**Title**  
**Uterine electrophysiological monitoring outside pregnancy**

**Main supervisor**  
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**Location**  
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**Background**  
In developed countries, infertility represents a serious psychological and economic burden. Uterine contractions play a determinant role in infertility: a relatively quiescent (not contracting) uterus seems in fact a prerequisite for successful conception and a healthy pregnancy afterwards. The properties of uterine contractions could be controlled by dedicated drugs. However, currently there is no method for an objective and continuous characterization of uterine contractions outside pregnancy. The electrohysterogram (EHG) is the measurement of the electrical activity originating uterine contractions and has been studied during pregnancy. Potentially, analysis of the EHG can provide a reliable and objective tool also for non-pregnant women. Preliminary studies are promising, but EHG analysis and interpretation is highly challenging due to the low amplitude of the signal and the innovative use of this technique outside pregnancy.

**Description**  
This master thesis project focuses on developing new methods for the analysis of the EHG and aims at characterizing and classifying uterine activity in non-pregnant women. The scope of the project will be defined based on the interest of the student and can include following aspects: extracting and understanding physiologically meaningful features from the EHG, developing methods for detecting the contractile periods, and improving the robustness to noise. The techniques used can vary from more traditional signal processing and modelling approaches to machine learning.

**Keywords**  
Healthcare/Perinatology, Electrohysterography (EHG), Signal analysis, Parameter estimation, Algorithm development and simulation, Jointly with clinical partners.

**Elective courses**  
5LSCO Biomedical sensing technology  
5LSLO Machine learning for signal processing  
5SSCO Adaptive array signal processing