

# MASTER THESIS PROJECT

**SUPERVISORS: S. MOHANTY<sup>1</sup> & PROF. S. MISRA<sup>2</sup>**

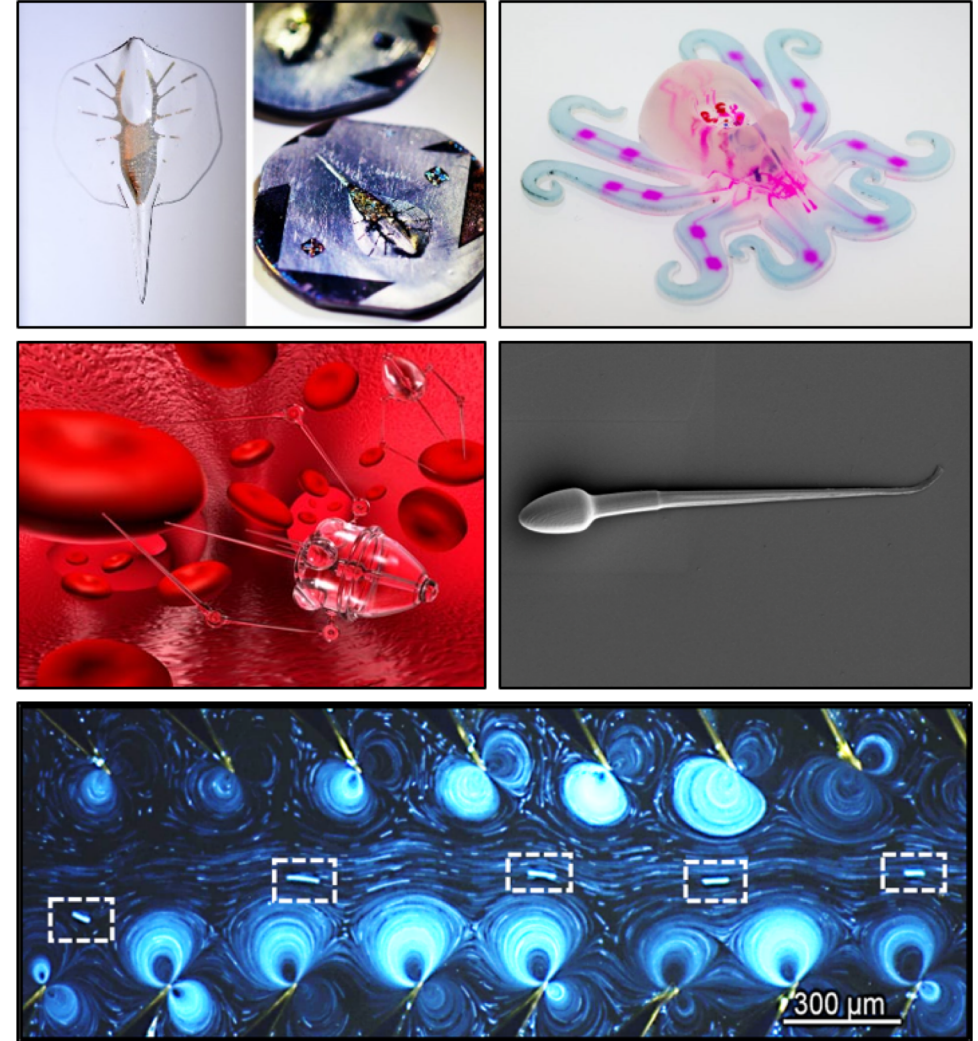
**Project title:** Design and control acoustic micro-propellers

**Background:** Turning science fiction into reality, contactless actuation of micro-robots have paved way for clinical applications like targeted drug delivery. An interesting approach to achieve micro-robot propulsion is through harnessing energy from sound waves in form of sound-fluid interaction and vibrating air-fluid interfaces. In this project, we aim to develop compound micro-propellers with assemblies of acoustic actuation units to investigate different possibilities of motion.

## **Tasks:**

- Literature survey on application of acoustically induced propulsion as method of contactless actuation.
- Design and CAD based modeling of bio-inspired micro-propeller prototypes.
- Synthesis and development of different micro-propellers designs.
- Experimental investigation of vibrating micro-structures and bubbles as propulsion mechanism.
- Combined study of magnetic and acoustic hybrid micro-propellers.

Suited for: *BME, ME, 4TU S&C, EE, NT, APH*



<sup>1</sup> s.mohanty@utwente.nl

<sup>2</sup> s.misra@utwente.nl

# MASTER THESIS PROJECT

**SUPERVISORS: S. MOHANTY<sup>1</sup> & PROF. S. MISRA<sup>2</sup>**

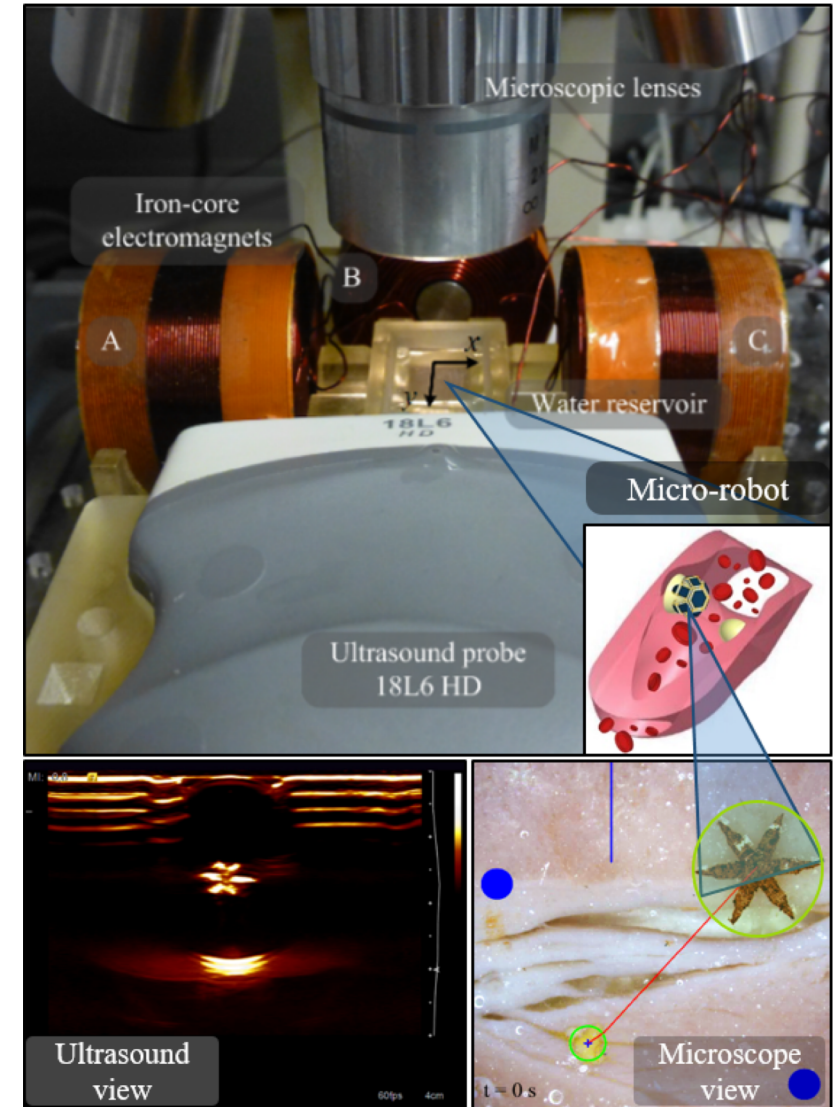
**Project title:** Ultrasound and camera aided tracking of magnetic micro-agents

**Background:** Magnetic micromanipulation provides an indirect means of powering clinical micro-agents to deploy them for localized therapy. Controlled actuation of these micro-agents requires accurate tracking of their position with regards to their environment. Further, clinical compliance of such an application demands their visibility and detection under ultrasound guidance. The aim of this project is to augment an ultrasound based tracking interface to an existing magnetic actuation setup with camera based vision.

## Tasks:

- Integration of magnetic actuation setup with visual feedback to an ultrasound imaging system.
- Programming a C++ based module to enable ultrasound feedback on a pre-existing custom designed based interface for magnetic actuation and visual feedback.
- Development of a tracking algorithm based on image segmentation for position detection of single and multiple micro-agents.
- Prerequisites – Knowledge of programming in C++

Suited for: *BME, ME, 4TU S&C, EE, TM*



<sup>1</sup> s.mohanty@utwente.nl

<sup>2</sup> s.misra@utwente.nl