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| <b>Module title</b>  |                          | <b>Abbreviation</b>                         |
| Robotics 1   |                          | 10-I=RO1-182-m01                            |
| <b>Module coordinator</b>  |                          | <b>Module offered by</b>                    |
| holder of the Chair of Computer Science XVII   |                          | Institute of Computer Science               |
| <b>ECTS</b>  | <b>Method of grading</b> | <b>Only after succ. compl. of module(s)</b> |
| 8  | numerical grade          | --  |
| <b>Duration</b>  | <b>Module level</b>      | <b>Other prerequisites</b>                  |
| 1 semester   | graduate                 | --  |
| <b>Contents</b>  |                          |   |
| <p>History, applications and properties of robots, direct kinematics of manipulators: coordinate systems, rotations, homogenous coordinates, axis coordinates, arm equation. Inverse kinematics: solution properties, end effector configuration, numerical and analytical approaches, examples of different robots for analytical approaches. Workspace analysis and trajectory planning, dynamics of manipulators: Lagrange-Euler model, direct and inverse dynamics. Mobile robots: direct and inverse kinematics, propulsion system, tricycle, Ackermann steering, holonomes and non-holonomie restrictions, kinematic classification of mobile robots, posture kinematic model. Movement control and path planning: roadmap methods, cell decomposition methods, potential field methods. Sensors: position sensors, speed sensors, distance sensors.</p> |                          |   |
| <b>Intended learning outcomes</b>  |                          |   |
| <p>The students master the fundamentals of robot manipulators and vehicles and are, in particular, familiar with their kinematics and dynamics as well as the planning of paths and task execution.</p>  |                          |   |
| <b>Courses</b> (type, number of weekly contact hours, language — if other than German)   |                          |   |
| <p>V (4) + Ü (2)<br/>Module taught in: English</p>   |                          |   |
| <b>Method of assessment</b> (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)   |                          |   |
| <p>written examination (approx. 60 to 90 minutes)<br/>Separate written examination for Master's students.<br/>Language of assessment: English<br/>creditable for bonus</p>   |                          |   |
| <b>Allocation of places</b>  |                          |   |
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| <b>Additional information</b>  |                          |   |
| <p>Focuses available for students of the Master's programme Informatik (Computer Science, 120 ECTS credits): IS, ES, LR, HCI, GE.</p>  |                          |   |
| <b>Workload</b>  |                          |   |
| 240 h  |                          |   |
| <b>Teaching cycle</b>  |                          |   |
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| <b>Referred to in LPO I</b> (examination regulations for teaching-degree programmes)   |                          |   |
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| <b>Module appears in</b>   |                          |   |
| <p>Master's degree (1 major) Computer Science (2018)<br/>Master's degree (1 major) Information Systems (2019)<br/>Master's teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)<br/>Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2020)</p>  |                          |   |