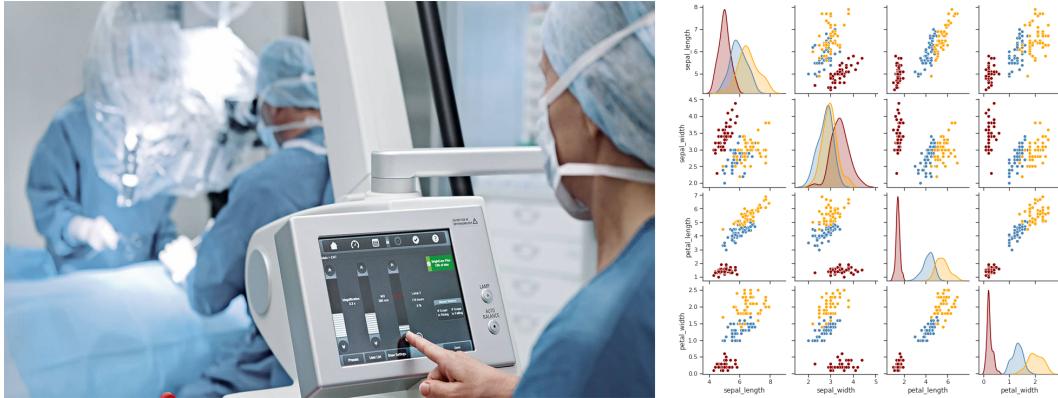


# Model-based individualized healthcare



We are looking for one or two excellent and motivated students for a master's thesis project. Ideally you have a specialization in control systems, and good knowledge about dynamics and programming.

The scope of the thesis is to investigate how inter-patient variability in the drug response affects performance in commonly used continuous drug administration schemes. Gaining a better understanding of this will enable the design of individualized dosing schemes with benefits for patients under intensive care, but also type-1 diabetes, and other patient categories benefiting from continuous drug administration treatments.

The project will be based on an a data set describing the dynamics of the anesthetic drug propofol. Today, target-controlled infusion (TCI) is a common method for automated open-loop administration of the drug. The physician sets a desired target blood concentration and the drug is delivered according to a patient model, which is based on demographic covariates such as age, weight, etc.

You will compare performance of a TCI system with that of a system that relies on online feedback from clinical monitoring equipment, with particular focus on the effect of inter-patient variability. We will use a widely adopted pharmacometric framework, within which this uncertainty is expressed in terms of distributions.

You will implement a simulator for the patient response dynamics, and algorithms both for TCI and closed-loop control. Using probabilistic sampling, you will then investigate how the uncertainty caused by the residual variability impacts performance of the TCI and closed-loop control schemes.

In the project you will

- Learn how dynamic models are used in pharmacology
- Improve your programming skills
- Use probabilistic uncertainty descriptions in the context of control.
- Work with researchers who have an extensive background in the field, including clinical work.
- Contribute with entirely new knowledge that will be useful when developing future drug dosing systems.

If this sounds interesting and you want to learn more about this opportunity, contact me Ylva Wahlquist ([ylva.wahlquist@control.lth.se](mailto:ylva.wahlquist@control.lth.se)), and we can plan a meeting to discuss more in detail.