UNIVERSITÄT DUISBURG-ESSEN
Lehrstuhl Steuerung, Regelung
und Systemdynamik
Univ.-Prof. Dr.-Ing. Dirk Söffker

Sommersemester 2021

Course	**Vision-based Control (3S)**
Zielgruppe	Mechanical Engineering, Communications Engineering, Elektrotechnik und Informationstechnik, Automation and Safety, Angewandte Kognitions-und Medienwissenschaft, Angewandte Informatik, Wirtschaftsingenieurwesen (Wahlfach)
URL of the course	https://moodle.uni-due.de/course/view.php?id=19648
Lecturer	Dr.-Ing. Fateme Bakhshande
About course	In SoSe 2021, the course will be realized via the Moodle system using video material and video conference tools. The realization is carried out via: - Lecture (pdf) - Lecture video material - Seminar presentations and interactive discussion via video conference tools The initial lecture videos are published online 3 days before the event in the Moodle course and can be downloaded. During the consulting hours, the questions can be asked about the video and organization of the seminar posted in the corresponding week. After the initial lecture part, the students should contribute significantly to interaction during the video conference. All students should select a topic and prepare a presentation based on the given reference materials. Participation and interactive discussion in all seminar presentations are mandatory for success in this seminar lecture. The presentations and consulting hours are held via Zoom. Prior to this, registration via the Moodle course is required. After the registration, you will receive all the necessary information or the weekly updated link for participation in the video conference. The basis of the course is the specified textbook mentioned in the course description. Further references for the seminar presentations will be provided and distributed later during the course and based on the students' interests. For some lecture units (initial information and basic concepts), a raw manuscript will be published which can be downloaded in the Moodle course **from the beginning of the course**. This serves to structure the personal/personalisable notes. For preparation/postprocessing of the lecture, it is strongly recommended to ➢ **read the initial lecture materials,**

	➢ **attend the consultation hours for further discussion and basic seminar information,** ➢ **read additional publications to prepare the seminar presentation, and** ➢ **read the corresponding substance in the given chapters in advance (in the specified textbook/textbook) to work out.**
Material	Moodle: Vision-based Control – VbC (https://moodle.uni-due.de/course/view.php?id=19648) The password can be requested via the e-mail address srs-pw@uni-due.de. The subject must contain the word **VBC**.
Day	Thursday
Time	Lecture units (initial information and basics concepts): Preparation time: 2:00 – 3:30 pm using lecture video Interactive consulting hour and discussion: 3:30 – 6:00 pm
First course	**May 6, 2021 >> Kick-off-Meeting: participation is mandatory for students** Preparation time: 2:00 – 3:30 pm using available lecture video (initial information and basic concepts) An interactive consulting hour and discussion: 3:30 – 6:00 pm: in this part, the topics will be discussed and the students have one week time to select one of the introduced topics. The time of interactive seminar presentations will be discussed later based on the number of participants.
Last course	June 24, 2021
Literature	Corke, P. I. (1996). Visual Control of Robots: high-performance visual servoing. Taunton, UK: Research Studies Press. Corke, P. I. (2017). Robotics, vision and control: fundamental algorithms in MATLAB® second, completely revised (Vol. 118). Springer. Chaumette, F., & Hutchinson, S. (2006). Visual servo control. I. Basic approaches. IEEE Robotics & Automation Magazine, 13(4), 82-90.
Content	• Fundamentals of image capturing and machine vision approaches • Modeling of the robot (manipulator or UAVs) • Image-based visual servoing • Position-based visual servoing • Design of vision-based controller e.g. adaptive controller, sliding mode controller, and fuzzy logic controller
Exam	Homework and presentation