Computer Vision					AR-210
Rota Summer or Winter Term by Announcement	**Duration** 1 Semester	**Semester** 2nd / 3rd (Semester)	**SWS** 4 SWS	**Credit Points** 6	**Workload** 180 h

1 Modul Structure

Course (Abbreviation)	Type/ SWS	Presence	Self Study	Credit Points
a) Computer Vision (CV)	Lecture/ 2 SWS	25 h	65 h	2
b) Computer Vision (CV)	Tutorial/ 2 SWS	25 h	65 h	2

2 Language:

English

3 Content

For the majority of living beings vision is the most important perception mechanism for orienting themselves in the environment. Therefore, there exists a multitude of attempts to recreate this capability in artificial systems. In contrast to image processing techniques found in industrial applications the aim of such advanced systems for machine vision is to obtain a task-oriented interpretation of a complex scene with as few restrictions as possible concerning the context and the recording conditions.

In this lecture advanced techniques of machine vision are covered which to some extent are inspired by cognitive processes known from human visual perception. First, important aspects of imaging processes are introduced including the perception and representation of colors. Afterwards, methods for the computation of local feature representations (e.g. descriptors, depth, or motion) and for the extraction of image primitives (e.g. regions, contours and keypoints) are presented. Finally, the lecture focusses on appearance based object recognition techniques that lie at boundary between image segmentation and scene interpretation. Especially, deep neural networks will be covered that currently are the dominant methodology for the solution of machine perception tasks.

The accompanying tutorials will give students the opportunity to deepen their knowledge of the theoretical concepts presented in the lecture by working on relevant practical problems.

Literature:

- Gonzalez, Rafael C.; Woods, Richard E.: Digital Image Processing, Prenctice Hall, 2nd Ed., 2002.
- Forsyth, David A.; Ponce, Jean: Computer Vision - A Modern Approach, Prentice Hall, 2003.
- Szeliski, Richard: Computer Vision, Springer, 2010

4 Competencies

In this module students will be made familiar with solutions for advanced problems in the field of machine vision. A fundamental understanding of the principles underlying visual perception systems will enable participants to apply such techniques for themselves in innvative application scenarios - as, e.g., robotics and man-machine interaction – and to assess their strengths and limitations.

5 Examination Requirements

Module examination: oral examination (30–45 minutes)

Course achievements: as per announcement

6 Formality of Examination

☒ Module Finals ☐ Accumulated Grade

7 Module Requirements (Prerequisites)

Prerequisite Knowledge: Basic knowledge of mathematics

Desirable knowledge: Programming skills

8 Allocation to Curriculum:

Program: Automation & Robotics, Field of study: Robotics, Cognitive Systems

9 Responsibility/ Lecturer

	Prof. Dr.-Ing. G. Fink/ Prof. Dr.-Ing. G. Fink