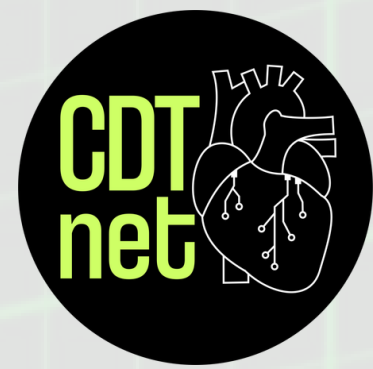


F9 Novel Intramyocardial Sensing to Inform Digital Twin-Based Therapy Optimization



HOST ORGANISATION

Medtronic Bakken Research Center
(MDT), Maastricht, Netherlands

PHD AWARDING INSTITUTION

Maastricht University
(UM), Netherlands

Supervisory Team

Lead Supervisor

- Dr. Richard Cornelussen (Medtronic Bakken Research Center)

Co-Supervisors

- Prof. Joost Lumens (Maastricht University)
- Prof. Maja Cikes (University of Zagreb, School of Medicine)

Project Description

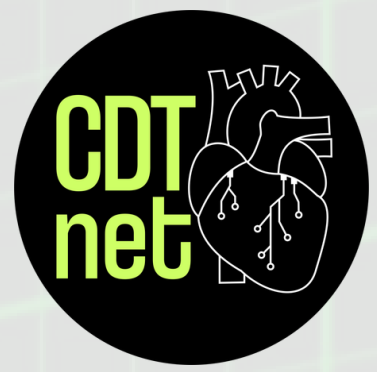
Heart failure is a leading cause of hospitalisation worldwide, and many patients experience abnormalities in the way the heart relaxes and fills with blood during diastole. Although cardiac pacing therapies can improve outcomes, clinicians currently have limited access to direct measurements of the mechanical response of the heart, making optimisation of treatment difficult.

This project aims to develop and validate a new generation of intramyocardial sensing technologies that can provide real-time measurements of cardiac mechanics. Building on advances from previous European research projects, the doctoral candidate will contribute to the design of innovative pacing leads equipped with embedded sensors capable of measuring parameters related to myocardial relaxation, compliance and filling pressures. These measurements will provide direct information about cardiac function that is currently difficult to obtain in routine clinical practice.

The project will combine sensor development, cardiovascular physiology and digital twin technology. Data collected by the sensors will be integrated into computational models of the heart, enabling personalised digital twins that can support therapy optimisation. By linking sensing technologies with simulation tools, the project aims to identify optimal sensor placement, improve pacing strategies and enable real-time adaptation of therapy based on patient-specific physiological responses.

The doctoral candidate will work closely with both academic and industrial partners and contribute to the development of a pathway towards clinical translation.

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The project includes preclinical validation, in-silico testing and the exploration of regulatory requirements necessary for future use in patients. Ultimately, the research seeks to improve treatment outcomes for people living with heart failure through the combination of advanced sensing technology and personalised digital twins.

Planned Secondments

In this project, collaboration, scientific curiosity and translational impact are central. We are looking for someone who enjoys working at the intersection of engineering, physiology and clinical application, and who is motivated to contribute to research with real-world impact (more industry-oriented).

- Curious and translationally minded
- Research-minded and analytical
- Technically creative and hands-on
- Independent and proactive
- Strong communicator and team player
- Open to learning

Your background should include:

- A Master's degree in a relevant field such as Biomedical Engineering, Electrical Engineering, Mechanical Engineering, Medical Technology, Physics or Cardiovascular Science.
- Proven interest in cardiovascular physiology, heart failure, cardiac mechanics/hemodynamics and/or pacing therapies.
- Experience in or affinity with sensor development, medical instrumentation, signal processing or embedded systems.
- Programming and quantitative data analysis skills, preferably in Python, MATLAB, R, C/C++ or similar.
- Proven interest in computational modelling, digital twins or in-silico testing.
- Good organisational, project management and scientific writing skills.
- Excellent English language skills, both written and spoken.

Please direct any query regarding this project to:

Richard Cornelussen richard.cornelussen@medtronic.com