| Module Name | Adaptive Laser Sensor Technology |
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| **Module Number** | EuI-ET-E-AdLas, EuI-IST-E-AdLas, EuI-MT-E-AdLas |
| **Responsible Lecturer** | Prof. Dr.-Ing. habil. Jürgen Czarske<br>juergen.czarske@tu-dresden.de |
| **Qualification Objectives** | After completing the module, students are able to describe and evaluate the physical principles and technical design of adaptive laser sensors. They master fundamental approaches and methods for the system design of modern laser sensors. |
| **Contents** | The module covers:<br>- Laser measurement technology with fundamental physical and electrical engineering principles such as Gaussian beams, interferometry, ultrashort pulse lasers, Fourier optics, and fiber sensor technology,<br>- Mechatronic laser sensors, including design and principles, micro-opto-electro-mechanical systems, and adaptive optics,<br>- The practical implementation and application of adaptive laser sensors, for example, in biophotonics, medical technology, optical information technology, and energy technology. |
| **Teaching and Learning Forms** | 4 hours per week of lectures, 1 hour per week of exercises, 1 hour per week of practical lab courses, and self-study. The language of instruction for lectures, exercises, and practical lab courses may be German or English and will be determined by the lecturer at the beginning of the semester and announced in the usual manner. |
| **Prerequisites for Participation** | Knowledge of physics at the advanced high school level and the competencies to be acquired in the module "Systems Theory" are required. |
| **Usability** | The module is an elective module in the elective area "Competence Deepening" according to § 6 paragraph 3 SO and § 33 paragraph 4 PO of the main study program in the fields of Automation Technology and Robotics as well as Information Technology in the diploma program Electrical Engineering. Furthermore, it is an elective module in the elective area "Competence Deepening" according to § 6 paragraph 3 SO and § 33 paragraph 3 PO of the main study program in the field of Automation, Sensorics, and Robotics in the diploma program Information Systems Engineering. Additionally, it is an elective module in the elective area "Methods and Applications" according to § 6 paragraph 3 SO and § 33 paragraph 3 PO of the main study program in the diploma program Mechatronics. It creates the prerequisites for the modules that list this module in the field "Prerequisites for Participation." |
| **Prerequisites for the Award of Credit Points** | Credit points are awarded when the module examination is passed. The module examination consists of a non-public oral examination as an individual examination lasting 30 minutes and a portfolio with a workload of 20 hours. Both examination components are relevant for passing the module. |
| **Credit Points and Grades** | 7 credit points can be earned through the module. The module grade is determined by the weighted average of the grades of the examination components. The oral examination is weighted sixfold, and the portfolio is weighted singly. |
| **Frequency of the Module** | The module is offered every summer semester. |
| **Workload** | The total workload is 210 hours. |
| **Duration of the Module** | The module lasts one semester. |