Motion Planning | Introduction to Optimization Techniques
Autonomous Mobile Robots

Martin Rufli – IBM Research GmbH
Margarita Chli, Paul Furgale, Marco Hutter, Davide Scaramuzza, Roland Siegwart
Introduction | the see – think – act cycle

Real World Environment

Perception

- Sensing
  - raw data

Information Extraction

- environment model
  - local map

Localization
- Map Building

knowledge, data base

see-think-act

“position“ global map

Cognition
- Path Planning
  - path

Motion Control

- Path Execution
  - actuator commands
  - actuator commands

Acting

mission commands

Autonomous Mobile Robots
Margarita Chli, Paul Furgale, Marco Hutter, Martin Rufli, Davide Scaramuzza, Roland Siegwart

Autonomous Systems Lab

ETH Zurich

Introduction | the motion planning problem

Goal
**Introduction | work-space versus configuration-space**

- **Work-space**
  - Configuration-space

- **Configuration-space**
  - Work-space
Introduction | hierarchical decomposition

1. Motion control
2. Local collision avoidance
3. Global search-based planning
Introduction | further reading

- Control theory

- Motion planning for robotics