Novel Control Techniques for Complex Dynamical Systems such as Autonomous Cars and Robotic Manipulators

Bastian Schürmann

Technische Universität München

July 7, 2017
Control of Dynamical Systems

- Dynamical systems can be modeled using differential equations with states (position, velocity, etc.) and inputs (steering, acceleration, breaking, etc.)

**Goal:** Find a feedback-controller which stabilizes the system around a trajectory while satisfying given constraints
Constrained Control of Complex Dynamical Systems

- Control task might become challenging for several reasons
  - Complex, nonlinear system dynamics
  - Constraints on states and inputs
  - Safety-critical application cases which require formal guarantees

- Many current research projects focus on one or more of these challenges

- Different control techniques are being developed depending on which of the above challenges are present
Topic: Novel Control Techniques for Complex Dynamical Systems such as Autonomous Cars and Robotic Manipulators

- Choose one or more of the previously mentioned challenges
- Review literature/read papers about different control approaches which take these challenges into account
- Implement one or more for an example system
- Compare the approaches

Chance to learn more about novel and state-of-the-art control methods, which are not included in lectures, but necessary for many real-life applications

Required: Background in control theory
Questions?

Contact:
Bastian Schürrmann
MI 03.07.039
bastian.schuermann@in.tum.de