

## **Modeling of drug effect in general closed-loop anesthesia**

Anesthetic drugs are administered in order to induce reversible loss of sensation and facilitate surgery. Since the depth of anesthesia (DoA) can be nowadays measured from electroencephalogram of the patient using so-called bispectral index (BIS), automatic closed-loop anesthesia has become feasible. Besides of relieving the anesthesiologists from the routine task of adjusting the flow of anesthetic drugs to achieve a desired level of DoA, closed-loop anesthesia holds promise for more consistent drug effect because of treatment individualization and less side effects due to a reduction of the overall administered drug dose during the surgery. Systematic design of feedback control is impossible without an accurate description of the drug concentration in the organism and its actual effect on the patient.

This MSc project aims at mathematical modeling of the effect of the hypnotic/amnestic agent Propofol and the analgesic drug Remifentanyl that are intravenously administered in manual general anesthesia. The effect of the drugs is measured by BIS. The data come from University of Brescia, Italy that cooperates with Uppsala University on this project. Methods for parameter estimation in nonlinear models, such as the particle filter and extended Kalman filter, are to be applied to the available datasets and their performance compared.