

# Comparison of Different Numerical Solvers for Optimal Control Problems on the Example of an Autonomous Car

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January 21, 2016

# Control of Dynamical Systems

- Dynamical systems can be modeled using differential equations with states (position, velocity, etc.) and inputs (steering, acceleration, breaking, etc.)
- **Task:** Find an input sequence such that the car/robotic arm moves from the initial position to a desired end position

# Optimal Control

- Many possible input combinations. How to choose?
  - Additional restrictions through
    - Costs (time, energy consumption, forces) → should be minimized
    - Constraints (obstacles/other cars, maximum forces, maximum time) → must not be violated
- ⇒ Constrained optimization problem

# Topic: Comparison of Different Numerical Solvers for Optimal Control Problems on the Example of an Autonomous Car

- Different possible methods to solve these optimization problems
- For each method, many different solvers exist
- **Tasks:**
  - Obtain an overview of existing optimization tools
  - Implement an optimal control problem for an autonomous car and solve it with different solvers
  - Compare the performance and accuracy of different solvers

# Questions?

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