GASTRIC MOTILITY TRACKING SETUP

Supervising staff

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Context

To treat obesity, gastric electrical stimulation (GES) has been investigated in the last few decades with promising pre-clinical results. If long-term clinical trials demonstrate efficacy in inducing and sustaining weight loss, GES would have the advantage of offering a minimally invasive, long-term, reversible, and adjustable alternative to bariatric surgery, which is currently the gold-standard treatment but suffers from invasiveness and restrictions.

Despite its potential benefits, the underlying physiological mechanisms that mediate the effects of gastric stimulation are not fully understood. The stomach's movements and distention are particularly interesting, which may be closely linked to feelings of fullness and satiety.

Specialized monitoring systems are required to accurately measure these motions, ranging from a few millimeters in smaller animal models like rats to centimeters in dogs, in all three spatial dimensions. Before proceeding to clinical trials, it is necessary first to establish proof-of-concept using phantoms or ex vivo models.

Work

This master thesis aims to design, implement and validate a gastric motility monitoring setup. Various options will be considered, evaluating their pros and cons and classifying them based on practical trials. Creating a test bench is part of the project. It could be done by creating a phantom and/or using ex-vivo stomachs from rats, combined with the engineering of a motion generator. As the final application might be used on larger animals such as dogs, scalability should be one of the multiple criteria to fulfill.

Major steps include:

- Define the technical requirements of the setup
- Draw a state of the art of the existing motion tracking techniques
- Creating a test bench (phantom and/or ex-vivo stomach + motion generator)
- Prototyping the theoretically best motion tracking setups
- Practical trials and measurements
- Evaluation of the best solution
- Improvement and scalability