

MI142 - Pose Estimation for Mapping, VR & AR-Tracking

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General information	
Module Code	MI142
Unique Identifier	
Module Leader(s)	Prof. Dr. Woelk, Felix (felix.woelk@haw-kiel.de)
Lecturer(s)	Dr. Köser, Kevin (kkoeser@geomar.de) Prof. Dr. Woelk, Felix (felix.woelk@haw-kiel.de)
Offered in Semester	Wintersemester 2022/23
Module duration	1 Semester
Occurrence frequency	Regular
Module occurrence	In der Regel im Wintersemester
Language	Englisch
Recommended for international students	Yes
Can be attended with different study programme	No

Curricular relevance (according to examination regulations)
Study Subject: M.Eng. - MET - Elektrische Technologien (PO 2017, V3) Study Specialization: Kommunikationstechnik und Embedded Systems Module type: Wahlmodul Semester: 1, 2, 3
Study Subject: M.Sc. - MIE - Information Engineering (PO 2022, V3) Module type: Wahlmodul Semester: 1, 2, 3, 4

Qualification outcome
<i>Areas of Competence: Knowledge and Understanding; Use, application and generation of knowledge; Communication and cooperation; Scientific self-understanding / professionalism.</i>
Students understand the basic theories and algorithms underlying pose estimation systems. Such systems are used in a variety of algorithms and applications, f.e. in mapping algorithms (SLAM) or tracking systems for augmented and virtual reality. Students can judge the possibilities and limitations of these algorithms and systems.
Students can choose and use the right building blocks from software libraries to tailor specific pose estimation applications.
Students are able to collaborate in a team and present their work.
Students are able work independently on complex assignments.

Content information	
Content	<p>The module covers the fundamental technical and theoretical building blocks of a pose estimation system for mapping, augmented or virtual reality system:</p> <ul style="list-style-type: none"> - camera models - lens distortion - camera calibration - pose estimation - marker detection - feature detection - feature description - handling of outliers - camera tracking - triangulation <p>The basic building blocks of a tracking system based on OpenCV using python will be implemented in the lab.</p>
Literature	<p>"Multiple View geometry", Richard Hartley and Andrew Zisserman, Cambridge, 2003 "Computer Vision: Algorithms and Applications", Richard Szeliski, Springer, 2011 More literature will be given in the first lecture</p>

Teaching formats of the courses	
Teaching format	SWS
Labor	2
Lehrvortrag	2

Workload	
Number of SWS	4 SWS
Credits	5,00 Credits
Contact hours	48 Hours
Self study	102 Hours

Module Examination	
Examination prerequisites according to exam regulations	None
MI142 - Übung	Method of Examination: Übung Weighting: 50% wird angerechnet gem. § 11 Absatz 2 PVO: No Graded: Yes
MI142 - Klausur	Method of Examination: Klausur Duration: 120 Minutes Weighting: 50% wird angerechnet gem. § 11 Absatz 2 PVO: No Graded: Yes

Miscellaneous	
Recommended Prerequisites	<ul style="list-style-type: none"> - Good programming skills in one language using object oriented paradigm - Knowledge in mathematics, particularly in linear algebra
Miscellaneous	Lab exercises (Übung) and written exam (Klausur) must be taken within the same term, no transferal of test performance to following terms.