Technology
Arts Sciences
TH Köln

Course Manual AS

Autonomous Systems

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General information

Long name	Autonomous Systems
Approving CModule	AS_BaTIN
Responsible	Prof. Dr. Chunrong Yuan Professor Fakultät IME
Valid from	summer semester 2022
Level	Bachelor
Semester in the year	summer semester
Duration	Semester
Hours in self-study	69
ECTS	5
Professors	Prof. Dr. Chunrong Yuan Professor Fakultät IME
Requirements	Capability of algorithm analysis and implementation Knowledge of signal processing and mathematics Capability of software and project development Basic knowledge of embedded software
Language	German
Separate final exam	Yes

Literature

Hertzberg: Mobile Roboter: Eine Einführung aus Sicht der Informatik, Springer Vieweg, 2012

Final exam

Details	Oral exam, with the option of written examination if necessary (e.g.: in case of a large number of participants)
Minimum standard	At least 50% with correct answers
Exam Type	EN mündliche Prüfung, strukturierte Befragung

− Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	Sensors Wheel/motor sensors Heading sensors Positioning sensors Cameras Locomotion Wheeled mobile robots Legged mobile robots Data processing and feature extraction Edge detection Line extraction Point detection and description Recognition and Modelling Object detection Place recognition 3D motion and structure estimation Navigation Localization Mapping Path planning

Special requirements

none

Accompanying material	Lecture slides
Separate exam	No

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Tutorial (voluntary)	0

− Practical training

Learning goals

Goal type	Description
Skills	Teamwork: Development of systems with intelligent behaviours for autonomous interpretation of sensor data and real-time robot control. The goal is to realize prototypes with the required functions.

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	0.5
Tutorial (voluntary)	0

Special requirements

none

Accompanying material	Documents with task descriptions as well as instructions on project implementation development tools and examples
Separate exam	Yes

Separate exam

Exam Type	EN Projektaufgabe im Team bearbeiten (z.B. im Praktikum)
Details	Evaluation of the achieved results based on presentations, live demonstrations, discussions as well as documentations in form of texts, source codes, graphic illustrations and video clips
Minimum standard	On-schedule delivery, presentation and demonstration of the realized systems according to task descriptions.

− Lecture / Exercises

Learning goals

Goal type	Description
Skills	Sensor characterization Feature extraction Image matching and clustering Image based place recognition Motion analysis Programming of robot behaviour

Special requirements

Be prepared to use Python and install all the necessary software tools on one's own laptop

Accompanying material	Practical exercises Example programs
Separate exam	No

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Exercises (whole course)	1
Exercises (shared course)	1
Tutorial (voluntary)	0