

Bachelor- / Masterthesis

» Optical Heartbeat Detection«

The research group

Circuit and System Technology

offers a

Bachelor-/ Masterthesis or Student Job

Detecting the heartbeat is of immense importance as it serves as a fundamental indicator of cardiovascular health. By monitoring heart activity, medical professionals can diagnose conditions such as arrhythmias, heart disease or even early signs of heart problems. In addition to clinical applications, heart rate measurement is also important for other applications, such as detecting vital signs in self-driving vehicles or measuring vital signs in body armor.

This work aims to analyse, compare, implement, and validate various optical methodologies for heartbeat measurement.

Normal Heartbeat



A sketch of a normal heartbeat.

Task Description:

In this thesis, an optical heartbeat detector shall be realized. The work content includes:

- Literature research
- System Consideration
- Demonstrator setup
- Preprocessing the measured data by an adaptive and optimal filter.
- Testing

Requirements:

- Solid knowledge of circuit and system design.
- Fundamental knowledge on optical systems is desirable but not required.
- Fundamental knowledge of human biology and in particular of the human heart is desirable but not required.
- Experience with simulation environments such as LtSpice, PSpice, ADS or similar.
- Experience with KiCad or another PCB tool.
- Experience with Matlab and/or Python is desirable but not required.
- Programming C++ is desirable but not required.

In case of interest, please send an E-Mail containing your latest transcript of records to Stephan Kruse (stkruse@hni.upb.de)