



## Master's Thesis Proposal

**Off-pump coronary artery bypass (OP-CAB)** surgery is a procedure to treat coronary artery disease. A special feature of OPCAB surgery is that the heart remains beating throughout the procedure. Traditionally, a cardiopulmonary bypass pump temporarily replaces the heart's function so that the heart can be stopped during surgery. But OPCAB works without the cardiopulmonary bypass which provides some benefits to the patient but makes the procedure more challenging for the surgeon. We have anecdotal evidence that the surgeon's and the patient's heart beats might synchronise during OPCAB surgery. And this might be the key to favourable outcomes. As a next step, we want to investigate whether the perceived heart beat synchronisation is also evident in electrocardiograms.

The cardiac surgery team at Klinikum Dortmund provided us with long-term electrocardiograms from the surgeon, the anaesthesiologist, and the patient during 24 individual OPCAB surgeries. With these data, we want to answer the following research questions:

1. Do the heart beats of surgeon, anaesthesiologist, and patient synchronise during OPCAB surgery?
2. If so, when exactly are the heart beats in synchronisation?
3. How does the synchronisation happen? Who is the driver and who reacts?
4. Is synchronisation correlated with the procedure's outcome?

Jonas Chromik  
jonas.chromik@hpi.de  
G-2.1.20 @ HPI Campus 3

Prof. Dr. Bert Arnrich  
bert.arnrich@hpi.de  
G-2.1.14 @ HPI Campus 3