

[MRE002] PERCEPTION

GENERAL INFORMATION

Studies	Master's Degree in ROBOTICS AND CONTROL SYSTEMS	Subject	Artificial Vision
Semester	2	Course	1
Character	OPTIONAL	Mention / Field of specialisation	AUTONOMOUS SYSTEMS - EIT
Plan	2019	Modality	Adapted Face-to-face
Credits	6	Hours/week	0
		Language	ENGLISH
		Total hours	120 class hours + 30 non-class hours = 150 total hours

PROFESSORS

IZAGUIRRE ALTUNA, ALBERTO
 ALONSO NIETO, MARCOS

REQUIRED PREVIOUS KNOWLEDGE

Subjects	Knowledge
ARTIFICIAL VISION	Linear Algebra Programming foundations

SKILLS

VERIFICA SKILLS

SPECIFIC

MRCE21 - "Designing and evaluating algorithms based on the analysis of the content of the data, especially images and videos "

GENERAL

MRCG01 - Automating, controlling, maintaining and providing intelligence to industrial processes and autonomous systems while directing innovative projects that guarantee their availability, using and integrating cutting-edge technologies in both industrial and scientific environments, with the ability to deliver advice on the most appropriate alternatives considering the specifications of users and current regulations

CROSS

MRCTR1 - Ability to work in multidisciplinary teams and in a multilingual environment and to communicate, both orally and in writing, knowledge, procedures, results and ideas related to subjects related to the Master's degree

MRCTR2 - Ability to do their job with a cooperative and participatory attitude, while being socially responsible

BASIC

M_CB9 - To share knowledge, conclusions and their rationale with specialised and lay audiences in a clear, unambiguous manner

LEARNING RESULTS

RA2111 Designs a perception system for a robotic application communicating his/her conclusions in an argued way

LEARNING ACTIVITIES

	CH	NCH	TH
Individual study and work, tests and evaluations and check points	15 h.	15 h.	30 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	55 h.		55 h.

EVALUATION SYSTEM

	W
Individual written and oral tests to assess technical skills of the subject	80%
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	20%

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

Comments: All activities (control points, individual and group work, etc.) must have a minimum grade of 5 and an opportunity for recovery (except the PBL). In unapproved training activities (less than 5) the recovery is compulsory and the final grade will be the grade obtained in the recovery. In the activities carried out it is necessary to obtain a minimum mark of 4 to calculate the average mark of the learning result. Otherwise, the note of the learning result will be that of the suspended activity. The system will calculate the final grade with the RA, applying the percentages defined in IKOF.

CH - Class hours: 70 h.
NCH - Non-class hours: 15 h.
TH - Total hours: 85 h.

RA212 Implements a perception system for autonomous navigation of a mobile robot, collaborating actively to evaluate and assume the social responsibility implicit in the proposal

LEARNING ACTIVITIES

	<i>CH</i>	<i>NCH</i>	<i>TH</i>
Individual study and work, tests and evaluations and check points	10 h.	15 h.	25 h.
Presentation of the teacher in the classroom, in participatory classes, of concepts and procedures associated with the subjects	40 h.		40 h.

EVALUATION SYSTEM

W

Individual written and oral tests to assess technical skills of the subject	80%
Technical skills, involvement in the project, finished work, obtained results, handed documentation, presentation and technical defence	20%

MAKE-UP MECHANISMS

Individual written and oral tests to assess technical skills of the subject

Comments: All activities (control points, individual and group assignments, etc...) must have a minimum grade of 5 and there will be an extra opportunity for those who do not pass in the first try. In case of a second-chance examination, the final grade will be calculated as follows: first try examination grade * 25% + second-chance examination grade * 75%. In the exams it is necessary to obtain a minimum grade of 4 to calculate the average grade of the learning outcome. Otherwise, the learning outcome grade will be the grade of the exam. In all activities with a grade less than 5, recoveries are mandatory.

CH - Class hours: 50 h.

NCH - Non-class hours: 15 h.

TH - Total hours: 65 h.

CONTENTS

Perception

1. 3D triangulation scanners
2. Two-view geometry
3. Geometry of multiple views
4. Dense motion estimators
5. Resolution of the Robot-World Hand-Eye calibration problem

LEARNING RESOURCES AND BIBLIOGRAPHY

Learning resources

Slides of the subject
 Specific Master Software
 Moodle Platform
 Technical articles

Bibliography

Olivier Faugeras - Three-Dimensional Computer Vision
 Richard Hartley - Multiple View Geometry in Computer Vision (Second Edition)
 Richard Szeliski - Computer Vision Algorithms and Applications
 Visual Sensing and its Applications
 Integration of Laser Sensors to Industrial Robots