

FEM design of biomedical strain sensor

Motivation

Cardiovascular diseases are one of the main death causes in industrialized countries.

Among those, the number of patients suffering from Heart Failure (HF) is estimated to increase in the next years, having a prevalence of at least 3% among the worldwide population.

Because of the poor prognosis and the late detection of the disease, half of the patients do not reach 5 years of survival.

Project

The aim of this interdisciplinary project is to develop new biomedical solutions, with the ultimate goal to estimate the early on-set of the disease and improve patients' life.

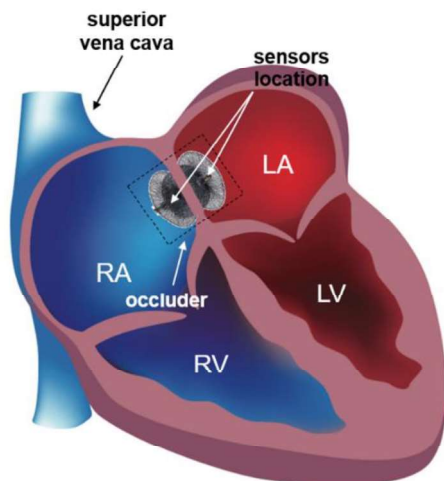


Figure 1: Schematic of the implanted sensing device in the human heart.

Your Task

Your task will be to implement new design solutions through FEM tools (e.g. Comsol). You will start with some state of the art examples in phononics and you will be asked to analyze and implement in Comsol different acoustic designs, in the real and

reciprocal space. Contribution to the prototype fabrication in the D-MAVT clean-room facilities may be discussed towards the end of the project, with respect to the progresses achieved in the simulation part.

Your Profile

- You are a student with a background in **physics** or **mechanics**, looking for an interdisciplinary **Master, Bachelor or Semester** project.
- You have a good **solid state physics** knowledge.
- You are familiar with **FEM** tools (e.g. Comsol).
- You are interested in gaining experience in an **interdisciplinary** project at the edge with **physics, nanotechnology** and **medicine**.

You will learn how to:

- Apply your theoretical knowledge to a real engineering problem
- More insight into FEM tools
- Scientifically present your data
- Work in an interdisciplinary project with engineering and medical requirements
- Fabrication skills at the D-MAVT clean-room facilities

Contains: Critical literature review (30%), FEM implementation (25-30%), comparison and analysis (35%), Fabrication (5-10%)

Contact:

Lucrezia Maini

CLA G13

Micro and Nanosystems

lucrezia.maini@micro.mavt.ethz.ch

+41 (0) 44 632 24 13



Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Micro and Nanosystems

<http://www.micro.mavt.ethz.ch/>