

Development of a Heart Rate Monitoring System (Part II)

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Abstract

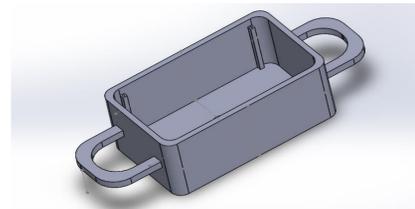
This project involves the development of a heart rate monitoring device capable of transferring numerical data to an external computer. It was proposed by Dr. Pi-Sui Hsu who is a staff member of NIU's College of Education. The device's purpose is to determine the anxiety levels of middle school students conducting engineering related activities. Using an infrared photodiode in conjunction with a pair of LED's, a waveform is created which can be converted into a pulse in beats per minute. This data is then transferred to a computer in the form of an excel file.

Introduction

The device would be worn around the wrist of the students undergoing engineering activities and will record each occurrence of anxiety. Although there are similar devices on the market, our team's device is affordable and can send data to an excel file. Most devices capable of sending data only do so to phone applications specifically designed for that product.

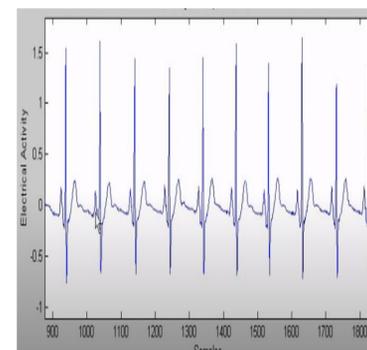
Methods and Materials

The Arduino, LEDs, and photodiode were soldered to a printed circuit board (PCB). The LED's and photodiode respectively emit and receive light from the user's wrist to create a waveform which is converted to a pulse in BPM. The soldered components are fitted into a housing box small enough to fit on the wrist of a young student.



Results

Below is an image of the waveform created by the LED's and photodiodes. This data is not shown to the user. However, it is converted to an excel file which shows the BPM every 15 seconds.



Discussion

The average heart rate for an adolescent participating in a mild activity like school ranges from 70-100 BPM. When stress or anxiety occurs, these values will spike around 140-180 BPM. This physical occurrence is evident in the data as a somewhat steady stream of values shows a sudden increase.

Conclusions

Although there are thousands of heart rate monitors on the market, most do not contain the function of wirelessly transferring data to a computer. Additionally, the ones that do are typically twice the price as our device. Each aspect of the design was carefully considered and tested to ensure quality, safety, and functionality.

Acknowledgements

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