and detector. In this project, we have Arduino uno microcontroller which acts as brain of our system; hence the entire system program is stored in it. We have used finger-print sensor and heart rate sensor. The heart rate sensor unit consists of an infrared light-emitting-diode (IR LED) and a photo diode. The IR LED transmits an infrared light into the fingertip, a part of which is reflected back from the blood inside the finger arteries. The photo diode senses the portion of the light that is reflected back.
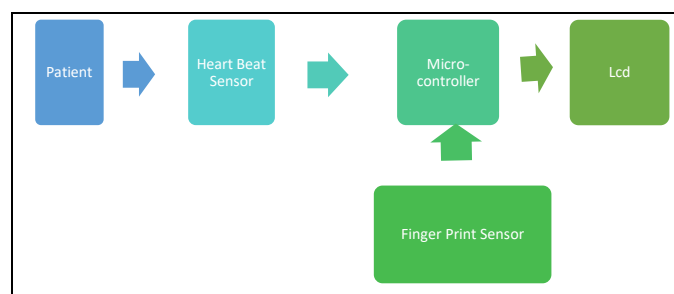

Fig 1 Principal of photophelthysmography (PPG) system

The intensity of reflected light depends upon the blood volume inside the fingertip. So, every time the heart beats the amount of reflected infrared light changes, which can be detected by the photo diode. With a high gain amplifier, this little alteration in the amplitude of the reflected light can be converted into a pulse. The finger print sensor matches the biometric images which is already enrolled in the database once it gets matched the person's heart rate sensor is displayed in the lcd.
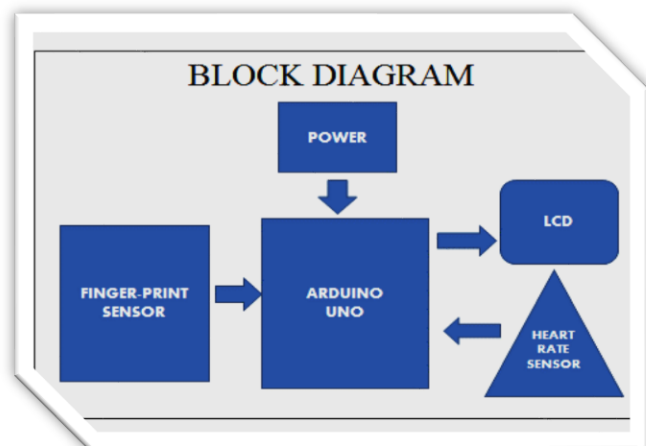

Fig 2 Block diagram of photoplethysmography (PPG) system

RESULTS AND DISCUSSION

When all the hardwares are connected all together we get the desire result. The power supply supplies power to the circuit, heartbeat sensor senses the heartbeat and gives us the heart rate of the user and fingerprint module detects the user finger which is already updated in the arduino software. Thus, the heart rate of the user is displayed on the LCD along with their respective names. As this is cost effective and portable this can be used by anyone, this is an efficient system and hence provides flexibility and shows improvement over continuous monitoring and alerting system.

CONCLUSION

The design and development of a low-cost Aroudino (Atmega328P microcontroller) based device for measuring the heart pulse rate has been described. ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows you to upload new code to it without the use of an external hardware programmer. The device is economic, portable, durable, and cost effective. The device is efficient and easy to use. Sound can be added to the device so that a sound is output each time a pulse is received. The maximum and minimum pulse rates over a period of time can be displayed. Serial output can be attached to the device so that the pulse rates can be sent to a PC. Machine learning and deep learning algorithms can be implemented for predicting the heart diseases based on the recorded data. This shows the applications in medical industry and biomedical engineering.

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