Detection of the pulse rate from fingertip using open-source Arduino software and piezo disc sensor

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ABSTRACT

The Arduino is the open-source Processing IDE and it has been used to display the output of the sensors on the computer screen. The piezo disc sensor has the piezoelectric properties which can act as the medium which translates the vibration of the blood flow when the heartbeat pulses as an analog input [1]. There are many other methods to measure heart rates like Phonocardiogram (PCG), ECG, blood pressure wave form and pulse meters but these methods are clinical and expensive [2]. In this experiment, the pulse from the fingertip was detected using piezo disc sensor and open-source Arduino programming software. This measurement system is simple and cheap to detect the general heart pulse easily and quickly without the other instruments .

Figure 1 shows the measurement setup of detecting the pulse. Power cable (Red) of the piezo disc connected to analog pin 0 of the Arduino circuit board and ground cable (Black) of the piezo disc goes to ground of the board. The pulses from the fingertip were detected through the piezo disc for one minute and measured five times. Figure 2 shows the comparison of the results form piezo disc sensor and heart rate sensor. The bpm was resulted generally from 60 to 90 depending on the way of pressing on the piezo sensor. The actual heart rate at that time was detected using Samsung Health Heart rate sensor which measures heart rate in beats per minute (bpm) using an optical LED light source and an LED light sensor. After measuring and taking average, the error percentage was was around 2.7 % comparing with the data from Samsung Health heart rate sensor. In a conclusion, the heart rate can be understood by detecting the pulse with the piezo disc and Arduino unless other electrical instrumentation.
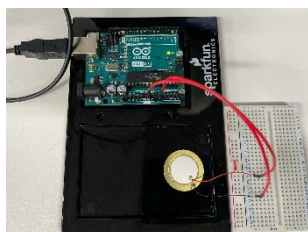
Figure 1 the measurement setup of detecting the pulse.

Pulse rate per minute (BPM) from piezo disc sensor	Heart rate (BPM) from Samsung Health Heart rate sensor
78	
60	
78	72
84	
72	

Figure 2. Comparison of the results form piezo disc sensor and heart rate sensor

References

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