Heart rate monitor

Ubiquitous Computing Mini Project

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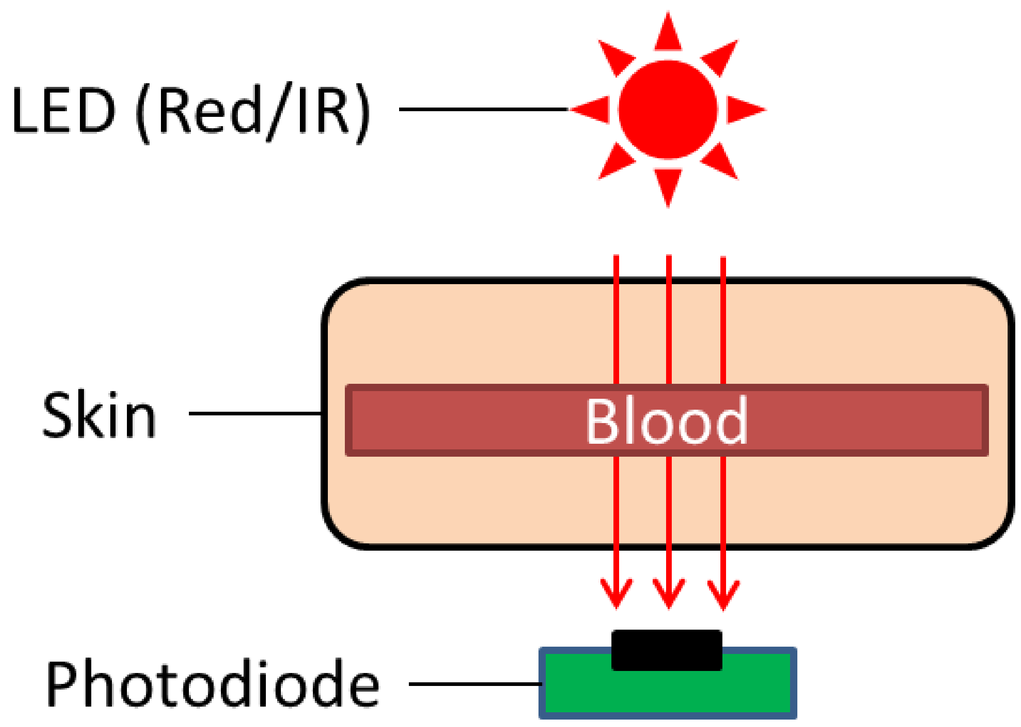
Abstract

There are many heart rate monitor devices available, which can even be connected to a smartphone or computer via bluetooth. However, the **internal functionality of these devices is not exposed to the user**, so there cannot be made any statements about their precision and quality. The purpose of this project is to create a **fully functional heart rate monitor device** from scratch, so all internal functionality is known to the user and changes can be applied to it.

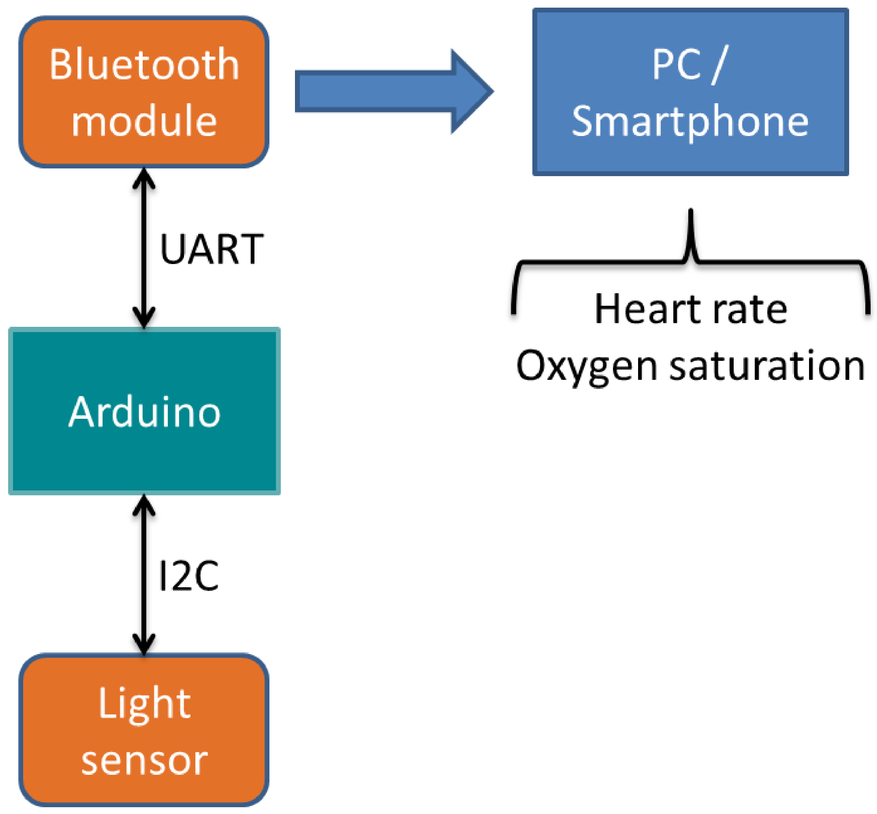


Measure the heart rate

The heart rate is measure by using the **photoplethysmogram technique**. This method measures the change of blood volume through the absorption of light. A **LED** emitts red light, which shines through a body part (e.g. finger). On the other side a **photodiode** measures the intensity of light, that traversed the tissue. If the heart pushes blood through the vessels, **more oxygenatd blood lays between LED and photodiode**. Since blood changes its color according to its grade of oxygenation, more or less light gets absorbed by it.
The values of light intensity and its changes over time are used to clalculate the heart rate of a person.

Prototype Features

- ATMega for measuring light intensity
- **Highspeed calculation** using a desktop pc (leads to high resolution)
- filtering, transforming, convolution and applying a window function done by the application
- **high quality and high precision** heart rates
- visually appealing **cross platform GUI** with QT



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