DEPARTMENT OF MECHATRONICS ENGINEERING

Course Details

Code	Academic Year			Semester
MEC324	3			Spring
Title	**T**	**A**	**L**	**ECTS**
Image Based Automation II	2	1	1	6

Language	German					
Level	**Undergraduate**	x	**Graduate**		**Postgraduate**	
Department / Program	Mechatronics Engineering					
Forms of Teaching and Learning	Classroom teaching					
Course Type	**Compulsory**	x	**Elective**			
Objectives	Upon completion of this module, students will have: - Competencies for the design of a system for image acquisition and image processing - Knowledge of methods and tools of thermography and 3D image acquisition - Knowledge of methods for feature extraction and classification as well as their functionality and application					
Content	System Integration - Thermography - 3D imaging Feature extraction (SIFT, Harris Corner Detector, HOG, PCA) - Classification (Bayes, k- NN, Neural Networks, SVM) - Project					
Prerequisites	-					
Coordinator	-					
Lecturer(s)	Asst. Prof. Dr. N. Özben Önhon					
Assistant(s)	Onur Akgün					
Work Placement	-					

Recommended or Required Reading

Books / Lecture Notes	• C. M. Bishop: „Pattern Recognition and Machine Learning“ • T. Hastie, R. Tibshirani, J Friedman: „The Elements of Statistical Learning – Data Mining, Inference, and Prediction“; Umfassendes Werk zum Thema Machine Learning • G. Bradski: „Learning OpenCV: Computer Vision with the OpenCV Library“; Anwendungsbeispiele • C. Demant: „Industrielle Bildverarbeitung: Wie optische Qualitätskontrolle wirklich funktioniert“; Praxisorientierte Einführung • B. Jähne: „Digitale Bildverarbeitung“; Vertiefung mathematischer Grundlagen
Other Sources	

Additional Course Material

Documents	
Assignments	
Exams	1 Midterm, 1 Final

Course Composition

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Mathematics und Basic Sciences		30%
Engineering		30%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		%
Health Sciences		%
Expert Knowledge		40%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	25
Quiz		
Assignments		
Attendance		
Recitations		
Projects	1	15
Final Exam	1	60
	Total	**100**

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	2	28
Self-Study	14	8	112
Assignments			
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14
Laboratory	14	1	14
Projects			
Final Exam	1	2	2
		Total Work Load	**172**
		ECTS Points (Total Work Load / Hour)	**6**

Learning Outcomes

1	Competence in the design of a system for image acquisition and image processing
2	Knowledge of thermography and 3D imaging methods and tools
3	Knowledge of feature extraction and classification

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Weekly Content	
1	Introduction
2	System integration
3	Thermography
4	3D Image acquisation
5	3D Image acquisation
6	Feature Extraction (Harris Corner Detector)
7	Feature extraction (HOG, SIFT, PCA)
8	Feature extraction (HOG, SIFT, PCA)
9	Midterm exam
10	Introduction to classification methods
11	Evaluation criteria, confusion matrix
12	Bayes, Naive Bayes Classifier
13	kNN Classifier
14	SVM
15	Artificial Neural Networks

Contribution of Learning Outcomes to Program Objectives (1-5)												
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**	**P12**
1	5	5	5	5	5	5	4	4	5	4	5	
2	5	5	5	5	5	5	4	4	5	4	5	
3	5	5	5	5	5	5	4	4	5	4	5	
4												
5												
6												

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7												
8												
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10												
11												
12												

Contribution Level	1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=196

Compiled by:	Asst. Prof. Dr. N. Özben Önhon
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