Module name	**Applied Robotics and Control for Cooperative and Autonomous Mobility**
Module number	CMS-TRK-ARCCAM
Senior Lecturer	Prof. Dr. Meng Wang meng.wang@tu-dresden.de
Qualification objectives	Students are familiar with fundamental theories of robotics and control technology and are able to identify and explain fundamental phenomena of transport systems in terms of inefficiencies, risks and environmental pressures, describe the architecture and functionality of essential components of autonomous driving systems, apply robotics and control theories to programme and test mobile robots in a miniature laboratory, design and implement a controller in a mobile robot to solve a traffic problem and assess a controller's performance.
Contents	The content of the module is experimental learning with mobile robots in a scale laboratory, in particular the basics of traffic phenomena in terms of road safety, congestion and emissions, the state of the art in autonomous driving systems, the architecture of autonomous driving systems, key components such as sensors, controls and communication technologies, examples of Cooperative Adaptive Cruise Control (CACC), and programming and testing of robot systems in a Miniature Connected, Cooperative and Automated Mobility Lab (MiniCCAM). Other content is the basis for cooperative control theory, in particular the implementation of a controller into a multi-robot system, the performance testing of controllers and the documentation of performance tests and controller evaluations.
Forms of teaching and learning	The module includes lectures of 2 SWS, exercises of 2 SWS and self-study. The language of the lectures and exercises will be English. Participation in the module is limited to 15 participants in accordance with Section 6(7) of the Rules on Studies. The selection is carried out by drawing lots.
Eligibility for participation	Knowledge of python programming, the control theory and the linear algebra at bachelor level is required.

Usability	In the Computational Modeling and Simulation Masters Course, the module is a compulsory voting module in the Track Applied Artificial Intelligence, to be selected in accordance with Annex 2 to the Specific Examination Regulations. The module cannot be chosen in the Master's Course Computational Modeling and Simulation if this or a module with substantially the same content from a Course with which the entry conditions under § 3 of the Studienordnung have been met has already been completed. The module provides the pre-requisites for the modules it designates under the pre-requisites for participation.
Conditions for the award of credits	Credits are awarded when the module test is passed. The module test consists of a complex performance of 70 hours. The language of the test will be English.
Credits and marks	The module allows 5 credit points to be obtained. The module score corresponds to the test performance score.
Frequency of the module	The module is offered every summer semester.
Workload	The total workload is 150 hours.
Duration of the module	The module covers 1 semester.