

Computer Vision

MAP-I Curricular Unit

Context

This document describes a PhD level course, corresponding to a Curriculum Unit credited with 7 ECTS, intended for the MAP-I doctoral program. It is offered jointly by (i) Escola de Engenharia, Universidade do Minho (ii) Departamento de Electrónica, Telecomunicações e Informática, Universidade de Aveiro (iii) Faculdade de Ciências, Universidade do Porto (iv) Faculdade de Engenharia, Universidade do Porto.

Course Description

The proposed unit intends to be a specialization in computer vision topics, namely image and video processing, pattern recognition and machine learning. The impressive technological evolution of signal and image capturing hardware has slowly created a new and demanding problem: How do we handle so much data? There is a clear need for automatic tools that can help us analyse, find and annotate the massive amount of video information captured by modern technology. A Computer Vision learning unit is therefore vital for motivating and preparing PhD students with mathematical tools that will help them handle the various real-world problems where computer vision methods might provide robust solutions.

Teaching Staff

Miguel Tavares Coimbra (Principal Instructor)	FC, UP	mcoimbra@fc.up.pt
João Paulo Silva Cunha	DETI, UA	jcunha@det.ua.pt
Jaime dos Santos Cardoso	FE, UP	jaime.cardoso@inescporto.pt
Manuel João Oliveira Ferreira	DEI, UM	mjf@dei.uminho.pt

Prerequisites

Familiarity with basic signal processing methods, namely frequency domain analysis, is highly desirable. Also, some familiarity with a popular programming language such as C or Java is desirable. None of these are strictly necessary but students who have not previously taken courses in these topics may have to work harder to keep up.

Textbooks and references

- D. Forsyth, J. Ponce, "Computer Vision: A Modern Approach", Prentice Hall, 2002.
- R. Gonzalez, R. Woods, "Digital Image Processing – 3rd Edition", Prentice Hall, 2008.
- L. Shapiro, G. Stockman, "Computer Vision", Prentice Hall, 2001.

M. Sonka, V. Hlavac, R. Boyle, "Image Processing, Analysis, and Machine Vision", Brooks/Cole Publishing, 1999.

Course Objectives

The main objectives of this unit can be summarized in the following topics:

- Present and motivate the student for the various topics of Computer Vision.
- Provide the students with a core-set of mathematical tools, useful for most Computer Vision challenges.
- Introduce the student to national and international institutions and companies where Computer Vision is a potential solution to their real-world problems.
- Help the student develop rigorous research and development methodologies.

Course Topics

Chapter I - Image and Video Processing

- Definitions: optics and image formation; digital image; colour models; medical imaging; noise.
- Low-level feature extraction: colour; texture; shape.
- Image pre-processing: filtering; enhancement.

Chapter II - Image Segmentation

- Basic methods: thresholding; colour segmentation; region-based segmentation; mathematical morphology.
- Segmentation by clustering: background subtraction; mean-shift; k-means; graph-theoretic clustering; normalised cuts.
- Segmentation by fitting: fitting lines; fitting curves; robust methods.

Chapter III - Pattern Recognition

- Fundamentals: definitions; feature vectors; classes; principal component analysis.
- Generic pattern recognition techniques: statistical pattern recognition, soft-computing machines, neural networks, support vector machines.
- Pattern recognition for computer vision: hypothesize and test; template matching; relations between templates.

Chapter IV - 3D Vision

- Motion analysis: block matching; optical flow: motion as a low-level feature; visual tracking.
- Geometry and 3D reconstruction: geometry of multiple views; stereo vision; structure from motion.

Expected number of students

10-15

Teaching Methodology

- Theoretical presentation of Computer Vision topics in the form of classes and/or seminars given by lecturers of the learning unit or invited speakers.
- Practical implementation of some of the studied mathematical tools in a research lab environment.
- Integration of students into the teaching process, namely the presentation of state-of-the-art reviews on certain Computer Vision topics, enabling them to tighten their relationship with the learning unit and stimulating their interest on a set of specific topics.

Time scheduling

- 7 ECTS (189 hours)
- 3 hours/week for 14 weeks
- 1.5 hours/week guided study

Evaluation Criteria

- 50% - A written final exam covering the topics studied in the learning unit.
- 50% - A written scientific article, concerning either results obtained during their experimental work or a state-of-the-art review on a Computer Vision topic, which must be presented orally in a public seminar.

CURRICULUM VITAE

PERSONAL DETAILS

Name: Miguel Tavares Coimbra
Date of Birth: 15/05/1975
Nationality: Portuguese
Address: Rua Clube dos Caçadores, 905, 1º DTTZ
4430-057 Vila Nova de Gaia
Portugal
E-mail: mcoimbra@fc.up.pt
Webpage: www.dcc.fc.up.pt/~mcoimbra

EDUCATION

2004-2006 Post-Doc studies at IEETA, University of Aveiro, Portugal. Work consisted in using computer vision methods for the creation of computer tools for clinical analysis of a variety of video exams. Examples include automatic annotation of endoscopic capsule exams, single particle tracking for low SNR confocal microscopy exams, and numerical quantification of patient 3D motion during epileptic seizures.

1999-2004 PhD in Electronic Engineering, Queen Mary, University of London, “Compressed Domain Processing with Applications to Surveillance”. Research consisted in the study of compressed domain information of encoded digital video. This resulted in the development of fast tools that approximate traditional image and video processing methods. The test scenario for these tools was a real underground train CCTV surveillance system.

1993-1998 BEng in Electrical and Computer Engineering with specialization in Telecommunications, at Faculdade de Engenharia da Universidade do Porto, Portugal. Final average: 16. Distinction for graduating in the top 5% of students.

PROFESSIONAL AND ACADEMIC EXPERIENCE

2006-... Assistant Professor of the Computer Science Dep., Faculty of Sciences of the University of Porto, Portugal.

1998-1999 Researcher at INESC-Porto. Worked in the VIDION project in collaboration with RTP, the Portuguese public television provider. Work consisted in the development of the ‘Search workstation’ for RTP’s multimedia digital archive. It included search, real-time navigation and on-line visualization of results.

TEACHING EXPERIENCE

2006-... Graduate and Undergraduate Courses at Universidade do Porto

- 2009/10
 - Human-Computer Interaction
 - Computer Vision (MSc. Level)
- 2008/09
 - Human-Computer Interaction
 - Computer Vision (MSc. Level)
 - Seminar (MSc. Level)
 - Telemedicine and e-Health (MSc. Level)
 - Signal and Image Processing (MSc. Level)
 - Computer Vision (PhD. Level)
- 2007/08
 - Human-Computer Interaction
 - Computer Vision (MSc. Level)

- Computer Vision (PhD. Level)
- Signal and Image Processing (MSc. Level)
- 2006/07
 - Introduction to Informatics (43 undergraduates)
 - Data Structures and Algorithms (183 undergraduates)
 - Graphical Interfaces (138 undergraduates)
 - Signal and Image Processing (7 graduates)
 - Monograph (individual)
- 2002-2003 Lab Monitor for 'Image Processing' at Queen Mary, University of London, under the supervision of Dr. Ebroul Izquierdo.
- 2002-2003 Lab Monitor for 'Multimedia' at Queen Mary, University of London, under the supervision of Dr. Ebroul Izquierdo.
- 1999-2000 Lab Monitor for 'C++ Programming' at King's College London, under the supervision of Dr. Sergio Velastin.

STUDENT SUPERVISION

PhD	Fahran Riaz <i>"Computer Assisted Analysis of Narrow-Band Imaging Endoscopy Exams", DCC, FCUP</i> Paulo Alves <i>"Event Detection for Capsule Endoscopy Video Exams", ProDEI, FEUP</i> Can Ye <i>"Applied Computer Vision for Critical Infrastructures", CMU-Portugal, FCUP</i> Fábio Hedayioglu, <i>"DigiScope - DIGItally enhanced stethoSCOPE for clinical usage", MIM, UP</i>
MSc	Francisco Oliveira, <i>"Real-Time Computer Vision Tools for Capsule Endoscopy Exam Analysis", MCC, FCUP</i> Bruno Lopes, <i>"Software Platform for Assisted Analysis of Cellular Images", MCC, FCUP</i> Celso Ferreira <i>"CellNote: Image processing modules for cellular images", MCC, FCUP</i> Marcos Marafona <i>"Photographic Records of Wounds", MIM, FCUP/FMUP (Co-Supervision)</i>
Researchers	Pedro Gomes <i>Researcher, CMU Portugal Vital Responder project</i> Pedro Nogueira <i>MSc Student, CMU Portugal Vital Responder project</i> Joel Gouveia <i>BSc Student, CMU Portugal Vital Responder project</i> Nuno Marques <i>BSc Student, CMU Portugal Vital Responder project</i>

ALUMNI

MSc	Fábio Hedayioglu, <i>"DigiScope - DIGItally enhanced stethoSCOPE for clinical usage", MIM, UP</i> João Patriarca <i>"Criptografia Adaptiva para Codificação Avançada", MCC, FCUP (Co-Supervision. Supervisor: João Barros, FEUP), 2009</i> André Sousa, <i>"Analysis of colour and texture features of vital-stained magnification-endoscopy images for computer-assisted diagnosis of precancerous and cancer lesions", MIEIC, FEUP, 2008</i>
Scientific	Nelson Gomes,

- Projects
- "Plataformas de processamento de imagem digital: ao encontro de um propósito mais abrangente", DCC, FCUP, 2007*
- Bruno Lopes,
"Determining Leishmania Infection Levels by Automatic Analysis of Fluorescence Microscopy Images", IBMC, 2008
- Carla Teixeira
 "Visita Guiada ao Interior de um Computador", 2008
- Luciana Santos
"Introdução à imagem digital", 2008
- Marta Falcão,
"Levantamento de tecnologias Web actuais passíveis de apoiar o estudo de um aluno do ensino secundário", 2008
- Nádea Serra,
"Ferramenta de ensino para alunos com necessidades educativas especiais", 2008
- Patrícia Silva, Isabel Neves, Teresa Soares,
"Tenho Dislexia", 2009

PUBLICATIONS - JOURNAL PAPERS

1. M. Coimbra, M. Mackiewicz, M. Fisher, C. Jamieson, J. Soares, J.P. Silva Cunha, "Computer Vision Tools for Capsule Endoscopy Exam Analysis", invited paper in Eurasip NewsLetter, vol. 18/1, March 2007, pp. 1-19.
2. J.P. Silva Cunha, M. Coimbra, P. Campos, J. Soares, "Automated Topographic Segmentation and Transit Time Estimation in Endoscopic Capsule Exams", accepted for publication in IEEE Transactions in Medical Imaging.
3. M. Coimbra, and J.P. Silva Cunha, "MPEG-7 visual descriptors – Contributions for automated feature extraction in capsule endoscopy", in IEEE Trans. Circuits and Systems for Video Technology, vol. 16/5, 2006, pp. 628-637.
4. M. Coimbra, and M. Davies, "Approximating optical flow within the MPEG-2 compressed domain" in IEEE Transactions on Circuits and Systems for Video Technology, Volume: 15 , Issue: 1 , Jan. 2005, pp. 103-107.

PUBLICATIONS - CONFERENCE PAPERS

1. J. P. S. Cunha, S. Lima, D. Pacheco, I. Oliveira, J. M. Fernandes, L. Alves, M. Coimbra, and J. Soares, "Automated Endoscopic Capsule Massive Analysis using a Grid Computing Environment," (abstract) in VIII Reunião Ibérica de Cápsula Endoscópica, Porto, Portugal, 2010.
2. J. P. S. Cunha, S. Lima, M. Coimbra, and J. Soares, "ECCA - A Tool for fast annotation of endoscopic capsule exams and its use in a new polyp detection algorithm," (abstract) in VIII Reunião Ibérica de Cápsula Endoscópica, Porto, Portugal, 2010.
3. M. Dinis-Ribeiro, F. Riaz, A. Sousa, P. Pimentel-Nunes, M. Areia, M. Coimbra, "Computer-assisted analysis of gastric magnification chromoendoscopy images: feasibility and potential applications", (abstract) in World Congress of Gastroenterology, London, UK, Nov 2009.
4. A. Sousa, M. Dinis-Ribeiro, M. Areia, M. Coimbra, "Identifying cancer regions in vital-stained magnification endoscopy images using adapted color histograms", in Proc. of IEEE ICIP 2009, Cairo, Egypt, Nov 2009.
5. F. Riaz, M. Dinis-Ribeiro, M. Coimbra, "Quantitative Comparison of Segmentation Methods for In-Body Images", in Proc. of IEEE EMBC 2009, Minneapolis, USA, Sep 2009.
6. S. Lima, J.P. Silva Cunha, M. Coimbra, J. Soares, "ECCA – Endoscopic Capsule Capview cAtaloguer", in Proc. of 11th World Congress on Medical Physics and Biomedical Engineering, Munich, Germany, Sep 2009.
7. F. Riaz, A. Sousa, P. Pimentel-Nunes, M. Areia, M. Coimbra, M. Dinis-Ribeiro, "Análise assistida por computador de imagens de cromendoscopia gástrica: praticabilidade e aplicabilidade", (abstract) in 29th National Meeting in GastroEnterology, Porto, Portugal, 2009.

8. F. Riaz, M. Dinis-Ribeiro, M. Coimbra, "A Review of Current Computer Aided Diagnosis Systems for Polyp Detection in Virtual Colonoscopy", 7th Conference on Telecommunications, Santa Maria da Feira, Portugal, May 2009.
9. F. Riaz, M. Dinis-Ribeiro, M. Coimbra, "Semantic relevance of current image segmentation algorithms", in Proc. of IEEE WIAMIS 2009, London, UK, May 2009.
10. S. Lima, M. Coimbra, J. Soares, J.P. Silva Cunha, "A Tool for Endoscopic Capsule Dataset Preparation for Clinical Video Event Detector Algorithms", in Proc. of HealthInf 2009, Porto, Portugal.
11. F. Hedayioglu, S. Mattos, and M. Coimbra, "A Survey of Audio Processing Algorithms for Digital Stethoscopes", in Proc. of HealthInf 2009, Porto, Portugal.
12. A. Sousa, M. Dinis-Ribeiro, M. Areia, M. Correia, M. Coimbra, "Towards more adequate colour histograms for in-body images", in Proc. of IEEE EMBC 2008, Vancouver, Canada, 2008.
13. M. Coimbra, J. Kustra, P. Campos, J.P. Silva Cunha, "Combining Color with Spatial and Temporal Position of the Endoscopic Capsule for Improved Topographic Classification and Segmentation", in Proc. of SAMT 2006, Athens, Greece, 2006.
14. J.P. Silva Cunha, M. Coimbra, J. Kustra, P. Campos, J. Soares, "Posição e Velocidade Espacial da Cápsula Endoscópica como Ferramenta de Apoio ao Diagnóstico Clínico", (abstract) in 26th National Meeting in GastroEnterology, Porto, Portugal, 2006.
15. J. Soares, F. Baldaque, L. Lopes, M. Coimbra, J.P. Silva Cunha, "Precisão e Eficiência da Anotação Topográfica Manual de Exames de Cápsula Endoscópica", (abstract) in 26th National Meeting in GastroEnterology, Porto, Portugal, 2006.
16. J.P. Silva Cunha, M. Coimbra, C. Vollmar, S. Noachtar, "Quantification of 3d Motion Data for Seizure Semiology Analysis in Epilepsy", (abstract) in 18th National Meeting in Epileptology, Porto, Portugal, 2006.
17. J.P. Silva Cunha, M. Coimbra, P. Campos, J. Soares, "Faster Wireless Capsule Exam Analysis using Automatic Tools", (abstract), in Proc. of International Conference on Capsule Endoscopy 2006, Miami, USA, 2006.
18. M. Coimbra, J.P. Silva Cunha, P. Campos, J. Soares, "Capview.org: A Research Framework for the Development of Automatic Tools for Capsule Endoscopy", (abstract), invited paper in Proc. of 4th Iberian Meeting of Capsule Endoscopy, Coimbra, Portugal, 2006.
19. J.P. Silva Cunha, M. Coimbra, P. Campos, J. Soares, "The First Capview.Org Automatic Tool for Capsule Endoscopy", (abstract), invited paper in Proc. of 4th Iberian Meeting of Capsule Endoscopy, Coimbra, Portugal, 2006.
20. M. Coimbra, P. Campos, and J.P. Silva Cunha, "Topographic Segmentation and Transit Time Estimation for Endoscopic Capsule Exams", in Proc. of IEEE ICASSP 2006, Toulouse, France, 2006.
21. M. Coimbra, P. Campos, and J.P. Silva Cunha, "Extracting clinical information from endoscopic capsule exams using MPEG-7 visual descriptors", in Proc. of IEE EWIMT 2005, London, UK, 2005.
22. M. Coimbra, J.P. Silva Cunha, R. Bausinger, C. Bräuchle, A. Zumbusch, "Objective analysis of illumination noise in fluorescence microscopy", in Proc. of WIAMIS 2005, April, Montreux, Switzerland, 2005.
23. M. Coimbra, and M. Davies, "A Numerical Comparison of Compressed Domain Approximations to Optical Flow", WIAMIS 2004, Lisbon.
24. M. Coimbra, and M. Davies, "Segmentation of moving pedestrians within the compressed domain", in Proc. of IEEE ICASSP 04, Montreal, Canada, 2004.
25. M. Coimbra, and M. Davies, "A New Pedestrian Detection system using MPEG-2 Compressed Domain Information", in Proc. of IASTED International Conference on Visualization, Imaging, and Image Processing (VIIP 2003), Spain, 2003, pp. 598-602.
26. M. Coimbra, M. Davies and S. Velastin, "Pedestrian Detection using MPEG-2 Motion Vectors", in Proc. of WIAMIS 2003, London, 2003, pp. 164-169.

OTHER PUBLICATIONS

1. M. Coimbra, "Poderá um computador 'ver' imagens de cápsula endoscópica?", in EndoNews, Vol: 15, Jul. 2006, pp. 9.

FINANCED PROJECTS

1. MovEpi3D - Motion quantification of 3D body motion during epileptic seizures; Funding Organization: FCT; Role: Investigator; Funding: 128.796€; Duration: 3 years.
2. GERES-Med - Grid-Enabled REpositorieS for medical applications; Funding Organization: FCT; Role: Investigator; Funding: 199.560€; Duration: 3 years.
3. CapView – Automated Tools for Endoscopic Capsule Exam Analysis; Funding Organization: FCT; Role: Investigator; Funding: 87.300€; Duration: 3 years.
4. Vital Responder - Monitoring Stress in First Responder Professionals; Funding Organization: FCT; Role: Co-PI (IT Team Leader); Funding: 519.456€; Duration: 3 years.
5. DigiScope - DIGItally enhanced stethosCOPE for clinical usage; Funding Organization: FCT; Role: PI; Funding: 120.000€; Duration: 3 years

SELECTED PRESENTATIONS

1. 04/12/2009 - "Detecting Cancer in Chromoendoscopy", Universidade da Beira Interior, Covilhã
2. 14/04/2009 - "Computer Assisted Analysis of Emerging Gastroenterology Imaging Technologies", MSc Seminar (MSc in Medical Physics), FCUP, Porto
3. 18/03/2009 - "Image Processing and Analysis", 1st Basic Course on Optical Microscopy Imaging for Biosciences, IBMC, Porto
4. 06/03/2009 - "Looking In: Emerging Imaging Technologies for Gastroenterology", MSc Seminar (MIM), FMUP, Porto
5. 30/01/2009 - "A Little Vision for Biologists", MIT, Boston, USA.
6. 29/01/2009 - "Vital Responder - Monitoring Stress in First Responder Professionals", Carnegie-Mellon University, Pittsburgh, USA.
7. 01/08/2008 - "Medical Imaging Research @ NIP.", UNICENTRO - Universidade Estadual do Centro-Oeste, Guarapuava, Brazil
8. 01/07/2008 - "Medical Imaging Research @ NIP", Real Hospital Português de Beneficência de Pernambuco, Recife, Brazil
9. 21/07/2008 - "Applied Computer Vision Applications", Fraunhofer Institute, Porto
10. 31/01/2008 - "Applied Computer Vision Applications", IBMC, Porto
11. 08/01/2008 - "Analysis tools for endoscopic capsule exams", MSc Seminar (MAOPI), FCUP, Porto

PATENTS

1. M. Coimbra and M. Davies, PCT International Application No. PCT/EP2004/051325, "Optical Flow Estimation Method", Queen Mary & Westfield College, 1st July 2004.

TECHNICAL PROGRAM COMMITTEES

1. CISP 2010, 3rd International Congress on Image and Signal Processing, Yantai, China
2. ICIAR 2009, International Conference on Image Analysis and Recognition, Halifax, Canada
3. ICIAR 2008, International Conference on Image Analysis and Recognition, Póvoa de Varzim, Portugal
4. SecTech 2008, International Conference on Security Technologies, Samui, Thailand

ACADEMIC COMMITTEES

- | | |
|-----|---|
| PhD | 1. Janete Borges, DMA, FCUP, Oct 2009 |
| | 2. Sílvia de Francesco, UA, 2009 |
| | 3. Pedro João Soares Rodrigues, UM, Dec 2008 |
| MSc | 1. Paulo Saraiva, DETI, UA, Dec 2009 |
| | 2. João Oliveira, DI, UBI, Set 2009 |
| | 3. João Correia, DMA, FCUP, 2009 |
| | 4. Sérgio Lima, DETI, UA, Jan 2009 |
| | 5. Denis Roda Dos Santos, DETI, UA, July 2008 |

REVIEWER ACTIVITIES

Journals	<i>IEEE Transactions on Circuits and Systems for Video Technology</i> <i>IEEE Transactions on Medical Imaging</i> <i>IEEE Transactions on Biomedical Engineering</i> <i>IEEE Transactions in Image and Video Processing</i> <i>IEE Electronic Letters</i> <i>Eurasip Journal on Applied Signal Processing</i> <i>Image and Vision Computing</i> <i>Journal of Universal Computer Science</i> <i>International Journal of Imaging</i>
Conferences	<i>EMBC 2010</i> <i>EMBC 2009</i> <i>ICIAR 2009</i> <i>PCS 2009</i> <i>ICIAR 2008</i> <i>PCS 2007</i> <i>ICIAR 2007</i> <i>ICIAR 2006</i> <i>BMVC 2004</i> <i>IASTED VIIP 2003</i>

OTHER DATA

2009	Organizing committee of a one day symposium in medical informatics (2° Simpósio de Informática Médica)
2008	Organizing committee of a one day symposium in medical informatics (1° Simpósio de Informática Médica)
2007	Organized a three day workshop on the topic: Design and Development of Video-Games (CDVJ'07 – Criação e Desenvolvimento de vídeo-jogos). Invited speaker: Verónica Orvalho, UPC, Barcelona. Participation: 30 students of 7 different Portuguese Faculties and Universities.
2003	Collaborated in the organization of the IEEE WIAMIS 2003 conference, at Queen Mary, University of London.
1998	Four month studies at Coventry University, UK, integrated in the European ERASMUS student interchange program. Participated in a collaboration project with a local hospital that consisted in the creation of an on-line telemedicine website. This system allowed encrypted access to a medical database, providing a variety of image processing tools for clinical analysis of visual exams.

Short CV

2002-2006

João Paulo Silva Cunha
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Short Biography

João Paulo Silva Cunha, is Associate Professor at the Dep. of Electronics, Telecommunications and Informatics of the University of Aveiro, Portugal and visiting professor at the University of Munich, Germany. He is the creator (1997) and leader of the “Healthcare Information and systems” R&D group of IEETA (<http://www.ieeta.pt/sias>) where he has currently 17 co-workers of which several PhD and MSc students. He is/was principal researcher of more than 10 projects funded by different R&D agencies in the area of biosignal and medical multimedia data processing. He has been researcher in several European projects such as: INFOBIOMED, TEAM-HOS and HANSA.

Dr. Cunha is Senior Member of the IEEE (2004), where he joined the Engineering in Medicine and Biology Society (1986 as a student member). He is habitual reviewer of several IEEE journals, such as the IEEE Trans. on Biomedical Eng., IEEE Trans. on Signal Processing and the IEEE Trans. on Information Technology in Biomedicine. Dr. Cunha is member and vice-president of the Portuguese Medical Informatics Association, member of the director’s board of the Portuguese Biomedical Engineering Association and member of the following clinical neurophysiology associations: Portuguese League Against Epilepsy, the Portuguese EEG and Neurophysiology Association (non-MD member) and the European Epilepsy Academy (EUREPA). He is holder of several prizes, of which is the most relevant the “Best contribution to clinical epileptology - Claudio Munari award of excellency” delivered by EUREPA in 2002. Dr. Cunha is co-author of more than 120 publications, of which, in the last five year, he has published 3 book chapters and 11 papers in scientific journals.

Project participation

The SIAS R&D group has been involved in the following projects in the last 5 years.

Acronym	Title	Duration	Group role	Funding/entity	Partners
Team-Hos (Proj. Europeu)	Methodology and Tools for World-best Teamwork in Hospitals	Jan 2000 - Dez 2002	Coordinator	2.1 Meuros / IST-DGXIII	ATB, Alemanha; TecAgentur, Austria; 5 Hospitais EU
EpilBI	Epilepsy Brain Imaging System	Set 2005 - Set 2008	Coordinator	80 000 Euros / FCT	UniNova, RMN Caselas, HJM, HFF, HEM
RTS	Rede Telemática de Saúde	Maio 2004 - Dez 2006	Creator e coordinator (sub-contracted)	878 000 Euros / Aveiro Digital	HIP, HDA, Sub Reg. Saúde, Aveiro
BioDreams NT	Parâmetros Fisiológicos, Estratégias de Vinculação e Esquemas Cognitivo-Emocionais em Diferentes Organizações Psicopatológicas	Jun 2003- Mai 2005	Partner	25 000 Euros / Fund. Bial	IEPsicologia-Uminho; C. Medicina Desportiva do Porto
SIMoD	Sistema Inteligente de Monitorização Domiciliário de Variáveis Fisiológicas e Psicossociais	Jan 2003 - Dez 2004	Coordinator	206 000 Euros / PRAI Centro	HIP, HSS
Topo3D	Statistical Topographic Analysis of 3D Spatial and Temporal Distribution of Epileptic Spikes and its Sources in Realistic Brain Models	Out 2002-Jan 2005	Coordinator	160 000 Euros / FCT	HGSA, Porto; HJM, Lisbon
MovEpile	Movement Quantification in Epilepsy: A New Contribution for Epileptic Seizures Classification	Out 2000 - Set 2002	Coordinator	7.815c / Sapiens-FCT	HGSA, Porto

Table 1: Participation and co-ordination of scientific projects

Post-grad supervision and jury

#	Student	Theme	Year
1	Li Zhanjian	Quantified Movement Analysis in Video-EEG of Epileptic Seizures: Evolution to Fine Movement Detection	2001-2004
2	Miguel Tavares Coimbra	New motion tracking tools for medicine and biology	2005-2006

Table 2: Post-doc supervision

#	Type	Candidate	Title	Institution
1	D	Li Zhanjian	Movement Quantification in Epileptic Seizures	Universidade de Aveiro
2	D	José Maria Fernandes	EpiGauss: spatio-temporal characterization of brain activity in Epilepsy	Universidade de Aveiro
3	D	Ilídio Oliveira	Um ambiente computacional para a exploração integrada de informação heterogénea em cenários clínicos	Universidade de Aveiro
4	D	Liliana Ferreira	MedAlert - Sistema de Processamento de Linguagem Médica	Universidade de Aveiro

Table 3: PhD supervision

#	Type	Candidate	Title	Institution	Year
1	D	Li Zhanjian	Movement Quantification in Epileptic Seizures	Universidade de Aveiro	2002
2	D	Robin Alvarez Rueda	Estudio de la alerta en humanos basado en ondas cerebrales	Universidad Politécnica de Madrid	2006
3	D	José Maria Fernandes	EpiGauss: spatio-temporal characterization of brain activity in Epilepsy	Universidade de Aveiro	2006
4	M	Fernando Tavares Ferreira	Sistema de Gestão de Dados de uma Seroteca	Faculdade de Engenharia da Universidade do Porto	1999
5	M	Ilídio Oliveira	Aplicação de Técnicas de Computação Baseada em Agentes na Integração de Dados Heterogéneos em Ambientes Clínicos	Universidade do Minho	2002
6	M	Frederico Santos	Sistemas de Informação em Ambientes Hospitalares: Utilização de Tecnologia de Computação Móvel para Processamento de Reletórios em Voz	Universidade de Aveiro	2002
7	M	Sara Campos de Araújo	Segurança na Circulação de Informação Clínica	Faculdade de Engenharia da Universidade do Porto	2006
8	M	Ricardo Oliveira	Técnicas de Subtração de SPECT e o seu co-registo com IRM: Análise e optimização de um protocolo clínico e a sua utilidade clínica em doentes epilépticos	Faculdade de Engenharia da Universidade do Porto	2006
9	M	Michael Guerreiro	Análise diferenciada das componentes independentes de potenciais evocados P3a e P3b	Universidade do Algarve	2006

Table 4: Post-grad jury participation

Publications 2002-2006

Book chapters

- [1] J. M. Fernandes, A. Leal, and J. P. S. Cunha, "EpiGauss: spatio temporal characterization of epileptogenic activity applied to hypothalamic hamartomas," in *Image Analysis and Recognition, Lecture Notes in Computer Science 4142*, A. C. M. Kamel, Ed. Heidelberg: Springer-Verlag, 2006, pp. 680-690.
- [2] J. P. S. Cunha, A. Värri, T. Oliveira e Silva, M. B. Cunha, and G. Hellmann, "Digital Interchange Formats and Applications in Biosignal," in *Computer Techniques in Medical and Biotechnology Systems*, C. T. Leondes, Ed. Newark NJ, USA: Gordon and Breach, 2002, pp. 269-294.
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 - Signals and Systems (FEUP/MIEIC, 2^o year, P) 2008/09
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Doctoral Theses

7. André Miguel Passos Baltazar
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Title: Reconhecimento óptico robusto de pautas musicais baseado na fusão de regras musicais
Role: Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2012 (estimation)
4. Ricardo Jorge Gamelas de Sousa
Title: Modelos multicritério para a previsão de relações de preferência
Role: Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2012 (estimation)
3. Hélder Filipe Pinto de Oliveira
Title: Modelos Computacionais 3D Avançados para Avaliação do Resultado Estético em Cirurgias Mamárias
Role: Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2012 (estimation)
2. Pedro Miguel Carvalho
Title: Análise e representação de vídeo baseada em modelos 3D
Role: Co-Supervisor
Course: Doctoral Program in Electrical and Computer Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: 2011 (estimation)
1. Susy Cabral da Costa
Title: Previsibilidade do Resultado Estético do Tratamento Conservador do Cancro da Mama
Role: Co-Supervisor
Course: PhD in Medicine, Faculdade de Medicina, Universidade do Porto
Conclusion: 2011 (estimation)

Master Theses

16. Luís Alberto de Sousa Rangel das Neves
Title: Sistema Web Semi-automático para Anotação Colaborativa de Media H.264 e Flash Vídeio
Role: Supervisor

- Course:** Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Feb. 2010
15. Andreas Dieter Mendes Seufert
Title: Investigação e Aperfeiçoamento de Algoritmos de Reconhecimento de Símbolos Musicais
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Feb. 2010
 14. Pedro Augusto Fernandes Antunes Martins Vitoriano
Title: Avaliação Automática do Resultado de Intervenções Cirúrgicas
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Feb. 2010
 13. Rui Alexandre Rodrigues Carneiro
Title: Unificação e expansão da interface de pesquisa no webmail
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2009
 12. Sérgio Manuel Colaço de Sá
Title: Adaptação Preditiva de Conteúdo Multimédia
Role: Co-supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2009
 11. Márcia dos Santos Pinheiro
Title: Sistema Web para o Reconhecimento de Partituras Musicais
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2009
 10. André Miguel Passos Baltazar
Title: Extracção de Informações Rítmicas de Movimentos de Dança Através de um Sinal de Vídeo
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Feb. 2009
 9. Ricardo Jorge Gamelas de Sousa
Title: Automatic aesthetic evaluation of breast cancer conservative treatment
Role: Supervisor
Course: Master in Engineering Mathematics, Faculdade de Ciências, Universidade do Porto
Conclusion: Nov. 2008
 8. Ana Maria Silva Rebelo
Title: New methodologies towards an automatic optical recognition of handwritten musical scores
Role: Supervisor
Course: Master in Engineering Mathematics, Faculdade de Ciências, Universidade do Porto
Conclusion: Nov. 2008

7. Pedro Luís Cameira Sollari Allegro
Title: Singing Voice Detection in Polyphonic Music Signals
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
6. Luís Daniel Torres Rebelo
Title: Avaliação objectiva do resultado estético dos tratamentos do cancro da mama
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
5. Luís Miguel Marques Soeiro Batista
Title: Sistema automático de reconhecimento de formulários manuscritos
Role: Supervisor
Course: Master in Electrical and Computers Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
4. Luís Jorge Trindade Certo
Title: QuidPyx mobile - Sistema de recomendação de música em dispositivos móveis
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
3. João Carlos Loureiro de Jesus Oliveira
Title: A Smarter YouTube - Sistema de organização automática de vídeo com base no seu conteúdo semântico
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Jul. 2008
2. Guilherme Artur Conceição Capela
Title: Reconhecimento de símbolos musicais manuscritos na framework Gamera
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Apr. 2008
1. Filipe Emanuel Amaro Coelho
Title: Sistema automático de reconhecimento do montante de um cheque
Role: Supervisor
Course: Master in Informatics and Computing Engineering, Faculdade de Engenharia, Universidade do Porto
Conclusion: Apr. 2008

Research Project Scholarships

2. Jakub Tkaczuk, integrated in the project “Picture Archiving and Communication System with Semantic Search Engine”, since Apr. 2010.
1. Igor Francisco Areias Amaral, integrated in the project “Advanced Objective Method for the Evaluation of the Aesthetical Result of Breast Interventions”, since August 2009.

RESEARCH EXPERIENCE

- *Current Position:*
Project Leader and Researcher at INESC Porto - Instituto de Engenharia de Sistemas e Computadores do Porto since Jan. 2009. Leader of a team of 7 PhD Students, 3 Master Students and 2 Researchers and coordinator as Principal Investigator (PI) of 3 Research Projects.

RESEARCH PROJECTS / GRANTS

7. Principal Investigator (PI) of Semantic PACS (Picture Archiving and Communication System with Semantic Search Engine), funded by the Portuguese Agency for Innovation (ADI), with a budget of 320K EUR for 2009/2011.
6. Principal Investigator (PI) of OMR (Optical Recognition System for Handwritten Music Scores), funded by the Portuguese Foundation for Science and Technology (FCT), with a budget of 50K EUR for 2007/2010.
5. Principal Investigator (PI) of BCCT (Advanced Objective Method for the Evaluation of the Aesthetical Result of Breast Interventions), funded by the Portuguese Foundation for Science and Technology (FCT), with a budget of 95K EUR for 2007/2010.
4. Investigator of the FP7 European Network of Excellence VISNET II, with a funding of 6.2M EUR, for 2006/09.
3. Investigator of the FP6 European Network of Excellence VISNET, with a funding of 2.2M EUR, for 2003/05.
2. Team Coordinator and Investigator of the FP5 European project METAVISION, with a funding of 4.5M EUR, for 2000/03.
1. Team Member of ORBIT (Object Reconfigurable Broadcast Infrastructure Trial), a direct contract with BBC, for 1999/02.

SERVICE TO THE SCIENTIFIC COMMUNITY

- **Organiser** of the first three editions of the “ECE Back to Basics Colloquium”, held weekly at FEUP, the Faculty of Engineering of the University of Porto (UPorto), during the 2nd semester of 2008/09, and 1st and 2nd semesters of 2009/10.

The goal of this colloquium is to promote awareness of fundamental tools and their use in ECE research, to promote interaction between researchers leading to cross-disciplinary research projects, and to raise the awareness of the international research community towards ECE research at UPorto. Every other week a distinguished invited researcher discusses his or her work, focusing on the fundamental mathematical tools that are core to their research. Intended audience includes researchers and graduate students from the different areas in ECE. Local researchers will discuss their work alternating with invited researchers.

- **Reviewer**
 - Journals: IEEE Transactions on Image Processing, IEEE Transactions on Biomedical Engineering, Artificial Intelligence in Medicine (Elsevier), EURASIP Journal on Advances in Signal Processing, EURASIP Journal on Image and Video Processing, Journal of Zhejiang University - Science A, International Journal of Imaging (IJI), International Journal of Pattern Recognition and Artificial Intelligence (IJPRAI), International Journal of Biometrics and Bioinformatics (IJBB), Revista Ibérica de Sistemas e Tecnologias de Informação

- Scientific Committee member of RISTI (Revista Ibérica de Sistemas e Tecnologias de Informação)
- Conferences: International Society for Music Information Retrieval Conference (ISMIR'10); Computational Modeling of Objects Presented in Images (CompIMAGE'10); Conferência Ibérica de Sistemas e Tecnologias de Informação(CISTI'10) International Joint Conference Neural Networks (IJCNN'09, IJCNN'08, IJCNN'07); International Conference on Image Analysis and Recognition (ICIAR'10, ICIAR'09, ICIAR'08, ICIAR'07, ICIAR'06); Doctoral Symposium on Informatics Engineering (DSIE'09); IEEE Globecom Ad Hoc, Sensor and Mesh Networking Symposium (2008); IEEE International Symposium on Information Theory (ISIT'07); Iberian Conference on Pattern Recognition and Image Analysis (ibPRIA'07); European Conference Machine Learning (ECML'05).

LIST OF
PUBLICATIONS

Thesis

2. Jaime S. Cardoso, “Metadata Assisted Image Segmentation”, PhD thesis, Faculdade de Engenharia, Universidade do Porto, 2006.
1. Jaime S. Cardoso, “Classification of Ordinal Data”, MSc thesis, Faculdade de Ciências, Universidade do Porto, 2005.

Papers on Refereed Journals

19. Pedro Carvalho, Jaime S. Cardoso, Luis Corte-Real, “Hybrid framework for evaluating video object tracking algorithms”, *Electronics Letters*, vol. 46, issue 6, pp. 411-412, 2010.
18. Ana Rebelo and Guilherme Capela, Jaime S. Cardoso, “Optical Recognition of Music Symbols: A Comparative Study”, *International Journal on Document Analysis and Recognition*, vol. 13, issue 1, pp. 19-31, 2010.
17. Jaime S. Cardoso, Artur Capela, Ana Rebelo, Carlos Guedes, Joaquim F. Pinto da Costa, “Staff Detection with Stable Paths”, *IEEE Transactions Pattern Analysis Machine Intelligence*, vol. 31, issue 6, pp. 1134-1139, 2009.
16. Maria J. Cardoso, Jaime S. Cardoso, Thomas Wild, Wilfried Krois, Florian Fitzal, “Comparing Two Objective Methods for the Aesthetic Evaluation of Breast Cancer Conservative Treatment”, *Breast Cancer Research and Treatment*, vol. 116, issue 1, pp. 149-152, 2009.
15. Jaime S. Cardoso, Pedro Carvalho, Luis F. Teixeira, Luis Corte-Real, “Partition-distance methods for assessing spatial segmentations of images and videos”, *Computer Vision and Image Understanding*, vol. 113, issue 7, pp. 811-823, 2009.
14. Joaquim F. Pinto da Costa, Hugo Alonso, Jaime S. Cardoso, “The unimodal model for the classification of ordinal data”, *Neural Networks*, vol. 21, pp. 78-91, 2008.
13. Maria J. Cardoso, Andre Magalhaes, Teresa Almeida, Susy Costa, Conny Vrieling, David Christie, Jorgen Johansen, Jaime S. Cardoso, “Is Face-Only Photographic View Enough for the Aesthetic Evaluation of Breast Cancer Conservative Treatment?” *Breast Cancer Research and Treatment*, vol. 112, pp. 565-568, 2008.
12. Maria J. Cardoso, Jaime S. Cardoso, Natalia Amaral, Isabel Azevedo, Lise Barreau, Mario Bernardo, David Christie, Susy Costa, Florian Fitzal, Jose L. Fogo, Jorgen Johansen, Douglas MacMillan, Maria Piera Mano, Lea Regolo, Jose Rosa, Luis F. Teixeira, Conny Vrieling, Janez Zgajnar, “Turning subjective into objective: The BCCT.core software for evaluation of cosmetic results in breast cancer conservative treatment”, *Breast (Elsevier)*, vol. 16, pp. 456-461, 2007.

11. Maria J. Cardoso, Jaime S. Cardoso, A. C. Santos, Conny Vrieling, David Christie, G. Liljegren, Isabel Azevedo, Jorgen Johansen, Jose Rosa, Natalia Amaral, R. Saaristo, V. Sacchini, H. Barros, M. C. Oliveira, "Factors Determining Esthetic Outcome after Breast Cancer Conservative Treatment", *Breast Journal* (Blackwell), pp. 140-146, 2007.
10. Luis F. Teixeira, Jaime S. Cardoso, Luis Corte-Real, "Object segmentation using background modelling and cascaded change detection", *Journal of Multimedia*, vol. 2, pp. 55-65, 2007.
9. Jaime S. Cardoso, Joaquim F. Pinto da Costa, "Learning to classify ordinal data: the data replication method", *Journal of Machine Learning Research*, vol. 8, pp. 1393-1429, 2007,
8. Emanuele Berti, Jaime S. Cardoso, Vitor Cardoso, Marco Cavaglia, "Matched-filtering and parameter estimation of ringdown waveforms", *Physical Review D*, vol. 1, 2007.
7. Jaime S. Cardoso, Maria J. Cardoso, "Towards an intelligent medical system for the aesthetic evaluation of breast cancer conservative treatment", *Artificial Intelligence in Medicine*, vol. 40, pp. 115-126, 2007.
6. Maria J. Cardoso, Jaime S. Cardoso, A. C. Santos, H. Barros, M. C. Oliveira, "Interobserver agreement and consensus over the esthetic evaluation of conservative treatment for breast cancer", *The Breast* (Elsevier), vol. 15, pp. 52-57, 2006.
5. Jaime S. Cardoso, Luis Corte-Real, "A measure for mutual refinements of image segmentations", *IEEE Transactions on Image Processing*, vol. 15, pp. 2358-2363, 2006.
4. Maria J. Cardoso, A. C. Santos, Jaime S. Cardoso, H. Barros, M. C. Oliveira, "Choosing observers for evaluation of aesthetic results in breast cancer conservative treatment", *International Journal of Radiation Oncology*Biophysics*, vol. 61, pp. 879-881, 2005.
3. Jaime S. Cardoso, Luis Corte-Real, "Toward a Generic Evaluation of Image Segmentation", *IEEE Transactions on Image Processing*, vol. 14, pp. 1773-1782, 2005.
2. Jaime S. Cardoso, Luis Corte-Real, "Accumulator size minimization for a fast cumulant-based motion estimation", *IEEE Transactions on Circuits and Systems for Video Technology*, vol. 15, pp. 1660-1664, 2005.
1. Jaime S. Cardoso, Joaquim F. Pinto da Costa, Maria J. Cardoso, "Modelling ordinal relations with SVMs: an application to Objective Aesthetic Evaluation of Breast Cancer Conservative Treatment", *Neural Networks* (Elsevier), pp. 808-817, vol. 18, 2005.

Papers on Refereed Conferences

22. Jaime S. Cardoso, Ana Rebelo, "Robust staffline thickness and distance estimation in binary and gray-level music scores", *Proceedings of The Twentieth International Conference on Pattern Recognition (ICPR)*, 2010
21. Jaime S. Cardoso, "Stable Text Line Detection", *Proceedings of IEEE Workshop on Applications of Computer Vision (WACV)*, 2009
20. Ricardo Sousa, Beatriz Mora, Jaime S. Cardoso, "An Ordinal Data Method for the Classification with Reject Option", *Proceedings of The Eighth International Conference on Machine Learning and Applications (ICMLA)*, 2009
19. Jaime S. Cardoso, Ricardo Sousa, Luis F. Teixeira, Maria J. Cardoso, "Breast Contour Detection with Stable Paths", *Communications in Computer and Information Science (CCIS 25)*, pp. 439-452, Springer-Verlag 2009

18. Ana Paula Afonso, Jaime S. Cardoso, Maria João Cardoso, Manuel Pérez Cota, “A Avaliação da Usabilidade de um Sistema Médico Inteligente: BCCT.core”, Proceedings of the 4^a Conferência Ibérica de Sistemas e Tecnologias de Informação (CISTI 2009).
17. Helder Oliveira, Jaime S. Cardoso, “Image Retargeting Using Stable Paths”, Proceedings of the International Conference on Computer Vision Theory and Applications (VISAPP 2009), pp. 40-47, 2009.
16. Jaime S. Cardoso, Artur Capela, Ana Rebelo, Carlos Guedes, “A Connected Path Approach for Staff Detection on a Music Score”, Proceedings of the International Conference on Image Processing (ICIP 2008), pp. 1005-1008, 2008.
15. Jaime S. Cardoso, Luis F. Teixeira, Maria J. Cardoso, “Automatic Breast Contour Detection in Digital Photographs”, Proceedings of the International Conference on Health Informatics (HEALTHINF 2008), vol. 2, pp. 91-98, 2008.
14. Filipe Coelho, Luis Batista, Luis F. Teixeira, Jaime S. Cardoso, “Automatic System for the Recognition of Amounts in Handwritten Cheques”, Proceedings of the International Conference on Signal Processing and Multimedia Applications (SIGMAP 2008), pp. 320-324, 2008.
13. Artur Capela, Ana Rebelo, Jaime S. Cardoso, Carlos Guedes, “Staff Line Detection and Removal with Stable Paths”, Proceedings of the International Conference on Signal Processing and Multimedia Applications (SIGMAP 2008), pp. 263-270, 2008.
12. Ricardo Sousa, Jaime S. Cardoso, Joaquim F. Pinto da Costa, Maria J. Cardoso, “Breast Contour Detection with Shape Priors”, Proceedings of the International Conference on Image Processing (ICIP 2008), pp. 1440-1443, 2008.
11. Artur Capela, Jaime S. Cardoso, Ana Rebelo, Carlos Guedes, “Integrated Recognition System for Music Scores”, Proceedings of the International Computer Music Conference (ICMC 2008), 2008.
10. Ana Rebelo, Artur Capela, Joaquim F. Pinto da Costa, Carlos Guedes, Eurico Carrapatoso, Jaime S. Cardoso, “A Shortest Path Approach for Staff Line Detection”, Third International Conference on Automated Production of Cross Media Content for Multi-channel Distribution (AXMEDIS 2007), pp. 79–85, 2007.
9. Jaime S. Cardoso, Jorge C. Cardoso, Luis Corte-Real, “Object-based spatial segmentation of video guided by depth and motion information”, IEEE Workshop on Motion and Video Computing (WMVC 2007), 2007.
8. Jaime S. Cardoso, “Bandwidth-efficient byte stuffing”, IEEE International Conference on Communications (ICC 2007), pp. 6175-6180, 2007.
7. Jaime S. Cardoso, Maria J. Cardoso, “Breast Contour Detection for the Aesthetic Evaluation of Breast Cancer Conservative Treatment”, Springer Lecture Notes in Computer Science, Advances in Soft Computing 45, Computer Recognition Systems 2 CORES 2007: 5th International Conference on Computer Recognition Systems, pp. 518-525, 2007.
6. Margarita Kotti, Luis Gustavo P.M. Martins, Emmanouil Benetos, Jaime S. Cardoso, Constantine Kotropoulos, “Automatic Speaker Segmentation Using Multiple Features and Distance Measures: A Comparison of Three Approaches”, Proceedings of International Conference on Multimedia & Expo (ICME), pp. 1101-1104, 2006.
5. Joaquim F. Pinto da Costa, Jaime S. Cardoso, “Classification of Ordinal Data Using Neural Network”, Proceedings of European Conference on Machine Learning (ECML), pp. 690-697, 2005.

4. Jaime S. Cardoso, Joaquim F. Pinto da Costa, Maria J. Cardoso, "SVMs Applied to Objective Aesthetic Evaluation of Conservative Breast Cancer Treatment", Proceedings of International Joint Conference on Neural Networks (IJCNN) 2005, pp. 2481-2486, vol. 4, 2005.
3. P. W. Walland, G. Thomas, M. Koppetz, Jaime S. Cardoso, T. Erseghe, F. Hericourt, "The Application of Intimate Metadata in Post Production", Proceedings of Int. Broadcasting Convention (IBC 2002), 2002.
2. Jaime S. Cardoso, J. C. Alves, Luis Corte-Real, "FPGAs based hardware applied to block-based motion estimation for real-time video processing", Proceedings of 11th Portuguese Conference on Pattern Recognition (RECPAD2000), pp. 455-458, 2000.
1. Telmo Cunha, Phillip Tome, Sergio Cunha, Jaime S. Cardoso, Luisa Bastos, Utilizacao de DGPS para a Monitorizacao de Frotas em Ambiente Urbano, Actas da 2 Conferencia Nacional de Cartografia e Geodesia, 1999.

Last updated: May 10, 2010

Curriculum vitae**Curriculum vitae****1. Dados pessoais****1. Personal data****Nome completo****Full name**

Manuel João Oliveira Ferreira

BI

National identity card

8417959

Local e data de Nascimento**Birth place and date**

Porto 28-12-1968

Pais de nacionalidade**Nationality**

PORTUGAL

Morada institucional**Institutional address**

Departamento de Electronica Industrial - Universidade do Minho

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4800-058 Guimarães

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2. Formação académica**2. Academic degrees**

Ano	Grau académico	Instituição	Classificação
Year	Academic degree	Institution	Classification
2004	DOUTORAMENTO	Escola de Engenharia	approved
1996	MESTRADO	Escola de Engenharia	Very Good
1992	LICENCIATURA	Universidade de Aveiro	14

3. Actividades anteriores e situação actual em termos científicos e/ou profissionais**3. Previous and current scientific and/or professional activities**

Período	Cargo ou categoria	Instituição
Period	Position or category	Institution
1992 a 2001	Research and scientific coordinator of the image processing area	INESC-Porto/Unidade ESP (Engenharia Sistemas de Produção)
2000	Development engineer and technical coordinator of the image processing and computer vision area	IDITE-Minho na Unidade Automação e Electrónica
1998 a 2000	PhD Scholarship student	Departamento de electrónica industrial - Universidade do Minho

1994 a 2000	Regent assistant professor	Universidade Lusíada - pólo de Vila Nova de Famalicão
2000 a 2004	Assistant professor	Departamento de electrónica industrial - Universidade do Minho
from 2004	Auxiliar professor	Departamento de electrónica industrial - Universidade do Minho
from 2006	Protocol established in order to develop new technologies, in the field of computer vision	Enermeter, Sistemas de Medição, Lda
from 2006	Protocol established in order to develop new technologies, in the field of computer vision	Lincis, Lda
2006 to 2007	Partnership established in order to develop new functionalities to the webots	Cyberbotics Company

4. Área de actividade científica

4. Area of scientific activity

-
- Computer vision
 - Image processing
 - Image analysis
 - Artificial intelligence
 - Neural networks
 - Fuzzy logic
 - Signal processing
 - Computer graphics
 - Computer languages
-

5. Domínio de especialização

5. Domain of specialization

Domínio de especialização

Domain of specializations

- Industrial computer vision technique
- Texture analysis
- Color analysis and calibration techniques
- Pattern recognition
- Inference fuzzy systems

Actuais interesses de investigação

Present research interests

- Inference fuzzy systems
- Color calibration techniques
- Wavelets transform applied to image analysis
- Human Motion Capture

Outras competências/actividades

Other skills/activities

Computer languages
C, C++, C#
Embedded OS and software development
Windows CE programming

6. Experiência na orientação

6. Supervising experience

Co-Supervisor of the following on-going MSc thesis:

“Visão Por Computador em Ambiente Imersivo como suporte à Interface Gestual para Sistemas de Performance Audiovisual”, Rudolfo José da Silva Pinto Pereira Quintas, Escola de Engenharia da Universidade do Minho, 2005

“Tecnologias da Realidade Virtual e Processamento de imagem no suporte à Arte e Expressão Artística de cariz Corporal”, Tiago Dionísio Severino Rodrigues, Escola de Engenharia da Universidade do Minho, 2005

Co-Supervisor of the following on-going PhD thesis:

“Visualização de cenas híbridas a partir de elementos abstractos em realidade virtual e de objectos reais em sequências de imagens”, Fernando Pereira da Silva. Escola de Engenharia da Universidade do Minho.

“Técnicas de Segmentação e de Classificação em Imagens – Estudo de um Caso de Aplicação”, Pedro João Rodrigues. Escola de Engenharia da Universidade do Minho.

7. Participação em projectos

7. Participation in research projects

2004 to 2006

AIVA: Intelligent Aeronave with Artificial Vision, Cristina Santos, Manuel João Ferreira, Paulo Carvalho, José Afonso, João Monteiro, Luís Silva, Heitor de Almeida, Filipe Silva, Helder Carvalho, Coordinator (DEM): Luís Ferreira da Silva, IN2TEC, Internal Contest of Engineering School, Starting date: October 2004, End: October 2006.

2004

Technical coordinator of DISPLAX - Interactive Window (www.displax.com).

2000

Technical coordinator of the computer vision and image processing group, at IDITE-MINHO, under the scope of SIPROFIT project. Development of the Electronic tailor, Inspec100% and Confec100% sub-projects.

1994 to 2001

Scientific coordinator of the computer vision group at INESCPorto, under the scope of the VISCOR (computer vision applied to cork industry) and DigitSonic (computer vision applied to shoe industry) projects.

1998 a 1999

Leader of the computer vision development team at DEI, under the scope of the VIPTEX project (computer vision applied to textile industry).

1992 a 1994

Member of the computer vision team at INESCPorto, under the scope of the LaserMadeira (Computer vision applied to furniture industry) project.

8. Prémios e Distinções

8. Prizes and awards

Ano Year	Nome do Prémio ou Distinção Name of the prize or award	Nome da entidade promotora Name of the granting entity
2004	biggest attraction of COMTEC '04, highlighting its origin 100% national product.	"The Best of COMTEC 2004", given by BIT magazine

2005	honrosa mention to the work «Bluethoth para Actuação e Sensorização Distribuída»,	ENDIEL
------	---	--------

9. Publicações

9. Publications

Teses / Thesis

Desenvolvimento de um protótipo para a identificação, classificação e quantificação de defeitos, aplicável em ambiente industrial. PhD Thesis, 2004, Universidade do Minho

Aplicação de técnicas de processamento de imagem ao controlo de qualidade na linha de produção em indústrias tradicionais, MSc Thesis, 1996, Universidade do Minho

Capítulos de livros / Chapters in books

Cristina P Santos, Manuel J Ferreira, "Computer Vision and Fuzzy Rules applied to a dispensing application in an Industrial Desktop Robot", Editor: Munir Merdan, Industrial Robots – from design to applications, Advanced Robotics Systems International, 2006.

Artigos em revistas de circulação internacional com arbitragem científica / Papers in international scientific periodicals with referees

C. P. Santos, Manuel João Ferreira, Computer Vision and Fuzzy Rules applied to an Industrial Desktop Robot, Assembly and Automation, 2006

Publicações em actas de encontros científicos / Papers in conference proceedings

M. J. Oliveira Ferreira e J. A. Campos Neves, "A wood industrial application for quality control using image processing", The European Symposium on Optics for Productivity in Manufacturing, EUROPTO, 1994, Frankfurt - Germany

J.A.B. Campos Neves e M.J. Oliveira Ferreira, "Segmentation of Wood Defects by Carving the Convex Hull Representing them", RECPAD'96, 1996, Guimarães - Portugal

M.J. Oliveira Ferreira, "Application of Neural Networks to the Quality Control in the Wood Industry", RECPAD'96, 1996, Guimarães - Portugal

J. C. Aparício Fernandes, M.J. Oliveira Ferreira, J.A.B. Campos Neves, Carlos A. C. Couto, "Fast Correction of Lens Distortion for Image Applications", ISEI'97, 1997, Guimarães - Portugal.

Manuel J. Ferreira, Aparício Fernandes, J.A. Campos Neves, João L. Monteiro, "Automatic Visual Inspection on Shoe and Textile Industries", IASTED – CGIM'98, 1998, Halifax - Canada.

Manuel J. Ferreira, Rui Picas de Carvalho, João L. Monteiro, "Texture Classification Based on Fuzzy System Applied to the Cork Industry", SIP'99, 1999, Nassau - Bahamas.

J. Roldão, L.Melo, Manuel J. Ferreira, João L. Monteiro, "Defects Detection in printing fabrics using Computer Vision", M2Vip'00, 2000, Sydney - Austrália.

C. P. Santos, Manuel João Ferreira – Control Of An Industrial Desktop Robot Using Computer Vision And Fuzzy Rules. In IEEE International Symposium on Industrial Electronics, ISIE-2005, D7-02F1, Vol.III, pp. 1297-1302, June 2005, Dubrovnik, Croatia

Oliveira, T, Carvalhal, P., Afonso, J., Ferreira, M.J., Santos, C. P., Distributed Sensing and Actuation over Bluetooth for Unmanned Air-Vehicles. In IEEE International Conference on Robotics and Automation (ICRA-2006) 15-19 May 2006, Orlando, EUA.

Cristina Santos, Manuel Ferreira, "Ball Catching by a Puma Arm: a Nonlinear Dynamical Systems Approach", IEEE/RSJ International Conference on Intelligent Robots and Systems, IROS 2006, October 2006, Beijing, China.

Tito E. Coelho, Ricardo Macedo, Paulo Carvalhal, José A. Afonso, Luís F. Silva, Heitor Almeida, Manuel J. Ferreira, Cristina Santos, "A FLY-BY-WIRELESS UAV PLATFORM BASED ON A FLEXIBLE AND DISTRIBUTED SYSTEM ARCHITECTURE". In IEEE International Conference on Industrial Technology, ICIT2006, December 2006, Mumbai, India.

Tito E. Coelho, Paulo Carvalhal, Manuel J. Ferreira, Luís F. Silva, Heitor Almeida, Cristina Santos, José A. Afonso, "A Bluetooth-based Wireless Distributed Data Acquisition and Control System". In IEEE International Conference on Robotics and Biomimetics, ROBIO 2006, December 2006, Kunming, China.

Cristina Santos and Manuel Ferreira, "Two Vision-guided vehicles: temporal coordination using nonlinear dynamical systems", . In IEEE International Conference on Robotics and Automation, ICRA-2007, April 2007, Roma, Italy

Manuel J. Ferreira, Cristina Santos, "Tracking system using texture cue based on wavelet transform". In 7th Portuguese Conference on Automatic Control, Controlo 2006, September 2006, Lisboa, Portugal

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10. Comunicações

10. Communications

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11. Línguas

11. Language

Língua Language	Leitura Reading	Escrita Writing	Conversa Conversation
Inglês	Excelente	Bom	Bom
