VRIJE UNIVERSITEIT BRUSSEL

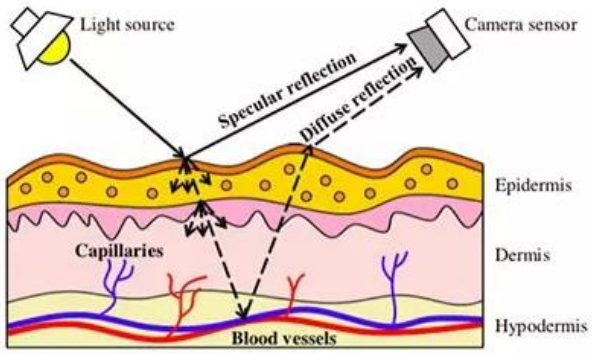
Promotor: Bruno da Silva, Johan Stiens

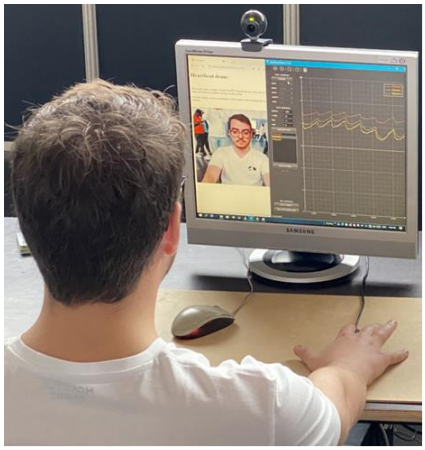
Remote Photoplethysmography (rPPG) monitoring

Introduction

Photoplethysmography (PPG) is a non-invasive method for detecting cardiovascular pulse waves that travel through the human body. It is based on the determination of the optical properties of vascular tissue by means of a probe, which consists of an LED-PD configuration (Light Emission Diode – Photodetector). Analog techniques are commonly used to determine the intensity of the light received by the photodetector. In these, the intensity of the light reaching the PD is measured and the variations, caused by changes in blood volume, are amplified, filtered and recorded as a voltage signal.

Remote PPG is the same principle as traditional PPG measurements but it is a contactless measurement. It measures the variance of red, green, and blue light reflection changes from the skin, as the contrast between specular reflection and diffused reflection. Specular reflection is the pure light reflection from the skin. Diffused reflection is the reflection that remains from the absorption and scattering in skin tissue, which varies by blood volume changes.





Objectives of this work

The main objective of this thesis is the measurement of raw PPG signals using rPPG. The signal quality obtained should be compared with traditional PPG systems. The student must compare and evaluate the signals obtained in terms of signal resolution, SNR (Signal to Noise Ratio), SQI (Signal Quality Index), system complexity and power consumption. Simple Heart Rate and SpO2 algorithms can be implemented to demonstrate the system application.

Expected student profile

- Interested in physiological sensing
- Basic knowledge of signal processing

References

- Yang, Cheng, Gene Cheung, and Vladimir Stankovic. "Estimating heart rate and rhythm via 3D motion tracking in depth video." IEEE Transactions on Multimedia 19.7 (2017): 1625-1636.

- Lai, Marco, et al. "Perfusion monitoring by contactless photoplethy smography imaging." 2019 IEEE 16th International Symposium on Biomedical Imaging (ISBI 2019). IEEE, 2019.

Location

Building K, Etterbeek Campus

Contact

bdasilva@etrovub.be; jstiens@etrovub.be