

Module: Advanced Machine Vision

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|------------------------------|---|--------------------------------|-----|
| Level | Master | Short Name | AMV |
| Responsible Lecturers | Prof. Dr. Ralph Hänsel | | |
| Department, Facility | Electrical Engineering and Computer Science | | |
| Course of Studies | Computer Science, Master | | |
| Compulsory/elective | Compulsory elective | ECTS Credit Points | 5 |
| Semester of Studies | (Unspecified) | Semester Hours per Week | 4 |
| Length (semesters) | 1 | Workload (hours) | 150 |
| Frequency | (Flexible) | Presence Hours | 60 |
| Teaching Language | German/English | Self-Study Hours | 90 |

The following section is filled only if there is **exactly one** module-concluding exam.

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|------------------------------------|---|----------------------------|------------------|
| Exam Type | Portfolio Exam | Exam Language | German/English |
| Exam Length (minutes) | | Exam Grading System | One-third Grades |
| Learning Outcomes | <ul style="list-style-type: none"> • Students can describe the main functionalities of the robot operating system 2 (ROS2) • Students can integrate new functional blocks into ROS2 • Students can describe basic deep learning architectures for object detection and other tasks in machine vision • Students can perform the training of a given object detector model on a custom dataset and evaluate the performance • Students can describe the properties of the environment model • Students can apply different depth estimation technologies to estimate the position of a detected object • Students can describe technologies for ego-motion estimation and joint map generation (SLAM) • Students can state the physical description of light | | |
| Participation Prerequisites | | | |

The previous section is filled only if there is **exactly one** module-concluding exam.

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| Consideration of Gender and Diversity Issues | <ul style="list-style-type: none"> ✓ Use of gender-neutral language (THL standard) ✓ Target group specific adjustment of didactic methods ✓ Making subject diversity visible (female researchers, cultures etc.) |
| Applicability | Robotics |
| Remarks | |

Module Course: Advanced Machine Vision (Lecture)

(of Module: Advanced Machine Vision)

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|---|----------------|--------------------------------|----------|
| Course Type | Lecture | Form of Learning | Presence |
| Mandatory Attendance | no | ECTS Credit Points | 3 |
| Participation Limit | | Semester Hours per Week | 3 |
| Group Size | | Workload (hours) | 120 |
| Teaching Language | German/English | Presence Hours | 45 |
| Study Achievements ("Studienleistung", SL) | | Self-Study Hours | 75 |
| SL Length (minutes) | | SL Grading System | |

The following section is filled only if there is a course-specific exam.

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|------------------------------------|--|----------------------------|--|
| Exam Type | | Exam Language | |
| Exam Length (minutes) | | Exam Grading System | |
| Learning Outcomes | | | |
| Participation Prerequisites | | | |

The previous section is filled only if there is a course-specific exam.

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|-------------------|--|
| Contents | <p>The course is focused on autonomous driving and how vision can play an important role as a sensor in an autonomous robot</p> <p>Processing Environment (ROS2)</p> <p>Image and Light</p> <p>Deep Learning in Machine Vision</p> <p>Environment Model</p> <p>Functional Safety Aspects</p> |
| Literature | Literature will be given in the lecture |
| Remarks | |

Module Course: Advanced Machine Vision (Lab)

(of Module: Advanced Machine Vision)

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|---|--------------------|--------------------------------|----------|
| Course Type | Practical Training | Form of Learning | Presence |
| Mandatory Attendance | no | ECTS Credit Points | 2 |
| Participation Limit | | Semester Hours per Week | 1 |
| Group Size | 12 | Workload (hours) | 30 |
| Teaching Language | German/English | Presence Hours | 15 |
| Study Achievements ("Studienleistung", SL) | | Self-Study Hours | 15 |
| SL Length (minutes) | | SL Grading System | |

The following section is filled only if there is a course-specific exam.

| | | | |
|------------------------------------|--|----------------------------|--|
| Exam Type | | Exam Language | |
| Exam Length (minutes) | | Exam Grading System | |
| Learning Outcomes | | | |
| Participation Prerequisites | | | |

The previous section is filled only if there is a course-specific exam.

| | |
|-------------------|-------------|
| Contents | See lecture |
| Literature | See lecture |
| Remarks | |