

Course Manual ATS

Autonomous Systems

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– General information

Long name Autonomous Systems

Approving CModule [ATS_BaET](#)

Responsible Prof. Dr. Chunrong Yuan
Professor Fakultät IME

Valid from summer semester 2023

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 and English

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
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Separate exam	Yes
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Separate exam

Exam Type	EN Projektaufgabe im Team bearbeiten (z.B. im Praktikum)
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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
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Minimum standard	On-schedule delivery, presentation and demonstration of the realized systems according to task descriptions.
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– 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
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Separate exam	No
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Expenditure classroom teaching

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