

Master's Thesis: Determining the Reachable Area of Automated Vehicles

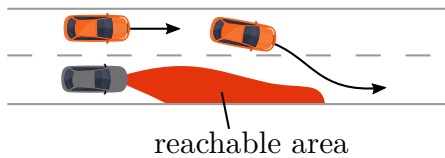


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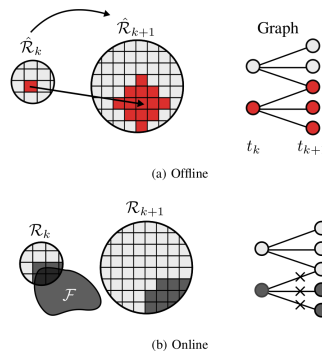
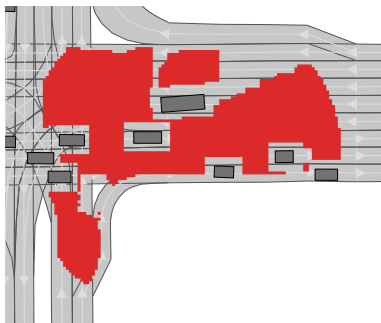


Fakultät für Informatik
Lehrstuhl für Echtzeitsysteme
und Robotik

Background



Guaranteeing that automated vehicles or mobile robots are safe is a major issue challenge in their development. One tool for guaranteeing safety is reachability analysis. Usually, the reachable set describe all states in state space that a vehicle can reach. But in applications where it should avoid obstacles, we are only interested in states that do not collide with obstacles.



Description

We developed a method that can computes this reachable area theoretically for arbitrary systems efficiently. So far, we have only demonstrated the method for a simple linear system. Nevertheless, vehicle dynamics are more realistically described by nonlinear systems. Your task is to extend the method and implement the algorithm for nonlinear systems by using our toolbox CORA¹ and Python tools for CommonRoad².

You should have ...

- basic knowledge in (nonlinear) control theory
- interest in mobile robotics and formal methods
- motivation to work independently on a theoretical topic
- practical experience in MATLAB and/or Python is preferable

If you are interested, contact me and we can discuss the thesis in more detail.

¹<https://tumcps.github.io/CORA/>

²<https://commonroad.in.tum.de/>

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Advisor:

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Research project:

interACT

Type:

Master's Thesis

Research area:

Automated vehicles, mobile robots, reachability analysis

Programming language:

Python, MATLAB

Required skills:

Control theory, Python, MATLAB

Language:

englisch

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