inf307 - Robotics

Module label: Robotics  
Module code: inf307  
Credit points: 6.0 KP  
Workload: 180 h

Used in course of study:
- Master's Programme Computing Science > Nicht Informatik
- Master's Programme Computing Science > Technische Informatik
- Master's Programme Embedded Systems and Microrobotics > Akzentsetzungsmodule
- Master's Programme Engineering of Socio-Technical Systems > Embedded Brain Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems > Human-Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems > Systems Engineering

Contact person:

- Module responsibility: Andreas Hein
- Authorized examiners: Die im Modul Lehrenden

Entry requirements:

Skills to be acquired in this module:

Professional competence:
The students:

- Name and know the functions and applications of robot systems
- Characterise the basic concepts to program robot systems
- Differentiate between the interaction of mechanical, electrical and software components

Methodological competence:
The students:

- Define characteristics and components of robot systems for a specific application
- Design and implement robot system sub-components
- Design and parameterise simple control structures
- Plan the application of robot systems and derive the requirements
- Model electrical and mechanical systems
- Develop and realise simple robot systems

Social competence:
The students:

- Solve robot systems problems in team work

Self-competence:
The students:

- Reflect their solutions in reference to robot system methods

Module contents:

- Integration in production plants / aims / subsystems
- Architectures / classifications (classification of robots)
- Robot components + Computer systems for programming
  - PA-10
  - Lego Mindstorms
- Basics of kinematics
  - Coordinate transformation, homogeneous coordinates, Coordinate transitions
  - Kinematic equation systems, transformation of vectors
- Kinematic
  - Joint types (manipulators) / Wheels, TCP
- Denavit-Hartenberg-Transformation
- Forward calculation
- Backward calculation

- Sensors
  - General properties of sensors, parameter
  - Simple optical position sensors
  - Inductive-, capacitive- und ultrasonic-sensors
  - Distance sensors (laser scanner, triangulation sensors)
  - Force sensors
  - Sensor data preparation

- Planning / Regulation
  - Overall regulation approach, terms, process- and control functions, PID-controller
  - Planning concepts and approaches (On-Line, Off-Line), planning processes, construction and path planning

- Actuators

### Reader's advisory

**essential:**
lecture nodes

**recommended:**

**secondary literature:**

### Links

### Languages of instruction
German, English

### Duration (semesters)
1 Semester

### Module frequency
once a year

### Module capacity
unlimited

### Modulelevel
AS (Akzentsetzung / Accentuation)

### Modulart
Pflicht o. Wahlpflicht / compulsory or optional

### Lern-/Lehrform / Type of program
V+U

### Vorkenntnisse / Previous knowledge

### Examination

<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
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<td>3.00</td>
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<td>Exercises</td>
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<td>SuSe</td>
<td>14 h</td>
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### Total time of attendance for the module
56 h