

Course Unit Description - (PERSE)

(Perception and Sensors)

(Mestrado em Engenharia Electrotécnica e de Computadores)

Academic year: 2009/2010



Subject group: Automação e Robótica

	Semestral	Optional		
Mode of study	Diurno	Hours/Week	T-Teórica	2
Year	1 ^o		PL-Prática-Laboratorial	2
Semester	1 ^o		OT-Orientação Tutorial	1
ECTS				3

Objectives

This course intends to provide the theoretical and practical background for the usage, selection, application or development of advanced sensor systems for autonomous systems.

Course Contents

Introduction to sensors and perception systems
Application of digital signal filtering to sensor systems.
Sensors technologies and working principles (GPS; INS, Radar, LIDAR, Sonars, LBL, USBL, Image sensors, etc)
Measurement techniques (Time of flight measurement, Doppler measurement, phase measurement imaging, radio tags and transponders, range tracking, etc)
Environment and the Sensors (atmospheric effects, multipath, target characteristics).
Active sensors and advanced techniques
Computer vision concepts

Recommended reading

- [1] Jacob Fraden, "Handbook of Modern Sensors: Physics, Designs, and Applications", 3ed, Springer, 2004
- [2] Jon Wilson, "Sensor Technology Handbook", Elsevier, 2005
- [3] John G. Webster Ed, "Measurement, Instrumentation and Sensors Handbook", CRC, 1999
- [4] Steven W. Smith, "The Scientist and Engineer's Guide to Digital Signal Processing Second Edition", California Technical Publishing, 1999
- [5] H. R. Everett, "Sensors for Mobile Robots: Theory and Application", AK Peters, Ltd. , 1995
- [6] J. Borenstein, H. R. Everett, and L. Feng, "Navigating Mobile Robots: Sensors and Techniques", AK Peters, Ltd. , 1996
- [7] Randy Frank, "Understanding Smart Sensors", Artech House Publishers; 2nd edition, 2000.
- [8] Edward A. Lee, Pravin Varaiya, "Structure and Interpretation of Signals and Systems", Addison-Wesley, 2003
- [9] Linda G. Shapiro, George C. Stockman, "Computer Vision", 1^o edição, Prentice Hall, 2001

Teaching Methods

Theory concepts presentation with consolidating practical examples and exercises done in the lab classes, and research and implementation works to be done extra classes.

Assessment methods

The final grade is composed by the assessment of following components:
Practical exercises resolution in classes, and one research work and one implementation work, both composed by a written report, an oral presentation and defense.

	Name
Teacher responsible:	José Miguel Soares de Almeida (JSA)
Lecturer:	José Miguel Soares de Almeida (JSA)