BACHELOR'S PROJECT INVITATION

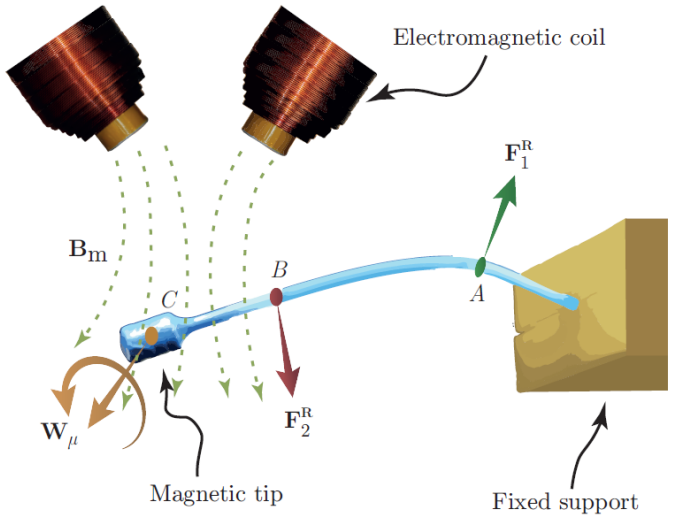
SURGICAL ROBOTICS LABORATORY

www.surgicalroboticslab.nl

SUPERVISORS: V. KALPATHY VENKITESWARAN[1] & PROF. S. MISRA[2]

Project title: Magnetic actuation for surgical applications

Background: Magnetic actuation shows good promise in driving the development of next era of surgical instruments. We aim to harness the advantages of magnetism and develop new tools for specific surgical interventions. Example applications include gripping, drug delivery, ablation, removal of calcified tissue and suturing. This project will focus on studying the mechanical interaction between magnetic surgical tools and actuation magnetic fields, with the aim of identifying key parameters that affect performance of the system. The suitability of this approach to minimally invasive surgical procedures will also be investigated.



Magnetic actuation for surgical application

Tasks:

- Survey literature on surgical robots
- Cultivate background in magnetic actuation
- Develop conceptual design of surgical robotic tool
- Calculations and/or simulations to develop working designs
- Experiments with robots and magnetic actuation systems

Example designs for 3D printable magnetic soft robots

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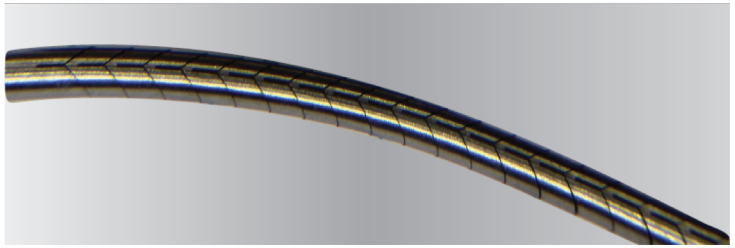
SUPERVISORS: V. KALPATHY VENKITESWARAN[1] & PROF. S. MISRA[2]

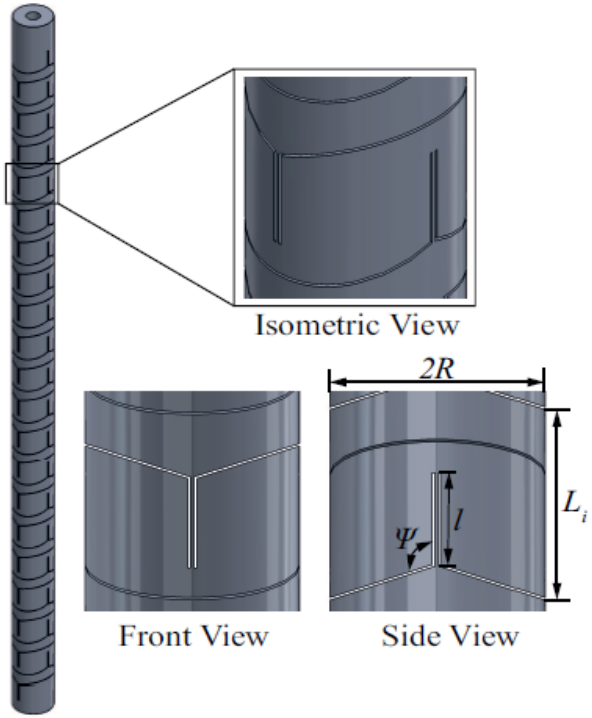
Project title: Flexure joints for surgical continuum manipulators

Background: Continuum manipulators can conform to their environment and perform tasks in restricted spaces due to their redundant degrees of freedom. This makes them suitable as tools for minimally invasive surgery. However, the nonlinearity in motion and under-actuation also makes them difficult to model and control. This can potentially be overcome using flexure joints. The aim of this project is to investigate existing designs of flexure joints and test their suitability for surgical continuum manipulators.

Tasks:

- Survey literature on flexure joints
- Identify key criteria and classify joints based on suitability for design
  - Size
  - Fabrication
  - Failure safety
- Calculations and/or simulations to analyze joints
- Conceptual design based on analysis
- Fabrication and testing of prototype





Example design of flexure-based continuum manipulator

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