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Subject: Stochastic Dynamical Optimization and Control Theory

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In many areas in our modern day society, we want to control the behaviour of complex systems in an optimal way - it could be a portfolio manager who wants to maximize profits of his portfolio or a homeowner who wants, at a minimal cost, a set temperature in his newly installed swimming pool whenever he is home.

However, often it is difficult (if not impossible) to define accurate models that perfectly describes the dynamics observed. One way to handle these model imperfections is to deploy stochastic differential equations (SDEs) - using SDEs, imperfections are modelled as random pertubations of the system. This has the effect that the underlying optimization problem - the control problem - becomes a stochastic optimization problem.

In this PhD project - "Stochastic Dynamical Programming and Control Theory" - methods of solving these types of problems are investigated. The main focus of the project will be to develop a deep theoretical understanding of the underlying methods and evaluate the performance of these methods compared to traditional approaches in different areas of application.