

COURSE DETAIL

MOTION PLANNING

Country

Germany

Host Institution

Technical University Berlin

Program(s)

Technical University Berlin

UCEAP Course Level

Upper Division

UCEAP Subject Area(s)

Mechanical Engineering Electrical Engineering Computer Science

UCEAP Course Number

144

UCEAP Course Suffix**UCEAP Official Title**

MOTION PLANNING

UCEAP Transcript Title

MOTION PLANNING

UCEAP Quarter Units

5.50

UCEAP Semester Units

3.70

Course Description

Motion planning is a fundamental building block for autonomous systems, with applications in robotics, industrial automation, and autonomous driving. After completion of the course, students will have a detailed understanding of: Formalization of geometric, kinodynamic, and optimal motion planning; Sampling-based approaches: Rapidly-exploring random trees (RRT), probabilistic roadmaps (PRM), and variants; Search-based approaches: State-lattice based A* and variants; Optimization-based approaches: Differential Flatness and Sequential convex programming (SCP); The theoretical properties relevant to these algorithms (completeness, optimality, and complexity). Students will be able to: Decide (theoretically and empirically) which algorithm(s) to use for a given problem; Implement (basic versions) of the algorithms themselves; • Use current academic and industrial tools such as the Open Motion Planning Library (OMPL).

It provides a unified perspective on motion planning and includes topics from different research and industry communities. The goal is not only to learn the foundations and theory of currently used approaches, but also to be able to pick and compare the different methods for specific motion planning needs. An important emphasis is the consideration of both geometric and kinodynamic motion planning for the major algorithm types.

Language(s) of Instruction

English

Host Institution Course Number

3151 L001

Host Institution Course Title

MOTION PLANNING

Host Institution Course Details

<https://moseskonto.tu-berlin.de/moses/modultransfersystem/bolognamodule/beschre...>

Host Institution Campus

Technische Universität Berlin

Host Institution Faculty

Host Institution Degree

Host Institution Department

Institut für Technische Informatik und Mikroelektronik

Course Last Reviewed

2023-2024

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