

Aníbal Castilho Coimbra de Matos

# Curriculum vitæ

January 2013



## Contents

<b>1</b>	<b>General information</b>	<b>4</b>
1.1	Biographic data . . . . .	4
1.2	Contact . . . . .	4
1.3	Academic degrees . . . . .	4
1.4	Current positions . . . . .	4
1.5	Previous positions . . . . .	4
1.6	Participation in scientific associations . . . . .	5
<b>2</b>	<b>Publications</b>	<b>6</b>
2.1	Monographs . . . . .	6
2.2	Journal papers . . . . .	6
2.3	Book chapters . . . . .	6
2.4	Conference proceedings . . . . .	7
<b>3</b>	<b>Supervisions</b>	<b>12</b>
3.1	Ph.D. students . . . . .	12
3.2	M.Sc. students . . . . .	12
<b>4</b>	<b>Scientific projects</b>	<b>15</b>
4.1	With coordination duties . . . . .	15
4.2	Other projects . . . . .	17

## 1 General information

### 1.1 Biographic data

Name: Aníbal Castilho Coimbra de Matos  
Birth date: 30<sup>th</sup> September, 1968  
Nationality: Portuguese

### 1.2 Contact

Address: FEUP – DEEC  
Rua Dr. Roberto Frias  
4200–465 Porto  
Portugal  
Telephone: +351 22 041 3221  
Mobile: +351 91 267 1288  
Email: [anibal@fe.up.pt](mailto:anibal@fe.up.pt)  
Web page: <http://paginas.fe.up.pt/~anibal/>

### 1.3 Academic degrees

- Ph.D. in Electrical and Computer Engineering,  
University of Porto, September 2001.
- M.Sc. in Electrical and Computer Engineering,  
Faculty of Engineering, Porto University, November 1994.
- Graduation in Electrical and Computer Engineering,  
Faculty of Engineering, Porto University, July 1991.

### 1.4 Current positions

- Researcher and project leader,  
INESC TEC – Insitute for Systems and Computer Engineering Porto,  
since July 2009.
- Assistant Professor,  
Department of Electrical and Computer Engineering,  
Faculty of Engineering, Porto University,  
since September 2001.

### 1.5 Previous positions

- Teaching Assistant,  
Department of Electrical and Computer Engineering,  
Faculty of Engineering, Porto University,

from February 1996 till September 2001.

- Researcher,  
Instituto for Systems and Robotics – Porto,  
from February 1996 till June 2009.

### **1.6 Participation in scientific associations**

- Member of SPR – Portuguese Robotics Society.
- Member of APCA – Portuguese Association for Automatic Control.
- Member of IEEE – Institute of Electrical and Electronics Engineers.

## 2 Publications

### 2.1 Monographs

2. *Optimality Conditions for Dynamic Optimization Problems* (in Portuguese)  
2001, Ph.D. Thesis, Porto University.  
*Aníbal Matos*
1. *Dynamic Optimization and Obstacle Avoidance* (in Portuguese)  
1994, M.Sc. Thesis, Porto University.  
*Aníbal Matos*

### 2.2 Journal papers

6. *Fast 3D Matching Localisation Algorithm*  
2013, Journal of Automation and Control Engineering, vol. 1, no. 2, pp. 110-115  
M. Pinto, A. Moreira, *A. Matos*, H. Sobreira, F. Santos
5. *Novel 3D matching self-localisation algorithm*  
2012, International Journal of Advances in Engineering & Technology, vol. 5, no. 1,  
pp. 1-12  
M. Pinto, A. Moreira, *A. Matos*, H. Sobreira
4. *Localization of Mobile Robots Using an Extended Kalman Filter in a LEGO NXT*  
2012, IEEE Transactions on Education, vol. 55, n. 1  
M. Pinto, A. Moreira, *A. Matos*
3. *Estimation Approach for AUV Navigation Using a Single Acoustic Beacon*  
2010, Sea Technology, vol. 51, n. 12  
B. Ferreira, *A. Matos*, N. Cruz
2. *Modeling and Control of the MARES Autonomous Underwater Vehicle*  
2010, Marine Technology Society Journal, vol. 44, n. 2  
B. Ferreira, *A. Matos*, N. Cruz, M. Pinto
1. *Shallow Water Surveying Using Experimental Interferometric Synthetic Aperture Sonar*  
2009, Marine Technology Society Journal, vol. 43, n. 1  
S. Silva, S. Cunha, *A. Matos*, N. Cruz

### 2.3 Book chapters

2. *MARES - Navigation, Control and On-board Software*  
2009, in *Underwater Vehicles*, ISBN 978-953-7619-49-7  
*A. Matos*, N. Cruz
1. *Synthetic Aperture Techniques for Sonar Systems*

2009, in *Advances in Sonar Technology*, ISBN 978-3-902613-48-6  
S. Silva, S. Cunha, A. Matos, N. Cruz

## 2.4 Conference proceedings

53. *Modular Building Blocks for the Development of AUVs - from MARES to TriMARES*  
2013, UT13 - International Symposium on Underwater Technology, Tokyo, Japan  
N. Cruz, A. Matos, B. Ferreira
52. *Optimal positioning of autonomous marine vehicles for underwater acoustic source localization using TOA measurements*  
2013, UT13 - International Symposium on Underwater Technology, Tokyo, Japan  
B. Ferreira, A. Matos, N. Cruz
51. *Bottom Estimation and Following with the MARES AUV*  
2012, Proceedings of OCEANS 2012 MTS/IEEE, Hampton Roads, USA  
J. Melo, A. Matos
50. *Control and guidance of a hovering AUV pitching up or down*  
2012, Proceedings of OCEANS 2012 MTS/IEEE, Hampton Roads, USA  
B. Ferreira, J. Jouffroy, A. Matos, Nuno Cruz
49. *Implementation of an Underwater Acoustic Network using Multiple Heterogeneous Vehicles*  
2012, Proceedings of OCEANS 2012 MTS/IEEE, Hampton Roads, USA  
N. Cruz, B. Ferreira, A. Matos, C. Petrioli, R. Petroccia, D. Spaccini
48. *Towards cooperative localization of an acoustic pinger*  
2012, Proceedings of OCEANS 2012 MTS/IEEE, Hampton Roads, USA  
B. Ferreira, A. Matos, N. Cruz, R. Almeida
47. *TriMARES – a Hybrid ROV/AUV for Dam Inspection*  
2011, MTS/IEEE OCEANS'2011, Kona, USA  
N. Cruz, A. Matos, R. Almeida, B. Ferreira, N. Abreu
46. *Automatic reconfiguration and control of the MARES AUV in the presence of a thruster fault*  
2011, IEEE OCEANS'2011, Santander, Spain  
B. Ferreira, A. Matos, N. Cruz
45. *Adaptive sampling of thermoclines with Autonomous Underwater Vehicles*  
2010, MTS/IEEE OCEANS'2010, Seattle, USA  
N. Cruz, A. Matos
44. *Automatic interface for AUV mission planning and supervision*  
2010, MST/IEEE OCEANS'2010, Seattle, USA  
N. Abreu, A. Matos, P. Ramos, N. Cruz
43. *Synchronized intelligent buoy network for underwater positioning*

- 2010, MTS/IEEE OCEANS'2010, Seattle, USA  
R. Almeida, N. Cruz, *A. Matos*
42. *Single beacon navigation: Localization and control of the MARES AUV*  
2010, MTS/IEEE OCEANS'2010, Seattle, USA  
B. Ferreira, *A. Matos*, N. Cruz
41. *Reactive AUV motion for thermocline tracking*  
2010, IEEE OCEANS'2010, Sydney, Australia  
N. Cruz, *A. Matos*
40. *Hydrodynamic modeling and motion limits of AUV MARES*  
2009, IEEE IECON'2009, Porto, Portugal  
B. Ferreira, M. Pinto, *A. Matos*, N. Cruz
39. *Using Side Scan Sonar to Relative Navigation*  
2009, MTS/IEEE Oceans'2009, Biloxi, USA  
M. Pinto, B. Ferreira, *A. Matos*, N. Cruz
38. *Side Scan Sonar Image Segmentation and Feature Extraction*  
2009, MTS/IEEE Oceans'2009, Biloxi, USA  
M. Pinto, B. Ferreira, *A. Matos*, N. Cruz
37. *Modeling and Motion Analysis of the MARES Autonomous Underwater Vehicle*  
2009, MTS/IEEE Oceans'2009, Biloxi, USA  
B. Ferreira, M. Pinto, *A. Matos*, N. Cruz
36. *Control of the MARES Autonomous Underwater Vehicle*  
2009, MTS/IEEE Oceans'2009, Biloxi, USA  
B. Ferreira, M. Pinto, *A. Matos*, N. Cruz
35. *Positioning Control of an Underactuated Surface Vessel*  
2008, MTS/IEEE Oceans'2008, Quebec, Canada  
*A. Matos*, N. Cruz
34. *Guidance and Control of an ASV in AUV Tracking Operations*  
2008, MTS/IEEE Oceans'2008, Quebec, Canada  
J. Melo, *A. Matos*
33. *Navigation of an Autonomous Underwater Vehicle in a Mobile Network*  
2008, MTS/IEEE Oceans'2008, Quebec, Canada  
N. Santos, *A. Matos*, N. Cruz
32. *The MARES AUV, a Modular Autonomous Robot for Environment Sampling*  
2008, MTS/IEEE Oceans'2008, Quebec, Canada  
N. Cruz, *A. Matos*
31. *Sub-Band Processing of Synthetic Aperture Sonar Data*  
2008, MTS/IEEE Oceans'2008, Quebec, Canada  
S. Silva, S. Cunha, *A. Matos*, N. Cruz



30. *An Algebraic Approach to Synthetic Aperture Sonar Image Reconstruction*  
2008, MTS/IEEE Oceans'2008, Quebec, Canada  
S. Silva, S. Cunha, A. Matos, N. Cruz
29. *Shallow Water Height Mapping With Interferometric Synthetic Aperture Sonar*  
2008, MTS/IEEE Oceans'2008, Quebec, Canada  
S. Silva, S. Cunha, A. Matos, N. Cruz
28. *Coordinated Operation of Autonomous Underwater and Surface Vehicles*  
2007, MTS/IEEE Oceans'2007, Vancouver, Canada  
A. Matos, N. Cruz
27. *An Autonomous Boat Based Synthetic Aperture Sonar*  
2007, MTS/IEEE Oceans'2007, Vancouver, Canada  
S. Silva, S. Cunha, A. Matos, N. Cruz
26. *Zarco – An Autonomous Craft for Underwater Surveys*  
2007, 7th Geomatic Week, Barcelona, Spain  
N. Cruz, A. Matos, S. Cunha, S. Silva
25. *An In-SAS System for Shallow Water Surveying*  
2007, 7th Geomatic Week, Barcelona, Spain  
S. Silva, S. Cunha, A. Matos, N. Cruz
24. *Simultaneous Acoustic Navigation of Multiple AUVs*  
2006, IFAC MCMC'2006 Conference, Lisbon, Portugal  
A. Matos, N. Cruz
23. *WaVeSim – Water Vehicle Simulator*  
2006, IFAC MCMC'2006 Conference, Lisbon, Portugal  
A. Santos, A. Matos
22. *AUV navigation and guidance in a moving acoustic network*  
2005, IEEE OCEANS'2005 Europe, Brest, France  
A. Matos, N. Cruz
21. *Algorithms for External Tracking of an AUV*  
2004, IFAC IAV'04 Symposium, Lisbon, Portugal  
A. Matos, N. Cruz
20. *Small size AUVs: Operation Results and New Mission Concepts*  
2004, IFAC IAV'04 Symposium, Lisbon, Portugal  
N. Cruz, A. Matos, J. Sousa
19. *Post Mission Trajectory Smoothing for the Isurus AUV*  
2003, MTS/IEEE OCEANS'2003, San Diego, USA  
A. Matos, N. Cruz, F. Pereira
18. *Operations with Multiple Autonomous Underwater Vehicles: the PISCIS Project*  
2003, Second Annual Symposium on Autonomous Intelligent Networks and Systems,

- Palo Alto, USA  
N. Cruz, A. Matos, J. Sousa, F. Pereira, J. Silva, E. Silva, J. Coimbra e E. Dias
17. *PISCIS: Multiple Autonomous Underwater Vehicles for Environmental and Oceanographic Field Studies*  
2003, Environment 2010: Situation and Perspectives for the European Union, Porto, Portugal  
N. Cruz, J. Sousa, F. Pereira, A. Matos, E. Silva, J. Coimbra, E. Dias
  16. *Dynamic Optimization in the Coordination and Control of Autonomous Underwater Vehicles*  
2002, IEEE CDC'2002, Las Vegas, USA  
J. Sousa, A. Matos, F. Pereira
  15. *Hamilton-Jacobi Conditions for a Class of Impulsive Control Problems*  
2002, 10th Mediterranean Conf. on Control and Automation - MED'2002, Lisbon, Portugal  
A. Matos, F. Pereira
  14. *A Versatile Acoustic Beacon for Navigation and Remote Tracking of Multiple Underwater Vehicles*  
2001, MTS/IEEE OCEANS'2001, Honolulu, USA  
N. Cruz, L. Madureira, A. Matos, F. Pereira
  13. *Monitoring an Ocean Outfall using an AUV*  
2001, MTS/IEEE OCEANS'2001, Honolulu, USA  
P. Ramos, N. Cruz, A. Matos, M. Neves, F. Pereira
  12. *Prediction Studies for an AUV Monitoring Mission Plan*  
2001, 5th Int. Conf. on the Mediterranean Coastal Environment - MEDCOAST'01, Hamammet, Tunisia  
P. Ramos, N. Cruz, A. Matos, M. Neves, F. Pereira
  11. *Hamilton-Jacobi conditions for an impulsive control problem*  
2001, 5th IFAC Symposium on Nonlinear Control Systems, S. Petersburgo, Russia  
A. Matos, F. Pereira, G. Silva
  10. *Development and Implementation of a Low-Cost LBL Navigation System for an AUV*  
1999, MTS/IEEE Oceans'99, Seattle, USA  
A. Matos, N. Cruz, A. Martins, F. Pereira
  9. *Estuarine Environment Studies with Isurus, a Remus class AUV*  
1999, MTS/IEEE Oceans'99, Seattle, USA  
N. Cruz, A. Matos, A. Martins, D. Santos, J. Silva, D. Boutov, D. Ferreira, F. Pereira
  8. *IES - an open system for underwater inspection*  
1999, MTS/IEEE Oceans'99, Seattle, USA  
A. Martins, A. Matos, N. Cruz, F. Pereira
  7. *Multiple AUVs for Coastal Oceanography*

- 1997, MTS/IEEE Oceans'97, Halifax, Canada  
J. Sousa, N. Cruz, *A. Matos*, F. L. Pereira
6. *On the Design and Implementation of a Control Architecture for a Mobile Robotic System*  
1996, IEEE Int. Conference on Robotics and Automation, Minneapolis, USA  
J. Sousa, F. Pereira, E. Silva, A. Martins, *A. Matos*, J. Almeida, N. Cruz, R. Tunes, S. Cunha
  5. *An Algorithm for Optimal Control Problems Based on Differential Inclusions*  
1995, IEEE CDC'95, New Orleans, USA  
F. Pereira, J. Sousa, *A. Matos*
  4. *On the Design and Implementation of a Mobile Robotic System*  
1995, IEEE International Symposium on Intelligent Control, Monterey, USA  
J. Sousa, F. Pereira, E. Silva, A. Martins, *A. Matos*, J. Almeida, N. Cruz, R. Tunes, S. Cunha
  3. *A Global Motion Control Strategy Using Dynamic Programming*  
1994, IEEE OCEANS'94, Brest, France  
S. Cunha, *A. Matos*, F. Pereira
  2. *A Methodology for Replanning Collision Free Trajectories for a Mobile Robot*  
1993, IEEE IECON'93, Maui, USA  
*A. Matos*, S. Cunha, F. Pereira
  1. *An automatic path planing system for autonomous robotic vehicles*  
1993, IEEE IECON'93, Maui, USA  
S. Cunha, *A. Matos*, F. Pereira

### 3 Supervisions

#### 3.1 Ph.D. students

5. *Visual guidance of underwater vehicles*  
André Bianchi Aguiar Araújo Figueiredo  
Ph.D. in Electrical and Computer Engineering, Porto University (supervisor).  
Started in October 2011.
4. *Posicionamento e navegação coordenados de múltiplos veículos submarinos autónomos*  
José Luis da Rocha Melo  
Ph.D. in Electrical and Computer Engineering, Porto University (supervisor).  
Started in October 2010.
3. *Automatic planning and replanning of autonomous vehicles operations*  
Nuno Miguel Neves de Abreu  
Ph.D. in Electrical and Computer Engineering, Porto University (supervisor).  
Started in October 2010.
2. *Control and coordination of vehicles under communication constraints*  
Bruno Miguel Mateus Ferreira  
Ph.D. in Electrical and Computer Engineering, Porto University (supervisor).  
Started in October 2009.
1. *SLAM for 3D Map Building to be used in a Matching 3D Localization Algorithm*  
Miguel Armando Migueis Pinto  
Ph.D. in Electrical and Computer Engineering, Porto University (co-supervisor).  
Finished in January 2013.

#### 3.2 M.Sc. students

17. *Optimized planning and control of marine robot trajectories*  
Margarida Maria Rosas Rebelo Correia  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Started in January 2013.
16. *Communications and coordination for a network of surface vehicles*  
André Filipe de Castro Reis  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Started in January 2013.
15. *Graça Silva*  
Trajectory planning and execution for underwater vehicles  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Started in September 2012.

14. *Visual guidance of autonomous boats*  
Ricardo Jorge Moreira da Silva Neves  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Started in September 2012.
13. *Autonomous boats competitions*  
João Paulo dos Santos Leite  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in July 2012.
12. *Autonomous board for search and rescue*  
Duarte Rafael de Aleida  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in July 2012.
11. *Integrated coprocessor for AUV navigation*  
Hélder Filipe Santana Campos  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (co-supervisor).  
Finished in July 2011.
10. *Intelligent system for underwater acoustic positioning*  
Rui Miguel Sousa Almeida  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (co-supervisor).  
Finished in July 2010.
9. *Modeling and control of a 4 DOF underwater vehicle*  
Bruno Miguel Mateus Ferreira  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in July 2009.
8. *Relative navigation with a side scan sonar*  
Miguel Armando Migueis Pinto  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in July 2009.
7. *Robust acoustic navigation*  
Ricardo Costa  
M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in July 2009.
6. *Modeling and control of an autonomous boat*  
André Savva Bordalo e Sá

M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in July 2009.

5. *Reconfigurable acoustic network*

Ivo Alcântara Tavares Dias

M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in July 2008.

4. *Coordinated control of surface and underwater autonomous vehicles*

José Luís da Rocha Melo

M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in July 2008.

3. *Navigation of an underwater vehicle in a moving acoustic network*

Nuno Filipe Leite dos Santos

M.Sc. in Electrical and Computer Engineering, Faculty of Engineering, Porto University (supervisor).  
Finished in March 2008.

2. *Simulation environment for marine vehicles*

António Manuel Nogueira Santos

M.Sc. in Computer Science, Faculty of Sciences, Porto University (supervisor).  
Finished in January 2007.

1. *Independent Component Analysis for Image Recognition*

Susana Isabel Santos Ferreira Silva

M.Sc. in Computational Methods in Science and Engineering, Porto University (co-supervisor)  
Finished in July 2004.

## 4 Scientific projects

### 4.1 With coordination duties

#### 7. Increased autonomy for AUVs – Mission Planning and Obstacle Avoidance

*Role:* Leader of INESC TEC team.

*Funding:* European Defence Agency – Unmanned Maritime Systems

*Start:* July/2012

*Duration:* 36 months

*Goals:* Development of tools for the automatic planning and replanning of AUV missions in mine countermeasure operations.

*Partners:* FFI – Forsvarets forskningsinstitutt (Norway), Saab Underwater Systems AB (Sweden), BWB – Bundesamt für Wehrtechnik und Beschaffung (Germany), WASS (Italy), INESC Porto (Portugal)

#### 6. ICARUS – Integrated Components for Assisted Rescue and Unmanned Search operations

*Role:* Leader of INESC TEC team.

*Funding:* European Union – call FP7-SEC-2010 – grant 285417

*Start:* Feb/2012

*Duration:* 48 months

*Goals:* This project addresses the development and integration of robotic tools for search and rescue operations in several scenarios.

*Partners:* ECOLE ROYALE MILITAIRE - KONINKLIJKE MILITAIRE SCHOOL, Belgium (leader); SPACE APPLICATIONS SERVICES NV, Belgium; ESTUDIOS GIS S.L., Spain; Centre de Tecnologia aeroespacial, Spain; FRAUNHOFER-GESELLSCHAFT ZUR FÖRDERUNG DER ANGEWANDTEN FORSCHUNG E.V., Germany; INSTYTUT MASZYN MATEMATYCZNYCH, Poland; Jean-Marc (Joseph) DESAULNIERS, France; TECHNISCHE UNIVERSITÄT WIEN, Austria; INTEGRASYS SA, Spain; Eidgenössische Technische Hochschule Zürich, Switzerland; QUOBIS NETWORKS SA, Spain; INESC PORTO, Portugal, Allen Vanguard Ltd, UK; UNIVERSITE DE NEUCHÂTEL, Switzerland; ATOS ORIGIN SOCIEDAD ANONIMA ESPANOLA, Spain, TECHNISCHE UNIVERSITÄT KAISERSLAUTERN, Germany; NATO Undersea Research Centre, Italy; Calzoni s.r.l., Italy; METALLIANCE, France; ESRI Portugal - Sistemas e Informação Geográfica, SA, Portugal; SYSECO SPRL, Belgium; INSTITUTO HIDROGRAFICO, Portugal; Belgian First Aid and Support Team, Belgium.

#### 5. COGNAT – Cooperative glider navigation and acoustic tomography

*Role:* Principal investigator.

*Funding:* Portuguese Foundation for Science and Technology

*Start:* June/2012

*Duration:* 24 months

*Goals:* Demonstration of an acoustic tomography system carried by and underwater glider, using the tomography data to improve the positioning accuracy of the glider.

*Partners:* INESC Porto, CINTAL (Algarve University)

4. **Intelligent system for the geo-referenced supervision of dams using an autonomous vehicle**

*Role:* Leader of INESC Porto team.

*Funding:* CEB Lajeado (Brazilian hydropower plant company)

*Start:* October/2010

*Duration:* 36 months

*Goals:* Development of a system based on an underwater vehicle for the inspection of underwater structures, for bathymetric studies, and for the measurement of water quality parameters in reservoirs.

*Partners:* Universidade Federal de Juiz de Fora, Brazil (leader) and INESC Porto.

3. **SIMPES – Integrated systems for sewage outfall monitoring**

*Role:* Leader of FEUP team.

*Funding:* Portugueses Innovation Agency – PRIME/IDEIA/70/00299

*Start:* July/2007

*Duration:* 12 months

*Goals:* Development of of prototype (AUV equipped with adequate sensors, integrated systems for planning, control and operation support, and automatic systems for data processing) desenvolvimento de um protótipo (veículo equipado com sensores, sistema integrado de planeamento, controlo e apoio à operação e sistema automático de processamento de dados) to be used in the monitoring of sewage outfalls.

*Partners:* Águas de Portugal (leader) e FEUP

2. **INCORP – Improved navigation with cooperative robotic platforms**

*Role:* Principal investigator.

*Funding:* Portuguese Foundation for Science and Technology

*Start:* June/2005

*Duration:* 37 months

*Goals:* Development and implementation of navigation algorithms to extend the operation area of underwater vehicles.

*Partners:* FEUP

1. **MUV – Navigation and control of multiple underwater vehicles**

*Role:* Principal investigator.

*Funding:* Portuguese Foundation for Science and Technology

*Start:* May/2004

*Duration:* 44 months

*Goals:* Development and implmentation of and intergated navigation and control system for the simultaneous operation of multiple underwater vehicles sharing the same acoustic positioning network.

*Partners:* FEUP



## 4.2 Other projects

### 5. **WWECO – Wastewater outfall monitoring using and autonomous underwater vehicle carrying bio-optic sensors**

*Role:* Researcher.

*Funding:* Portuguese Foundation for Science and Technology

*Start:* October/2008

*Duration:* 36 months

Development of methodologies to improve the efficiency of outfall monitoring using bio-optic sensors.

### 4. **KOS – Underwater operations kit**

*Role:* Researcher.

*Funding:* Portuguese Innovation Agency

*Start:* December/2003

*Duration:* 36 months

Design and implementation of an underwater inspection and light intervention system based on a remotely operated vehicle.

### 3. **PISCIS – Prototype of an integrated system for the intensive sampling of the coastal ocean**

*Role:* Researcher.

*Funding:* Portuguese Innovation Agency

*Start:* December/2002

*Duration:* 36 months

Development and implementation of modular and low cost system for oceanographic data gathering based on multiple autonomous underwater vehicles.

### 2. **IES – Inspection of underwater structures**

*Role:* Researcher.

*Funding:* Portuguese Innovation Agency

*Start:* December/1999

*Duration:* 36 months

Design and development of and experimental prototype of and underwater inspection system. The system is based on a remotely operated vehicle and the project aims at automating a set of tasks related to the guidance of the vehicle.

### 1. **Definition of environmental monitoring missions off the Portuguese coast**

*Role:* Researcher.

*Funding:* Portuguese Foundation for Science and Technology

*Start:* January/1996

*Duration:* 36 months

Characterization of missions to be carried out with autonomous underwater vehicles. The project also aims at performing a set of experimental missions with a REMUS class AUV.