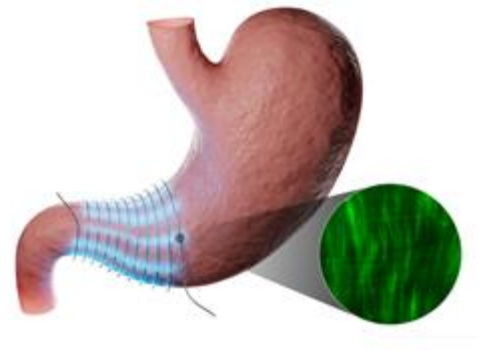


Bachelor's Thesis Proposal

Background:

The gastrointestinal tract represents a complex anatomical structure where the stomach and surrounding organs, such as the pancreas, closely interact. For experimental implant designs, it is crucial to create realistic models that allow testing of novel implantable devices under conditions that mimic the in vivo situation. This project focuses on the use of 3D anatomical reconstructions of mouse stomachs, with and without the neighboring pancreatic gland, in order to evaluate how local anatomy influences the design and placement of a silicon mesh implant. The long-term goal is to develop a mesh that not only conforms anatomically but is also suitable for future integration of micro-LEDs for experimental stimulation studies.



Aim: to study the influence of local anatomy on the design and placement of silicon mesh implants in mouse stomach models.

Major goals:

- Process and segment 3D scans of mouse stomachs
- Generate 3D-printable models of the stomach both with and without the surrounding pancreatic gland
- Investigate how the spatial presence of the pancreas affects the available diameter and geometry for a silicon mesh
- Design a prototype silicon mesh in AutoCAD, targeting suturing close to the esophagus
- Investigations on placing silicone rubber meshes on a stomach model, with a focus on positioning in the antral region
- Ensure that the mesh design is suitable for secure fixation and leaves the option to later incorporate micro-LEDs

Software and Tools:

- 3D Slicer for anatomical segmentation and preparation of 3D print files
- AutoCAD for mesh design and adaptation to anatomical constraints

Location: Institute for Machine-Brain Interfacing Technology (IMBIT)

Earliest starting date: November 2025(can be discussed)

Maximum length of the thesis: 3 months