Computer Vision					AR-210

two-year Rota SS	Duration 1 Semester	Semester 2nd (Semester)	SWS 4 SWS	Credit Points 6	Workload 180 h

1	Modul structure				
	Course (Abbreviation)	Type/ SWS	Presence	Self study	Credits
	a) Computer Vision (CV)	Lecture/ 2 SWS	30 h	90 h	4
	b) Computer Vision (CV)	Tutorial/ 2 SWS	30 h	30 h	2

2	**Language:** English
3	**Content**

For the majority of living beeings 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 with an emphasis on the perception of colors. Afterwards, methods for the computation of local feature representations (e.g. texture, depth, or motion) and for the extraction of image primitives (e.g. regions, contours and keypoints) are presented. Finally, the lecture focusses on visual perception processes at the boundary between image processing and scene interpretation. Especially, appearance based object recognition techniques and methods for tracking objects in image sequences will be covered.

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** The final exam will be an oral (30-45 minutes) exam.
6	**Formality of Examination** ☒ Module Finals ☐ Accumulated Grade
7	**Module Requirements (Prerequisites)**
8	**Allocation to Curriculum:** Program: Automation & Robotics, Field of study: Robotics, Cognitive Systems
9	**Responsibility/ Lecturer** *Prof. Dr. Gernot Fink/* Prof. Dr. Gernot Fink