

FCT Relatório Científico 2009 Print: 27-03-2011 23:12:53 [CENTRO ALGORITMI]

General Information

Name of Research Unit: (EEI-Norte-319)
CENTRO ALGORITMI

Coordinator: João Luis Marques Pereira Monteiro

Main Scientific Domain: Engenharia Electrotécnica e Informática

Other Subdomains: n/a

Host Institutions

Leading Host Institution: Universidade do Minho

Other Institutions Involved:

Objectives & Achievements**Unit Description**

The Centre Algoritmi (CAIlg) is a R&D unit of the University of Minho (UM), developing its activities in the areas of Systems Engineering, Information Technology/Information Systems and Electronics. It is organized around six research group (RG), reflecting different research and application domains. CAIlg has 183 members, 106 of them hold a PhD degree. Most of the doctorates members belong to the staff of three departments of the School of Engineering, while the reminder group is mainly composed of post-graduate students, post-doc and research assistants.

According to the UM main regulation, academic staff members must be affiliated to one or more of the UM's R&D units, where their research activities are integrated. Concerning hierarchy R&D units are subunits (like departments) under direction of a School. Most of the human resources depend on departments. This way, R&D units become a complementary structure dedicated to research activity, being responsible mainly for post-graduate courses and joining human resources managed by departments. The UM established an organization matrix model, to enhance flexibility and improve resource utilization. The 6 existing CAIlg's RGs were established by department association logic – reorganization is ongoing, as reported further on this document.

CAIlg is organized around a Directive Committee (DC), formed by a Director, a Vice-Director and six Group Coordinators (GC), one for each RG. The Director is elected among all senior researchers (full or associate professors), by all CAIlg's members, and each GC is also elected among the respective group's elements. Elections take place in each two years (the last one was at March, 2006 - the election at 2008 was postponed since we are now preparing new regulations, following the modification process of the national university system). The DC is responsible for all the executive and planning tasks, including strategic planning and reporting activities. There is also a Scientific Committee (SC) formed by all the doctorate members, which is essentially responsible for approving the DC work and the premature destitution of the Director. Actually, to optimize resources, most of the SC matters are discussed at the same level within regular department meetings. Finally, there is a Consultive Committee, formed by external experts, to advice the strategic planning process. All the administrative daily work is accomplished by two staff members. CAIlg interact with other university units related to research activity, like GAP (project support office) and the accounting office.

General Objectives

As a university research centre, CAIlg aims in assuring the long-term R&D, which allows researchers to keep up-to-date. Usually this type of research does not produce measurable scientific results (projects and publications), which imposes serious difficulties concerning its support, especially now that university funding is being considerable reduced. However, long-term R&D continues to be considered an important goal.

Following the recommendations of the previous evaluation reports more attention was devoted to the interdisciplinary activities, defining strategies to explore synergies between groups. This was achieved through awareness initiatives, promoting projects and collaborations mainly at the post-graduation level. The main idea behind this strategy keeps valid, since we believe that one of the CAIlg's strengths is its heterogeneous nature, which allows exploring different approaches and is an important factor towards innovation.

During the last years some modifications occurred in the university education system, motivating a strategy to promote research. Improving research is always an objective of a R&D centre, but the actual context forces us to give this goal high priority. The first reaction was to make every researcher ware of the new demands and this measure, per si, produced interesting results in scientific production. FCT lunched a program to support graduated students involvement in research activities (BII). 22 scholarships were granted under this program. However, to better explore the capacities of young researches, in particular, some other adjustments are required. Efforts are under way to reorganize CAIlg's research groups, promoting a leadership in each of the areas where research activities are well defined, there are enough human resources and the work produced foresees an excellent impact. These groups and its leaders will have a much more active role in the CAIlg management, but this requires a modification of the CAIlg's regulation, which is now being done.

Also following the recommendations from the last evaluation reports, the strategy for improvement must address a higher level of internationalization. CAIlg benefited from the FCT national program to support fellowships for post-doctoral positions in Portuguese R&D centres, and includes now 10 post-doctorate researchers with a main goal to improve internationalization.

FP7, the European 7th Framework Programme is also seen as a very important opportunity. This program addresses all type of research activities, including the co-operation between different R&D centres and the stimulus to young researcher initiative. All CAIlg researchers must be ware of this program and keep in touch with its evolution. Furthermore, since most of the project proposal evaluations are carried by researchers from all over Europe, and since this activity is also a source of knowledge and contacts, CAIlg's members are encouraged to register themselves as project reviewer candidates.

Co-operation should not be stimulated only at the international level. In some research areas there are other R&D centres in Portugal with very good groups. The collaboration with such groups is always an important goal since that is a natural way to get stronger groups with more potential to be recognized.

Finally, one last CAIlg's aim is the intensification of regional activities concerning the science dissemination and technology transfer. This goal is very important nowadays since society and industries expect a lot from universities and its research infrastructures. Besides, this is also a strategic vector for UM and the School of Engineering.

Objectives & Achievements

Main Achievements during the year of 2009

In 2009 there was an improvement in the number of publications (books, journals and international/national magazines). The total number increased to 117, keeping an annual increase of about 25%. The actual ratio of publications per ETI PhD member/year is 1.3. The number of communications, covering all sorts of conferences and workshops, both national and international, was 227. This value is also higher than previous year (by 28%) and covers mostly high topical events. This is the result of a higher pressure to publish at international recognized events, but also shows a weakness concerning the capacity to organize such events in Portugal. Globally, the publication indicators supersede the expected numbers, which reveals that CALg's researchers are aware of the current challenges. This positive results were obtained during an year of a lower budget, resulting from the evaluation's results published by the end of 2008, and reflect a strong commitment of CALg's members. Despite this improvement, quality is still a main concern among all groups, and some groups clearly need to give more attention to this aspect.

In 2009 it was completed the last phase of the Portuguese Government initiative "Ciência 2007". Under this program CALg opened 10 post-doctoral calls resulting on 9 new research assistants admitted - one of the positions was later removed by FCT. Another grant opportunity in 2008 was the FCT initiative "integration into research grants", created to foster the engagement of graduate level students in research activities. Under this program CALg was authorized to open 24 calls, ending up with a total of 22 grants awarded.

Another important achievement is the number of thesis produced: 13 PhD thesis and 75 MSc thesis. This indicators are not uniform among CALg's groups and it is evident the necessity of a more efficient strategy to attract external PhD candidates, involving researchers more deeply in external programs (e.g., CMU/Portugal). The number of MSc thesis shows a tendency to increase, which reveals a growth in the enrolment of students at this level.

The number of funded projects is another indicator of the CALg's performance. This indicator keeps high (funding from projects represent near 60% of the CALg's global budget - about 0,7ME/year). During 2009 CALg's members were responsible or were involved in over 40 approved projects. Most of the projects are founded by FCT and other governmental agencies, but 4 projects are founded by European Programs and 1 project is founded by the CMU/Portugal initiative.

In 2009 CALg's researchers produced 5 prototypes and 4 patents (registered at the international and national levels). Most of these achievements came from the Industrial Electronic Group and the Micro & Nano Technologies group, which are the research areas that work more closely with physical devices typically more suitable to this kind of accomplishment.

Concerning the organization of scientific/technical events, in 2009 CALg's members were involved in 27 events (excluding the participation in technical committees). In several areas some of these events are considered very topical being supported by organizations that play an important role in those areas (i.e. ACM, IEEE and IFIP) - details are given in the individuals RG reports.

Regarding to industrial application of research, in 2009 there was the creation of two spin-off resulting from research work at CALg, and installed in a technology park, in the region: Exva - Expert in video analysis, and ISURGICAL3D.

Activities

Integrative/multidisciplinary activities during the year of 2009

CALg is a multidisciplinary research centre by nature. Looking to its main scientific areas it is not difficult to identify a wide research stream including researchers from Electronic field, addressing the construction of computing devices, Engineering Systems field, focusing on the construction of complex systems and Information Systems, focusing on the issues related with the valuable utilization of Information and Communication Technology in organizations. This main stream is complemented by some specific research areas, like Energy, Instrumentation, Optimization, Micro/Nano technologies, Data Bases, etc., which address much more narrow issues and where multidisciplinary is more limited. Identifying projects in the main research stream is not an easy task since it would require a very long term research agenda and industry support behind our capacity. But there are interesting opportunities in sub-streams and, more important, from sharing knowledge acquired in each scientific area and that can influence research activities in other areas. So we can envisage two different types of collaboration: projects, where individuals' expertises are aggregated; and sharing knowledge activities, which conduces to a deeper understanding of surrounding requirements.

CALg members are involved in the national initiatives with CMU and MIT, addressing several engineer disciplines. At a local level, there is a significant research stream involving researchers from the Industrial Electronic group and researchers from another UM research centre (2C2T Centre of Science and Textile Technology). This collaboration resulted in some important industrial projects. Other similar collaborations embrace researchers from the CIPsi (Centre for Research in Psychology) and CCTC (Centre of Sciences and Computer Technologies), mainly within Knowledge and Information Systems and Services group activities, and researchers from "Officina Mathematica", CEB (Centre of Biological Engineering) and CITEPE (Interdisciplinary Centre in Technologies for Energy Production), mainly within Nonlinear Systems Optimization and Statistics group activities.

Knowledge sharing is the second form of collaboration, which can be accomplished by seminars, workshops, or similar meetings. This kind of activities has been planed several times. However, the lack of resources, the actual overload of senior researchers (due to teaching loads and administrative duties) and a large period of internal changes - reorganization of the university system -, impose serious restrictions to these activities.

Outreach activities during the year of 2009

During 2009 CALg's several researchers have been invited for seminars and similar scientific events, revealing their recognized relevance within their scientific fields - details are given in each group report.

Following the tendency of last years, low level schools and social and economic agents keep showing a clear strategy to approach universities as a mean to explore knowledge advance. After all, this is the essence of the knowledge society. University as a whole responds to this requests positively opening its doors and organizing or adhering to several events. This is a global movement traversing all university's units. Concerning CALg, since it is integrated in the School of Engineering, most of the outreach activities are also integrated in wider School initiatives, allowing a better resource use and broader social impact. Besides these activities, individual researchers are frequently invited to take part of scientific, technical or divulgation events. Due to lack of clarification between research and teaching affairs it is not always possible to track these individual initiatives.

The School of Engineering organizes every year an open event associated to its birthday, aimed to show technical innovations and science advances resulting from research. For one particularly activity PhD students are invited to take part on an exhibition where they have the opportunity to demonstrate their work and discuss with others theirs problems and achievements - most of the CALg's members adhered enthusiastically to this initiative. But other activities are also relevant, like visits to laboratories where young students can contact with the research environment and with the learning environment most of them will face in the near future.

One of the CALg's groups working in the robotic area developed a robot football team and has been involved in the RoboCup competition, where they

Activities

have achieved very interesting results. The group also organizes a local event, RoboParty, in Guimarães, which attracts a lot of people, including researchers, college students and teachers. This event had a tremendous impact, helping to divulgate the area and society to come close to CAIg research activities. More information is available at <http://www.robotica.dei.uminho.pt/robocup>.

CAIg's members are also deeply involved in several national non-profit organizations/associations dedicated to the normalization and dissemination of technological and scientific knowledge. Among them are: APDSI (Portuguese association for information society development); two Technical Committee for normalization (CT 163 and CT 128).

Funding

	2006	2007	2008	2009	2010
LA FCT	0,00	0,00	0,00		
Units FCT	334.631,25	228.250,00			
Projects FCT	911.841,00	698.828,00			
Other (National)	510.539,75	295.070,00			
Other (International)	1.226.766,00	1.416.614,00			
National Industry	166.521,00	47.610,00			
International Industry	0,00	0,00			
	0,00	0,00	3.150.299,00	2.686.372,00	0,00

General Indicators

	2006	2007	2008	2009	2010	Total
No. of Researchers Proposed	0,00	0,00	0,00	0,00	0,00	0,00
No. of Researchers Hired (LA)	0,00	0,00	0,00	0,00	0,00	0,00
Balance	0,00	0,00	0,00	0,00	0,00	0,00
No. of Researchers Hired (Ciência Programme)	0,00	0,00	7,00	2,00	0,00	9,00
No. of Researchers integrated with PhD	73,00	82,00	95,00	94,00	0,00	
Training Masters (Master thesis completed)	21,00	38,00	62,00	75,00	0,00	196,00
Training PhDs (PhD thesis completed)	31,00	8,00	16,00	13,00	0,00	68,00

Researchers Hired

Name	Start Date	End Date	Other Institution
Abdullah Rashed	15-06-2009	14-06-2014	
Agostinho Gil Teixeira Lopes	30-05-2008	29-05-2013	
Bruno Lourenço Silva Ferreira	01-09-2009	31-08-2010	
Bruno Miguel Pedro Alves	01-09-2009	31-08-2010	
Hakikur Rahman	06-11-2008	05-11-2013	
Henrique Daniel Oliveira Lopes	01-09-2009	31-08-2010	
Henrique Nuno Baptista Gonçalves	01-07-2009	30-06-2014	
João Paulo Pereira do Carmo	02-05-2008	01-05-2013	
MD. ABUL KALAM AZAD	01-10-2008	30-09-2013	
Nuno Miguel Matos Pires	15-09-2009	14-09-2010	
Nuno Ricardo Palmeiro Otero	03-03-2008	02-03-2013	
Pedro Lucas Farinha	01-09-2009	31-08-2010	
Pedro Miguel da Cunha Pereira	01-11-2009	31-10-2010	
Sílvia Raquel Monteiro dos Santos	01-09-2009	31-08-2010	
Telmo Miguel Pires Pinto	01-09-2009	31-08-2010	
Tiago Emanuel Lobo de Macedo Freitas Castro	21-09-2009	20-09-2010	
Tiago Emanuel Quintas Malheiro	15-09-2009	14-09-2010	

Technical Personnel Hired

Name	Start Date	End Date	Other Institution
No technical personnel found...			

Additional Comments

Research Groups**Reference****Title / Principal Investigator**

RG-Norte-319-2168

Nonlinear Systems Optimization and Statistics
(Edite Manuela da Graça Pinto Fernandes)

RG-Norte-319-2169

Systems Engineering, Optimization and Operations Research
(José Manuel Vasconcelos Valério de Carvalho)

RG-Norte-319-2171

Knowledge and Information Systems and Services
(Joao Alvaro Brandao Soares de Carvalho)

RG-Norte-319-2184

Ubiquitous and Pervasive Computing, Graphics, and Software Methodologies
(Adriano Jorge Cardoso Moreira)

RG-Norte-319-2959

Industrial electronics
(Carlos Alberto Caridade Monteiro e Couto)

RG-Norte-319-2976

Micro/Nanotechnologies and Biomedical Applications
(José Higinio Gomes Correia)

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Group Description

Title of Research Group: (RG-Norte-319-2168)
Nonlinear Systems Optimization and Statistics

Principal Investigator: Edite Manuela da Graça Pinto Fernandes

Main Scientific Domain: Engenharia Electrotécnica e Informática

Group Host Institution: Universidade do Minho

Funding, source, dates**Funding, source, dates**

(Team member = m)

Computação Avançada em Engenharia – Reequipment program, FCT, since May 2004, 195000€ , Leão, CP (m)

Desenvolvimento Musical na Infância e Primeira Infância, PTDC/EAT/68361/2006, 180966 €, Braga, AC. (m)

WALC - Laboratório Assistido pela Web para o Ensino de Engenharia de Controlo, PTDC/ESC/68069/2006, 70000 € (08-10), PI: Leão, CP.

Versatility of Filtering Techniques in Non-Linear Programming Optimization

Research grant RFQ/3-12584/08/NL/ST funded by ESA, 12/08-09/09, Monteiro, MT. (m)

Locomoção quadrúpede flexível e adaptativa usando sistemas dinâmicos não lineares, POCI – FCT, 7-2009 funded by FCT, 197.067 €, Rocha, AMAC, Costa L. (m)

CSD-Chip - Development of an integrated biomedical microdevice for blood cell separation and deformation, PTDC/SAU-BEB/105650/2008, 166919 €, Pereira, AI. (m)

Sustainable electricity power planning, PTDC/SEN-ENR/099578/2008, 77095 €, Vaz, AIF, Braga, AC. (m)

Derivative-Free Optimization: Future Challenges and New Applications, PTDC/MAT/098214/ 2008, 158256 €, Vaz, AIF. (m)

GRACE, FP7, FP7-NMP-2009-SMALL-3, no: 246203, 2009. 2657713 €, Pereira, A.I. (m)

Objectives & Achievements**Objectives**

The main objectives of the NSOS group reached during 2009 within each of the proposed projects are described below.

1. Continuous Nonlinear Optimization:

Monotone and non-monotone line search filter strategies, where each entry in the filter has three measures, to promote global convergence of interior point-based methods, have been implemented and compared within the IPOPT code. Two strategies have been simulated in the code: the primal-dual barrier method (IPOPT itself) and primal-dual interior point method. Performance was compared with a benchmark set of problems.

2. Derivative-Free Optimization:

The augmented Lagrangian pattern search method, based on Hooke and Jeeves exploratory moves and a random descent move, has been used to minimize investment and operation costs, in the context of Wastewater Treatment Plants design. Considering a long term based analysis, some simplifications were introduced in the balances (concerned with biomass at the influent, nitrogen compounds and the alkalinity).

3. Global Optimization:

Three different methodologies for constraint-handling based on Augmented Lagrangian functions have been tested within stochastic population-based algorithms. Assessment performance was carried out with the electromagnetism-like algorithm, as well as with a hybrid genetic algorithm. This hybridization integrates a derivative-free local procedure, to improve the solution provided by the algorithm. Preliminary results are promising.

A new population-based algorithm that simulates a set of behaviors in nature, crucial for exploration of the solution space, like swarming, chasing, searching and random, named as artificial fish swarm algorithm (AFSA) was developed and tested. A stochastic convergence study based on the principle of convergence in mean square was developed for AFSA.

4. Mixed Integer Programming:

A survey on mixed-integer nonlinear programming (MINLP) methods has been carried out. Branch-and-Bound (B&B) and Outer-Approximation methods are the most used for convex MINLP. Since pruning criteria used in B&B methods can only be used when global solutions of non-convex NLP relaxations are obtained, research has been directed to methods that converge to global solutions of non-convex NLP.

5. Multi-objective Optimization:

Ongoing work is focussed on multi-objective algorithm development, including the use of statistical and graphical methods to perform online and offline dimensionality reduction of multi-objective problems.

6. Semi-Infinite Programming:

The filter methodology, a novelty in a semi-infinite optimization context, has been incorporated in a reduction type method when solving semi-infinite programming problems. The solution method used to solve the finite reduced nonlinear optimization problem was based on a primal-dual interior point framework.

7. Statistics and Applications:

7.1. "Receiver Operating Characteristic (ROC) curves ": It aims to develop a methodology that can answer to the difficulties associated to the comparison of diagnostic systems which are represented by ROC curves that cross each other. This goal may be translated in new measures of performance. Moreover, this methodology will be incorporated in a new software application that provides the most usual performance measures associated with ROC curves.

Objectives & Achievements

Statistics in Medicine: In this field the group developed some investigative works in orthodontics, oncology, intensive cares with development of models to predict some kind of disease, etc.

Statistics in Arts: In this field the group establishes some collaborative work with the Superior School of Musical Sciences of Lisbon and School of the Arts - CITAR, Portuguese Catholic University. The investigative works involve some studies of recognition of melodies with children, use of technical vocal for therapy of children with vocal perturbation, evaluation of (MTF) techniques in musical instrument teaching and studies in developing the ability to perform in double bass.

7.2. "The Feminine side of Engineering: Challenges and opportunities" aims to contribute to a gender-specific perspective concerning women engineers' career progression. More specifically, to study the engineering career from the perspective of gender and to analyze the key challenges faced by Portuguese women engineers. Finally, it aims the study of the behavior of the different Portuguese engineering field and Industry at the level of women engineers career and gender equality.

8. Web Assisted Laboratory for Control on-line Education:

Development, implementation and set available in a Web environment, a virtual and remote laboratory applied to the Automation and Control teaching/learning in Engineering.

Main Achievements

1) Invited reviewing in International Journals:

Braga, AC, Medical Decision Making, 1 paper

Costa, L, IEEE Transactions on Evolutionary Computation, 1 paper.

Espírito Santo, IACP, Water Science and Technology, 1 paper; Journal of Computational and Applied Mathematics, 1 paper.

Leão, CP, iJOE international journal of online engineering, 8 papers.

Monteiro, MTT, International Journal of Computer Mathematics, 1 paper.

Rocha, AMAC, Journal of Computational and Applied Mathematics, 2 papers; Mathematical Problems in Engineering, 1 paper.

Vaz, AIF, Journal of Intelligent and Robotic Systems, 1 paper; Applied Mathematical Modelling, 2 papers; Journal of Global optimization, 3 papers; Engineering Optimization, 1 paper; Mathematical Problems in Engineering, 1 paper.

2) Invited reviewing in Conferences:

Costa, L, 14th Online World Conference on Soft Computing in Industrial Applications (WSC14), 1 paper; International Conference on Evolutionary Computation (ICEC2009), 1 paper; Congress on Evolutionary Computation (CEC-2009), 3 papers; IEE Transactions on Evolutionary Computation, 1 paper.

Espírito Santo, IACP, IWA Conferences, 6 papers.

Leão, CP, IRF'2009- 3rd International Conference on Integrity, Reliability & Failure, 13 papers.

Vaz, AIF, International MultiConference of Engineers and Computer Scientists (IMECS 2010)

3) Granted 3 BII/FCT (graduate student):

Sara T M N Morais (J518782U7E3J), Tiago F M C Martins (J523959G237Q), Francisco A G Ribeiro (J52396464KC5)

4) Training - Advanced courses:

"Applied Optimization in Science and Engineering" 15 ECTS (5 Integrated Master students, 1 PhD student; 1 MSc. student (3 curricular units: Modeling and Nonlinear Optimization, Derivative-free Optimization and Genetic and Evolutionary Algorithms) .

5) Academic committee for "tenure" position:

Fernandes, E.M.G.P., 5 reports for UMinho, 2009; 1 report for UTAD, 2009.

6) Academic committee for PhD and MSc jury:

Braga, AC, Mestrado em Eng^a Humana, UMinho, February 2009.

Costa, L, Mestrado de Engenharia Informática, UMinho, Dec 2009.

Fernandes, E.M.G.P., president, PhD thesis, UMinho, Dec 2009.

Leão, C. P., co-supervisor, Mestrado Integrado em Engenharia e Gestão Industrial, Uminho, Dec 2009; president, Mestrado em Engenharia Humana, UMinho, Oct 2009; president, Mestrado em Engenharia Humana, UMinho, Sept 2009; Mestrado em Engenharia de Segurança e Higiene Ocupacional, FEUP, Nov 2009; president, Mestrado em Engenharia Humana, UMinho, Nov 2009; Mestrado em Engenharia de Segurança e Higiene Ocupacional, FEUP, Nov 2009; president, Mestrado em Engenharia Humana, UMinho, Nov 2009; president, Mestrado em Engenharia Humana, UMinho, Nov 2009; president, Mestrado em Engenharia Humana, UMinho, Nov 2009; supervisor, Mestrado em Engenharia Humana, UMinho, Nov 2009; Mestrado Integrado em Engenharia de Polímeros, UMinho, Dec 2009.

Oliveira, P., PhD Thesis, University of Coimbra, Feb 2009; MSc Thesis, University of Porto, Dec 2009.

7) Eighth better paper in month <http://top25.sciencedirect.com/subject/engineering/12/journal/applied-mathematical-modelling/0307904X/archive/21/> Vaz, A.I.F.; Ferreira, E.C. (2009) Air pollution control with semi-infinite programming. Applied Mathematical Modelling. 33:1957-1969.

Group Productivity

Publications in peer review Journals

(IP from 2008 JCR); number citations (nc=ISI, Scopus, Google.Scholars)

Carneiro, F.; Leão, C.P.; Teixeira, S.F.C.F., (2010) Teaching differential equations in different environments: a first approach, Computer Applications in Engineering Education, published online May 2009, DOI:10.1002/cae.20231(IP= 0.30) (nc= , ,1)

Costeira, M.J.; Oliveira, P.; Ares, S.; de Escobar, G.M., Palha, J.A. (2009). Iodine status of pregnant women and their progeny in the Minho Region of Portugal. Thyroid, 19(2):157-63 (IP=2.692)(nc= 0, ,)

Cotter, J.; Oliveira, P.; Cunha, P.; Polónia, J. (2009) Risk Factors for Development of Microalbuminuria in Diabetic and Nondiabetic Normoalbuminuric

Group Productivity

Hypertensives with High or Very High Cardiovascular Risk – A Twelve-Month Follow-Up Study. *Nephron Clinical Practice*. 113(1):8-15. (IP=1.68)(nc=0, ,)

Moreira, F.; Sousa, R.M.; Leão, C.P.; Alves, A.; Lima, R.M. (2009) Measurement Rounding Errors in na Assessment Model of Project Led Engineering Education. *iJOE international journal of online engineering*. 5(2):39-44. (IP= ---)(nc=-, ,)

Otorio, N.S.; Sampaio-Marques, B.; Chan, C.H.; Oliveira, P.; Pearce, D.A.; Sousa, N.; Rodrigues, F. (2009) Neurodevelopmental delay in the Cln3(Delta ex7/8) mouse model for Batten disease. *Genes Brain and Behavior*. 8(3):337-245. (IP= 3.89)(nc=0, ,)

Pereira, A.I.P.N.; Fernandes, E.M.G.P. (2009) A reduction method for semi-infinite programming by means of a global stochastic approach. *Optimization*. 58(6):713-726. (IP=0.845)(nc= 3, ,4)

Rocha, A.M.A.C.; Fernandes, E.M.G.P. (2009) Modified movement force vector in a electromagnetism-like mechanism for global optimization. *Optimization Methods and Software*. 24(2):253-270 (IP=0.708)(nc=0, ,0)

Rocha, A.M.A.C.; Fernandes, E.M.G.P. (2009) Hybridizing the electromagnetism-like algorithm with descent search for solving engineering design problems. *International Journal of Computer Mathematics*. 86(10/11):1932-1946. (IP=0.308)(nc= 0, ,0)

Rodrigues, H.S.; Monteiro, M.T.T.; Vaz, A.I.F. (2009) An MPCC approach on a Stackelberg game in an electric power market: changing the leadership. *International Journal of Computer Mathematics*. 86(10):1921-1931. (IP=0.308)(nc=0, ,)

Vaz, A.I.F.; Ferreira, E.C. (2009) Air pollution control with semi-infinite programming. *Applied Mathematical Modelling*. 33:1957-1969 (IP=0.931)(nc=1, ,1)

Vaz, A.I.F.; Vicente, L.N. (2009) PSwarm: A hybrid solver for linearly constrained global derivative-free optimization, *Optimization Methods and Software*. 24(4-5):669-685. (IP=0.708) (nc=1, ,2)

Other publications International

Books: (iISIP = indexed in ISI Proceedings)

Costa, M.F.P.; Fernandes, E.M.G.P. Comparison of filter line search algorithms in the primal-dual barrier approach for nonlinear programming. *Numerical Analysis and Applied Mathematics*, T.E. Simos, G. Psihoyios and Ch. Tsitouras (Eds.). Greece AIP, 2009. 4pages ISBN:978-0-7354-0705-3. (iISIP)

Leão, C.P.; Pimentel, C.; Rodrigues, C.S. Being a Female Industrial Engineer: A Portuguese Case. *Women Education and Development Perspectives, Issues and Concerns*, Roy Rajarshi (Ed). India: Shipra Publications, 2009. 23pages ISBN:978-81-7541-459-4.

Leão, C.P.; Rodrigues, C.S. Teaching/Learning Process, Video and Statistics: What's in common?. *Innovation and Assessment of Engineering* . Spain: SEFI, 2009. 10pages, ISBN:84-692-2864-8.

Fernandes, F.P.; Costa, M.F.P. Costa; Fernandes, E.M.G.P. Overview on mixed integer nonlinear programming problems. *Numerical Analysis and Applied Mathematics*, T.E. Simos, G. Psihoyios and Ch. Tsitouras (Eds.). Greece AIP, 2009. 4pages, ISBN:978-0-7354-0705-3. (iISIP)

Pereira, A.I.P.N.; Fernandes, E.M.G.P. Constrained multi-global optimization using a penalty stretched simulated annealing framework. *Numerical Analysis and Applied Mathematics*, T.E. Simos, G. Psihoyios and Ch. Tsitouras (Eds.). Greece AIP, 2009. 4pages, ISBN:978-0-7354-0705-3. (iISIP)

Pinho, D.; Pereira, A.I.P.N.; Lima, R. Motion of red blood cells in a glass microchannel: a global optimization approach, *Numerical Analysis and Applied Mathematics*, T.E. Simos, G. Psihoyios and Ch. Tsitouras (Eds.). Greece AIP, 2009. 4pages, ISBN:978-0-7354-0705-3. (iISIP)

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Mota, A.T.M.; Vaz, A.I.F. - A reduction type penalty algorithm for nonlinear semi-infinite programming, *Preprints of the IFAC Workshop on Control*

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Leão, C.P.; Teixeira, S.F.C.F.; Machado, G.; Pereira, R.M.S. - Ensino de métodos numéricos na resolução de equações diferenciais recorrendo a um software de conforto térmico, num curso de engenharia. FINTDI - Fomento e Innocición com Nuevas Tecnologías en la Docencia de la Ingeniería. Vigo: Dec 2009. 5 pages

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Neves, M.M, Arezes, P.M, Teixeira, S.F, Leão, C.P, Cunha, J - Desenvolvimento de calçado termicamente confortável. Revista CESET - Conforto, Eficiência e Segurança no Trabalho (Brazil). Vol. 1: nº 6 (2009), p. 7-18.

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Master and Ph.D. thesis completed

(Supervisors = s)

1) MSc Concluded:

Ana S L Sampaio, Representações sobre a criatividade: Um estudo das diferenças na população docente dos Ensinos Básico e Secundário, Mestrado Integrado em Psicologia, Nov. 2019, s: Morais, F; Braga, A.C.

Jorge P B Lima, A utilização de equipamentos de protecção individual pelos profissionais de Enfermagem - práticas relacionadas com o uso de luvas, Mestrado em Engenharia Humana, Feb. 2009, s: Miguel, A.S.; Braga, A.C.

Marco R M Barros, Tingimento em jigger versus processo de esgotamento convencional – estudo da reprodutibilidade, Mestrado Integrado em Eng^a Gestão Industrial, Dec. 2009, s: Leão, C. P.; Santos, J.

Mariana I S P Ferreira, Detecção e prevenção de fraude, Mestrado em Engenharia Informática, Dec. 2009, s: Costa, L; Novais, P.

Matilde A Rodrigues, Condições de Trabalho e Conforto em Bibliotecas do Ensino Superior, Mestrado em Engenharia Humana, Nov. 2009, s: Barroso, M.; Leão, C.P.

Susana J Prozil, Mestrado em Engenharia Informática, Universidade do Minho, Priorização de requisitos de software utilizando AHP e ELECTRE I, Dec. 2009, s: Costa, L.; Fernandes, J.

Organization of conferences

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Costa, L., International Conference on Evolutionary Computation (ICEC2009), Scientific Committee.

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Leão, C.P., International Scientific Committee 3rd International Conference on Integrity, Reliability & Failure, Scientific Committee, 2009.

Fernandes, E.M.G.P., Pereira, A.I.P.M., "Nonlinear Optimization and Applications" Session Organizers in EURO XXIII - 23th European Congress on Operations of EURO, Bonn July 2009.

Group Productivity

- Fernandes, E.M.G.P., "Nonlinear Programming" Stream Organizer in EURO XXIV - 24th European Congress on Operations of EURO, Lisbon, July 2010.
- Fernandes, E.M.G.P., Organizing Committee in EurOpt (8th Europt Workshop "Advances in Continuous Optimization", Aveiro, Portugal, July 2010.
- Fernandes, E.M.G.P., Mini-Symposium Organizer on "Continuous Optimization" in EngOpt (2nd International Conference on Engineering Optimization), Lisbon, September 2010.
- Fernandes, E.M.G.P., Scientific Committee, Optimization 2011, Lisbon, July 2011.
- Oliveira, P., Congress on Evolutionary Computation (CEC-2009), Scientific Committee.
- Pereira, A.I.P.N.; Costa, M.F.P., "Numerical Optimization" Session organizers in International Conference on Numerical Analysis and Applied Mathematics, Greece, September 2009.
- Pereira, A.I.P.N., executive committee in III Conferencia Nacional em Mecânica dos Fluidos, Termodinâmica e Energia, Bragança, Portugal, September 2009.

Internationalization

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- Monteiro, M.T.T.; Silva, R.; Vicente, L.N. - A Survey of Filter Methods. Janeiro, 2009. Relatório técnico do projecto: Versatility of Filtering Techniques in Non-Linear Programming Optimisation, ESA. 15 p.
- Moreira, F., Sousa, R. M., Leão, C. P., Alves, A. & Lima, R. M. - Project-Led Engineering Education: Assessment Model and Rounding Errors Analysis (extended abstract), in IRF'2009 - Integrity, Reliability and Failure: Challenges and Opportunities (J. F. S. Gomes & S. A. Meguid), Porto, Portugal, Edições INEGI. Porto: Junho, 2009. ISBN: 978-972-8826-22-2. 113-114 p.
- Oliveira, P. Sabbatical leave in the Statistics Department of the University of Salamanca, Spain, Mar 09 till June 09.
- Lifelong Learning Program: Erasmus bilateral agreement for the years 2009/2012, between Slovenska Technicka Univerzita, Slovak Republic, and University of Minho (Leão, C.P.). Theme: Computer and Control Education.

FCT Relatório Científico 2009 Print: 27-03-2011 23:22:43 [CENTRO ALGORITMI]

Group Description

Title of Research Group: (RG-Norte-319-2169)
Systems Engineering, Optimization and Operations Research

Principal Investigator: José Manuel Vasconcelos Valério de Carvalho

Main Scientific Domain: Engenharia Electrotécnica e Informática

Group Host Institution: Universidade do Minho

Funding, source, dates**Funding, source, dates**

SearchCol: Pesquisa meta-heurística por geração de colunas, FCT (PTDC/EIA-EIA/100645/2008), 04-2010, 03-2013, 94.719,00€

Advanced Optimization Techniques based on Hybrid Integer and Constraint Programming Methods: Applications to Vehicle Routing and Cutting Stock Problems, FCT/CNRS, 01-01-2009, 31-12-2009

ASTRA - Sistema Alternativo de Transporte para Áreas Rurais, FCT (PTDC/TRA/72871/2006), 11-2007, 09-2011, 116.263,00€.

Business Intelligence, UM/Efacec, QREN, 09-2009, 08-2010, 70.000,00 €

Logística Inversa de REEE (Resíduos de Equipamentos Eléctricos e Electrónicos), Amb3E, 12-2009, 12-2010, 41.760,00€

Otimização de modelo de logística para recolha e processamento de biomassa florestal e agrícola, QREN - Vale Inovação, , Set 2009, Set 2010

Simulação do Sistema Logístico de Movimentação de Viaturas numa Unidade Industrial, UM/Cachapuz, QREN, 11-2009, 04-2010, 18.750,00 €

Sistemas de Apoio à Decisão para o IMTT – Instituto da Mobilidade e dos Transportes Terrestres, 08-2009 – 08-2010, 50.000€.

Development of state-of-the-art algorithms for the solution of very complex multicommodity network flow Network Design Problems, Prog. de Cooperação Científica e Tecnológica FCT/Ministério do Ensino Superior, da Investigação Científica e da Tecnologia da Tunísia, 2008-2009. 5.000,00€

Objectives & Achievements**Objectives**

The mission of SEOOR is to pursue research and research-led learning and teaching of the highest international level in all the teaching areas of the Optimization and Operations Research Group:

- Optimization
- Logistics and Transportation
- Modeling and Simulation
- Quality, Reliability and Maintenance

• Objectives:

1. Conduct both fundamental and applied research, targeting to publish in the highest quality and flagship journals;
2. Establish research mobility, exchange and cooperation programs with internationally renowned research centers;
3. Establish high quality research contracts with surrounding industries and services, aiming at contributing to their development;
4. Target the job placement of our PhD and MSc students in surrounding industries and services after they graduate;
5. Develop a research environment attractive to international graduate students, particularly from Portuguese speaking countries, and to postdoctoral researchers;
6. Encourage the involvement of postgraduate students in ongoing research projects

Main Achievements

1. Publications

The number of papers published in 2009 increased: there were 14 papers published or in press in international journals (11 ISI journals), 1 book, 4 chapters in books, and 20 papers published in conference proceedings.

2. International visibility

The International visibility and recognition of the group increased. The number of citations to publications in international journals resulting from the PhD thesis recently completed by many researchers of the group is significant, and the total figures increased significantly.

On the 27th March 2010, there were 111 citations in the ISI Web of Knowledge, 178 citations in Scopus and 333 citations in <http://scholar.google.pt/> to the papers published in the group.

The number of citations in the ISI Web of Knowledge more than doubled when compared with the figure of 2007.

3. Internationalization

In order to pursue objective 2 referred to above, in the past, internationally renowned professors visited SEOOR, and research cooperation programs have already been approved, and others are expected to follow.

We point out new collaborations with MIT, in the MIT-Portugal Program, and with the University of Valenciennes, France, which includes the exchange of a PhD student. The exchange of PhD students of SEOOR is envisaged in the future in a regular basis.

For further details, see Section Internationalization, Subsection New Collaborative research.

Some of these new cooperation programs are in areas within the group that gained a critical mass when researchers got their PhDs recently, enabling

Objectives & Achievements

targeting larger scope projects and to establish new international links.

4. Prizes and awards

Paulo Sampaio –Best Paper Award (3rd) presented in the Student Technical Competition of the American Society for Quality World Conference on Quality and Improvement.

Paulo Sampaio – Distinguished as Senior Member of the American Society for Quality.

5. Post-doctoral researchers

Post-doctoral students find SEOOR attractive. There were two post-doctoral researchers in 2009, and a new grant was awarded, and started in January 2010:

Chan Tak Ming, PhD Univ. Hong-Kong, Programa Compromisso Ciência 2008-2009.

Jürgen Rietz, PhD U.Freiberg, Germany, Post-doctoral grant from FCT, 2008-.

Mansi Raed, PhD U. Valenciennes, France, Post-doctoral grant from FCT, 2010-.

Chan Tak Ming returned to Hong-Kong due to a severe illness condition.

Some of the international research cooperation programs currently going-on are with past post-doctoral researchers, and we expect to do the same with the current researchers.

6. New PhD Program in Industrial and Systems Engineering

The new Programa Doutoral em Engenharia Industrial e de Sistemas (PDEIS) was approved by DGES in June 2009, and was first offered in the AY 2009/2010. There were 14 candidates, from 3 countries (Portugal, Brazil and Chile) who are now enrolled in the first year, taking courses.

A new course in Decomposition Methods in Integer Programming is already running, while all the faculty members of SEOOR are now preparing new PhD courses in the frontier of the knowledge of their research areas to offer in this PhD Program.

We anticipate that the number of PhD students in the SEOOR group will increase in the near future.

Group Productivity

Publications in peer review Journals

- Alves, C.; Macedo, R.; Valério de Carvalho, J.M. - New Lower Bounds Based on Column Generation and Constraint Programming for the Pattern Minimization Problem. *Computers and Operations Research*. Vol. 36: nº 11 (2009), p. 2944-2954. [ISI]

- Alvelos, F.; Chan, T.M.; Vilaça, P.; Gomes, T.; Silva, E.; Valério de Carvalho, J.M. - Sequence based Heuristics for Two-dimensional Bin Packing Problem. *Engineering Optimization*. Vol. 41: nº 8 (2009), p. 773-791. [ISI]

- Sampaio, P.; Saraiva, P.; Guimarães Rodrigues, A - ISO 9001 Certification Research: Questions, Answers and Approaches. *International Journal of Quality and Reliability Management*. Vol. 26: nº 1 (2009), p. 38-58.

- Sampaio, P.; Saraiva, P.; Guimarães Rodrigues, A - A Statistical Analysis of ISO 9000 Related Data for Ultra-peripheral and Portuguese Regions. *Quality Management Journal*. Vol. 16: nº 2 (2009), p. 44-58.

- Sampaio, P.; Saraiva, P.; Guimarães Rodrigues, A - An Analysis of ISO 9000 Data in the World and the European Union. *Total Quality Management and Business Excellence*. Vol. 20: nº 12 (2009), p. 1297-1315. [ISI]

- Faria, J., Nunes, E. and Matos, M. - Cost and Quality of Service Analysis of Production Systems Based on the Cumulative. *International Journal of Production Research*. First (2009), p. 33. [ISI]

- Santos, D.; Sousa, A.; Alvelos, F. - Engineering of Telecommunication Networks based on Multiple Spanning Tree Routing. *Lecture Notes in Computer Science*. Vol. 5464: nº (2009), p. 114-129. [ISI]

- Jürgen Rietz, J. Valério de Carvalho, Claudio Alves, "Theoretical investigations on maximal dual feasible functions", *Operations Research Letters*, Vol. 38: p174-178. [ISI]

- Elsa Silva, Filipe Alvelos, J.Valerio de Carvalho, "A new integer programming model for 2-dimensional cutting stock problems", *European Journal of Operational Research*, DOI: 10.1016/j.ejor.2010.01.039 [ISI]

- François Clautiaux, Cláudio Alves, Jose Valério de Carvalho, A survey of dual-feasible and superadditive functions, *Annals of Operations Research*, DOI: 10.1007/s10479-008-0453-8 [ISI]

- Pimentel, C.; Alvelos, F.; Valério de Carvalho, J.M. - Comparing Dantzig-Wolfe Decompositions and Branch-and-price Algorithms for the Multi-item Capacitated Lot Sizing Problem. *Optimization Methods and Software*. (in press - 2009). [ISI]

- Carina Pimentel, Filipe Alvelos, Antonio Duarte, J.M. Valerio de Carvalho, Exact and Heuristic Approaches for Lot Splitting and Scheduling on Identical Parallel Machines, *International Journal of Manufacturing Technology and Management*, 2009, accepted.

- Dorabella Santos, Amaro de Sousa, Filipe Alvelos, Mateusz Dzida, Michael Pióro, Optimization of Link Load Balancing in Multiple Spanning Tree Routing Networks, *Telecommunication Systems*, 2009, accepted. [ISI]

- Rita Macedo, Cláudio Alves, José Valério de Carvalho, Arc-Flow Model for the Two-Dimensional Guillotine Cutting Stock Problem, *Computers and Operations Research* 37, pp. 991-1001, 2010. [ISI]

Other publications International

Book

- Paiva, A L; Capelas, L; Sampaio, P; Saraiva, P - ISO 9001:2008 - Implementação e Certificação. 1ª. Lisboa: Verlag Dashofer, 2009. 232. 978-989-642-046-8.

Chapters in Books

- Sampaio, P; Sariaiva, P - Manual Prático para a Gestão e Qualidade nas Organizações – Unidade 2: Alterações Normativas; O Processo de Revisão das ISO 9000; As Normas da Série ISO 9000. N/A. Lisboa: Verlag Dashofer, 2009. 14. 978-972-98385-6-9.

- Sampaio, P; Sariaiva, P - Manual Prático para a Gestão e Qualidade nas Organizações – Unidade 7: Certificação ISO 9001. N/A. Lisboa: Verlag

Group Productivity

Dashofer, 2009. 60. 978-972-98385-6-9.

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- Tak Ming Chan, Filipe Alvelos, Elsa Silva, J. M. Valério de Carvalho, Heuristics for Two-dimensional Bin-packing Problems to appear in "Industrial Electronics Handbook, second edition", J. David Irwin and Bogdan M. Wilamowski (Eds.), CRC Press and IEEE Press Full Text in Proceedings of Conferences

- Carvalho, M.; Nunes, E.; Telhada, J. - A maintenance optimization model for two interactive failure modes. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense: Novembro, 2009. Texto completo e poster.

- Chan, T,M; Alvelos, F; Silva, E.; Valério de Carvalho, J. M. - A Combined Local Search Approach for the Two-dimensional Bin Packing Problem. EU/MEeting 2009, European Chapter on Metaheuristics Workshop. Porto, Portugal: April, 2009. Texto completo (6 pp) com arbitragem científica.

- Dias, A.; Telhada, J.; Carvalho, M.S. - On problems in public passenger transport flexible systems. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense (Espanha): Novembro, 2009. Resumo extenso e Apresentação Oral.

- Figueiredo, MCB; Hussain, D; Ferreira, FBN; - SWOT Analysis of Pakistan Textile Supply Chain. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense, Espanha: Novembro, 2009. texto completo.

- Figueiredo, MCB; Oliveira, LC; Lima, RMSP; - A Flexible Optimization Tool for Inbound Flows in a 2nd TIER Automotive Industry. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense, Espanha: Novembro, 2009. texto completo.

- Gomes, T.; Alvelos, F; Pimentel, C; Valério de Carvalho, J.M. - A VND for the integration of the two-dimensional cutting stock and sequencing problems. MIC 2009: The VIII Metaheuristics International Conference. Hamburg, Germany: July, 2009. Texto completo (10 pp) com arbitragem científica.

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- Nunes, E. and Sousa, S. - Fuzzy performance measures in a high uncertainty context. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense: Novembro, 2009. Texto completo.

- Oliveira, J.V.; Telhada, J.; Carvalho, M.S. - Integration and automation of multi-methodological algorithms for routing problems arising in flexible passenger public transport systems. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense (Espanha): Novembro, 2009. Resumo extenso e Apresentação Oral.

- Pereira, G A B; Dias, L M S; Ferreira, B L S - Flowchart Simulation – a tool for the automatic generation of simulation programs. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense, Espanha: Novembro, 2009. Texto Completo, Apresentação Oral.

- Pereira, G A B; Dias, L M S; Rocha, H T C - Teaching Simulation Basics through Flowchart Simulation the Event Scheduling World View. European Modeling and Simulation Symposium. Tenerife, Espanha: Setembro, 2009. Texto Completo, Apresentação Oral.

- Pinho, T; Telhada, J.; Carvalho, M.S. - Conceptual model of the construction logistics network. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense (Espanha): Novembro, 2009. Resumo extenso e Apresentação Oral.

- Raposo, R B; Pereira, G A B; Dias, L M S - Simulation of a Milk Run Material Transportation System in the Semiconductors Industry. Industrial Simulation Conference. Loughborough, UK: Junho, 2009. Texto Completo, Apresentação Oral.

- Sampaio, P; Saraiva, P; Guimarães Rodrigues, A - A Case Study Approach to the Economic Evaluation of ISO 9001 Certification. European Organization for Quality Congress. Dubrovnik: Maio, 2009. Texto completo e apresentação oral.

- Sampaio, P; Saraiva, P; Guimarães Rodrigues, A - ISO 9001 Certification pay-off: myth versus reality. American Society for Quality World Conference on Quality and Improvement. Minneapolis: Maio, 2009. Texto completo e apresentação oral.

- Santos, D.; Sousa, A.; Alvelos, F. - Load Balancing of Telecommunication Networks based on Multiple Spanning Trees. International Network Optimization Conference 2009. Pisa, Italy: April, 2009. Texto completo (8pp) com arbitragem científica.

- Santos, D.; Sousa, A.; Alvelos, F; Dzida, M.; Pióro, M.; Zagodzón, M. - Traffic Engineering of Multiple Spanning Tree Routing Networks: the Load Balance Optimization Case. 5th Euro-NGI Conference on Next Generation Internet Networks. Aveiro, Portugal: July, 2009. Texto completo (8pp) com arbitragem científica.

- Saraiva, P, Sampaio, P. - A Excelência Organizacional como Referência na Gestão. XII Convenção Iberoamericana de Excelência na Gestão. Lisboa: Maio, 2009. Apresentação oral.

- Silva, B.; Oliveira, J.A. - A heuristic method for the generalized assignment problem. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense: Novembro, 2009. Texto completo.

- Vik, P; Pereira, G A B; Dias, L M S - Software Tools Integration for the Design of Manufacturing Systems. Industrial Simulation Conference. Loughborough, UK: Junho, 2009. Texto Completo, Apresentação Oral.

Posters

- Hussain, D; Figueiredo, MC; Ferreira, FB; - SWOT Analysis of Pakistan Textile Supply Chain. IX Congreso Galego de Estatística e Investigación de Operacións. Ourense, Espanha: Novembro, 2009.

Other publications National

• Cerqueira, P; Dias, L; Oliveira, J.A.; Pereira, G. - Furnace scheduling in a foundry. IO 2009 – 14º Congresso da APDIO. Costa da Caparica: Setembro, 2009. Texto completo.

• Ferreira, A.; Telhada, J.; Carvalho, M.S. - Problems arising in demand-responsive passenger public transport systems. IO 2009 - 14º Congresso da Associação Portuguesa de Investigação Operacional (APDIO). Almada: Setembro, 2009. Apresentação oral.

• Figueiredo, MCB; Oliveira, LC; Lima, RMSP; - Optimização de Fluxos Inbound num TIER2 da Indústria Automóvel. 14º Congresso da Associação Portuguesa de Investigação Operacional. Lisboa: Setembro, 2009. Texto completo.

• Galdes, C A S; Carvalho, M S F B S; Pereira, G A B - Gestão de operações logísticas num armazém usando modelos de apoio à decisão. IO 2009. Lisboa: Setembro, 2009. Texto Completo, Apresentação Oral.

• Gomes, T.; Alvelos, F; Pimentel, C.; Valério de Carvalho, J. M. - Uma Heurística para a Integração dos Problemas de Corte a Duas Dimensões e Sequenciamento. 14º Congresso da Associação Portuguesa de Investigação Operacional. Costa da Caparica, Portugal: Setembro, 2009. Texto completo

Group Productivity

(8 pp) com arbitragem científica.

- Gonçalves, L; Marques, A.; Oliveira, J.A.; Borges, J.G. - Métodos Heurísticos aplicados à Gestão Logística Florestal. IO 2009 – 14º Congresso da APDIO. Costa da Caparica: Setembro, 2009. Texto completo.
- Rietz, J.; Alves, C; Valério de Carvalho, JM - Exploring a New Family of Maximal Staircase Dual Feasible Functions. 14o Congresso da Associação Portuguesa de Investigação Operacional. Lisboa: Setembro, 2009. Texto completo.
- Margalho, P. e Nunes, E. - Contributos para a melhoria da disponibilidade e para redução de riscos em unidades de transformação de subprodutos de origem animal. 14º Congresso da APDIO. Lisboa: Setembro, 2009. Texto completo.
- Oliveira, J.V.; Telhada, J.; Carvalho, M.S. - Tipologia e métodos de solução para problemas de rotas em sistemas flexíveis de transporte público de passageiros. IO 2009 - 14º Congresso da Associação Portuguesa de Investigação Operacional (APDIO). Almada: Setembro, 2009. Apresentação oral.
- Pereira, Teresa; Carvalho, M. Sameiro - Análise multicritério para a Análise e selecção de um sistema de Planeamento de rotas. IO2009. Lisboa: Setembro, 2009. Texto completo.
- Pinto, S.V.; Alvelos, F.; Silva, E.; Valério de Carvalho, J. M. - Heurísticas para empacotamento em placas de vários tamanhos. 14º Congresso da Associação Portuguesa de Investigação Operacional. Costa da Caparica, Portugal: Setembro, 2009. Texto completo (8 pp) com arbitragem científica.
- Saraiva, P; Orey, J; Sampaio, P; Reis, M; Cardoso, C - O Futuro da Qualidade em Portugal: Apresentação de Resultados Preliminares. 34º Colóquio da Qualidade. Porto: Novembro, 2009. Apresentação oral.
- Saraiva, P; Orey, J; Sampaio, P; Reis, M; Cardoso, C - O Futuro da Qualidade em Portugal: Workshop. 34º Colóquio da Qualidade. Porto: Novembro, 2009. Apresentação oral.
- Alves, C.; Macedo, R.; Carvalho, JV - Um Novo Limite Inferior Baseado num Modelo de Programação por Restrições para o Problema de Minimização de Padrões. Investigação Operacional. Aceite para publicação (2009).
- Sampaio, P; Saraiva, P; Guimarães Rodrigues, A - Uma descrição estatística dos resultados de auditorias ISO 9001 a 100 empresas nacionais. Revista Qualidade. Vol. Inverno-2008. (2009), p. 20-22.
- Sampaio, P; Saraiva, P; Guimarães Rodrigues, A - Desenvolvimento e validação de metodologias de classificação para as motivações subjacentes à obtenção da certificação ISO 9001 em Portugal. Revista Qualidade. Vol. Primavera-2009. (2009), p. 23-32.
- Sampaio, P; Saraiva, P; Guimarães Rodrigues, A - Modelação estatística do fenómeno ISO 9000. Revista Qualidade. Vol. Verão-2009. (2009), p. 41-49.
- Sampaio, P; Saraiva, P - Barómetro da Certificação 2008. Guia de Empresas Certificadas. Vol. 1. (2009), p. 60-72.

Master and Ph.D. thesis completed

PhD Thesis

Tiago Miguel Santa Rita Simões de Pinho, Telhada, J; Carvalho, MS, Definição de um modelo da rede logística na indústria da construção: estudo de um caso, 01-07-2005. (Submetida 30-09-2009)

MSc Thesis

MEI - Mestrado em Engenharia Industrial

MIEGI - Mestrado Integrado em Eng^a e Gestão Industrial

- Ana Cecília Dias Ferreira, Telhada, J. e Carvalho, M.S., Planeamento de Sistemas de Gestão de Transportes Públicos de Passageiros, MIEGI, 28-11-2008.

Anabela Patrícia Paiva Oliveira, Carvalho, M. S., Optimização dos processos logísticos na Vulcano; MIEGI, Nov 2009

- Arminda Sofia do Val Pinto Pereira Mendes, Alvelos, F., Heurísticas para Corte de Placas em Aço, MEI, 12-05-2009

Carla Sofia Veloso Gomes, Carvalho, M. S., Os desafios da adopção das boas práticas nas compras, MIEGI, 2009

- Carlos André de Sousa Riesenberge, Sousa, S. D. , Aplicação da metodologia Seis Sigma no tratamento de reclamações - Um caso de estudo na indústria automóvel, MIEGI, 2009

- Carlos Peixoto, Cláudio Alves, Modelos e algoritmos para o problema de minimização de padrões, MEI, 01-05-2009

- Cristiana Lopes Carneiro da Silva, Carvalho, M.S., Martins, P., Racionalização dos processos logísticos na indústria da construção civil – Estudo de caso, MIEGI, Nov 2009

- Danielle Paiva de Alencar, Romero, F.; Sousa, S. D., Implementação de Sistemas de Qualidade e Serviços de Investigação, Desenvolvimento e Inovação nos Parques de Biotecnologia: Uma Perspectiva Empresarial, MEI, 07-10-2009

- Eliana Sofia Dias Oliveira, Sousa, S. D. , Impacto da implementação de melhoria continua numa linha de produção , MIEGI, 2009

- Joaquim Vítor Araújo Oliveira, Telhada, J.; Carvalho, M.S., Sistema de apoio à gestão de um serviço de transporte público de passageiros, Mestrado em Engenharia de Sistemas, 31-12-2009.

- José Eduardo Ramos Nunes Pinto Ferreira, Lopes, I. S., Melhoria de um processo de sucatagem através da metodologia Seis Sigma, MIEGI, 17-11-2009

- Luis Miguel Martins Azevedo, Carvalho, M. S.; Alves, A. C., Aplicação do Lean Manufacturing na logística – aprovisionamentos, MIEGI, 2009

- Mário André Duro Martins Feiteira, Figueiredo, M. C., Caracterização do comércio electrónico em Portugal: análise das práticas de previsão da procura e gestão de stocks. , MIEGI, 18-12-2009

- Matilde Alexandra Rodrigues, Barroso, M.; Leão, C.P., Condições de Trabalho e Conforto em Bibliotecas do Ensino Superior, Mestrado em Engenharia Humana, 09-11-2009

- Nuno Manuel Ferreira Braga, Figueiredo, M. C., Racionalização dos processos logísticos numa empresa de distribuição, MIEGI, 02-12-2009

- Nuno Miguel da Costa e Silva Campos Ferreira, Figueiredo, M. C., Gestão da cadeia de abastecimento numa empresa do ramo automóvel, MIEGI, 23-10-2009

- Pedro Miguel dos Santos Miranda, Oliveira, J.A.; Dias, L., Modelos de simulação e optimização de um sistema de transporte de paletes com AGVs, MEI, 27-11-2009

- Pedro Nuno Ribeiro Vaz Silva, Carvalho, M. S.; Alves, A. C., Indicadores Lean para a melhoria do processo de expedição de uma empresa de

Group Productivity

componentes automóvel, MIEGI, 2009

- Vítor Manuel Meneses Barbosa, Alvelos, F.; Alves, C., DCGSolver: Decomposição e Geração de Colunas para Programação Linear, MEI, 27-10-2009

Susana Isabel Rodrigues Alves, Sousa, Sérgio D., "Desenvolvimento de Modelo de Aplicação de SPC nos Processos Produtivos, MIEGI, 9-12-2009

Organization of conferences

V. Carvalho, member of organizing committee: EURO XXIV Lisbon - 14th European Congress on Operations Research of EURO (The Association of European Operational Research Societies), Lisbon, July 2010.

V. Carvalho, member of scientific committee: MCPL 2010 - IFAC Conference on Management and Control of Production and Logistics, September 8 - 10, 2010, University of Coimbra, Portugal

J. Telhada, member of scientific committee: Thematic track on "Artificial Intelligence in Transportation and Urban Mobility" of the EPIA 2009 - Fourteenth Portuguese Conference on Artificial Intelligence, October 12-15, 2009, University of Aveiro.

P. Sampaio, member of scientific committee: American Society World Conference for Quality and Improvement, May 24 - 26, St. Louis, MO., USA.

P. Sampaio, member of scientific committee: International Symposium on Occupational Safety and Hygiene, February 11 - 12, University of Minho, Portugal.

Valério de Carvalho, J.M., member of scientific committee: Optimization 2011, Lisboa, 2011.

V. Carvalho, member of scientific committee: IO 2009, 14o Congresso da Associação Portuguesa de Investigação Operacional, 2009, FCT-Universidade Nova de Lisboa, Lisboa

F.Alvelos, member of scientific committee: IO 2009, 14o Congresso da Associação Portuguesa de Investigação Operacional, 2009, FCT-Universidade Nova de Lisboa, Lisboa

M.S. Carvalho, member of scientific committee: IO 2009, 14o Congresso da Associação Portuguesa de Investigação Operacional, 2009, FCT-Universidade Nova de Lisboa, Lisboa

SEMINARS (organizer, speaker, title, place date)

RECENT DEVELOPMENTS ON BIN-PACKING PROBLEMS WITH CONFLICTS, François Clautiaux, Département génie informatique, IUT A de Lille 1, Université des Sciences et Technologies de Lille, FRANCE, and INRIA, 21st July 2009.

Industry contract research

Coindu, S.A., Portugal (fabric and leather car set manufacturer with annual sales of 90M€) in operations planning and leather cutting. (50000 euros) 2006-. Coordinator: V.Carvalho. P. Brás was awarded a BDE grant (SFRH/BDE/ 15650/ 2007) (Joint FCT-Company PhD grant), and is involved in this project.

- DST, Portugal (construction company with annual sales of 100 M€). Logistic network model in the construction industry. 2005-2009. Coordinators: J. Telhada and M. Sameiro Carvalho. T. Pinho was awarded a BDE grant (SFRH/BDE/ 15545/ 2005), and is involved in this project.

- Moldartpóvoa, Portugal (manufacturer of frames for pictures/paintings; leader in Portugal with growing sales across Europe) development of a quality management system (QMS). (6000 euros) 2006. Coordinators: E. Nunes and S. Sousa.

- Several MSc students had/have thesis work related to their employing companies (Blaupunkt, Delphi, HOFESA, FAL, Kromberg & Schubert).

Internationalization

1. Collaborative publications and research:

François Clautiaux, Département génie informatique, IUT A de Lille 1, Université des Sciences et Technologies de Lille, France, and INRIA.

Richard Eglese, Lancaster University, U.K.

Said Hanafi, Université de Valenciennes, France, and LAMIH.

Jacques Carlier, Compiègne University of Technology, France

Antoine Jouglet, Compiègne University of Technology, France

Mohamed Haouari, Özyegin University, Istanbul, Turkey, and ROI, Tunisia.

Antonio Guasch Petit, Universitat Politècnica de Catalunya, Spain

Enrique Alba, University of Málaga, Spain

The following research cooperation programs have already been approved, and others are expected in the near future:

1. Development of state-of-the-art algorithms for the solution of very complex multicommodity network flow Network Design Problems (Processo 4.1.5-Tunisia), funded by FCT e o Ministério do Ensino Superior, da Investigação Científica e da Tecnologia da Tunísia (2008-2009).

2. Advanced Optimization Techniques based on Hybrid Integer and Constraint Programming Methods: Application to Vehicle Routing and Cutting Stock Problems, funded by Programa de Cooperação Transnacional ao abrigo do Acordo entre a FCT e o Centre National de la Recherche Scientifique (CNRS) de França (2009-2010).

2. New Collaborative research:

- with Stanley Gershwin (MIT) in the MIT-Portugal Program in a project with AutoEuropa, VW plant in Portugal, as an industrial partner.

- with Said Hanafi, University of Valenciennes, France, a collaboration that includes a common research proposal, recently submitted, and the exchange of a PhD student, which has the first visit period to the University of Valenciennes this April.

3. Graduate Training Networks

Valério de Carvalho, Università di Pisa, Dipartimento di Informatica, School of Graduate Studies G. Galilei, Pisa, Italy, Ph.D. Course on "Column generation and related topics for hard combinatorial problems", 20 horas

Several members of the group taught Operations Management and Supply Chain Management courses in the LTI and TME Programs of EDAM (Engineering Design and Advanced Manufacturing) of the MIT-Portugal Program.

Group Productivity**Government/Organization contract research**

Protocolo IMTT (3 years – 50.000€/year) – Contrato de Prestação de Serviços entre o Instituto de Mobilidade e dos Transportes, IP e a Universidade do Minho. Estudo de soluções de apoio à decisão e monitorização no contexto da Unidade de Regulação Ferroviária (URF) do IMTT (Coordinators: Carvalho, M. Sameiro)

FCT Relatório Científico 2009 Print: 27-03-2011 23:23:05 [CENTRO ALGORITMI]

Group Description

Title of Research Group: (RG-Norte-319-2171)
Knowledge and Information Systems and Services

Principal Investigator: Joao Alvaro Brandao Soares de Carvalho

Main Scientific Domain: Engenharia Electrotécnica e Informática

Group Host Institution: Universidade do Minho

Funding, source, dates**Funding, source, dates**

Sistema de Apoio à Decisão Inteligente para Medicina Intensiva – INT CARE, FCT, 133.000€. Jan/2008-Dez/2010.

Learning Classifiers Systems for Grid Data Mining – GRIDCLASS, FCT, 51.100€. Jan/2008-Dez/2010.

MIKRO MARKT - Holistic Micro Marketing for Women Farmers, Leonardo Project, 27.429€, Oct/2008 – Set/2011.

BATinLoko – Environmental performance indicators and their relation with economic factors in textile BAT implementation, LIFE+ Environment Policy and Governance, 311.955 €, Jan/2009-Dez/2010.

Spam Telescope Miner, FCT, 70.000 €, Jan/2008 – Dez/2010.

Post-graduate Systems Development in Cape Verde and East Timor (PostCaVET), EDULINK, 584.298 €, Set/2008-Ago/2011.

Objectives & Achievements**Objectives**

General objectives for the KISSrg address its consolidation: increase the number of publications in international refereed journals; increase the participation in R&D projects with international consortia; reinforce the RG's maturity, quality, and internationalization. In this matter, some particular aspects will be pursued: strengthen the criteria to be used for selecting the conferences and journals researchers aim to publish at; promote the statement of the R&D programs the R&D communities are using implicitly; encourage that PhD thesis are written in English.

More specific objectives are related to the work being carried out by the several R&D communities associated to the RG: knowledge management; business processes; business intelligence; information services; semantic web; scholarly communication; information systems security, software engineering and management. Although focusing on different problems/opportunities and relying on different scientific and technical areas, work in these communities is shaped by the R&D themes/streams the RG defined: Organizational Well-Being (OWB); Valuable and Trustable Information Services – VTIS; Sustained Software Industry (SSI).

Main Achievements

The results achieved during 2009 are at the same level of those of the previous year in what concerns projects, where there was a strong involvement in preparing projects proposals and setting up consortia. Most of the results of this effort aren't yet known.

In terms of scientific productivity and concluded advanced studies the group increased considerably its results. Namely:

- Books and book chapters: 12 (2008), 23 (2009)
- International Journals: 4 (2008), 20 (2009)
- National Journals: 3 (2008), 7 (2009)
- Conference Proceedings (International): 27 (2008), 66 (2009)
- Conference Proceedings (National): 6 (2008), 10 (2009)
- Concluded PhD Thesis: 5 (2008), 10 (2009)
- Concluded MSc Thesis: 13 (2008), 30 (2009)
- Organization of Conferences/Seminars/Workshops: 5 (2008), 10 (2009)

In terms of main achievements, it is worth to mention the reinforcement of involvement in international activities with other universities like CMU or MIT, and associations like AIS and IFIP.

Group Productivity**Publications in peer review Journals**

1. Adams, C. and I. Ramos (2009). Crowdsourcing: a social networking approach to outsourcing, Cutter IT Journal, 22(10).
2. P. Cortez, A. Cerdeira, F. Almeida, T. Matos and J. Reis. Modeling wine preferences by data mining from physicochemical properties. In Decision Support Systems, Elsevier, 47(4):547-553, 2009. ISSN: 0167-9236. (ISI JCR2008 1.873, Scopus).
3. Maribel Yasmina Santos and Adriano, Moreira, "Topological Relationships between a Circular Spatially Extended Point and a Line: Spatial Relations and their Conceptual Neighborhoods", IAENG International Journal of Computer Science, 36(4), December, 2009, pp. 301-312, ISSN 1819-9224 (online version) 1819-656X (print version).
4. Bernardino, T., & Baptista, A. A. (2009). The Instantiation of Omnipaper RDF Prototype in the Context of Scientific Publications. The Electronic Library, 27(5). (Indexed by ISI and Scopus)
5. Gago, P., Santos, M.F., Adaptive Knowledge Discovery for Decision Support in Intensive Care Units, WSEAS Transactions on Computers, 2009, ISSN: 1109-2750.
6. Pinto, F., Santos, M.F., Alzira M., Database marketing intelligence supported by ontologies, WSEAS Transactions on Business and Economics, 2009,

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ISSN: 1109-9526.

7. Santos, M.F., Mathew, W., Kovaks, T., Santos, H., A Grid Data Mining Architecture for Learning Classifier Systems, WSEAS Transactions on Computers, 2009, ISSN: 1109-2750.
8. Machado, J., Santos, M.F., Abelha, J. Neves, Portela, F., Boas, M., A. Silva, R. F., Information Architecture for Intelligent Decision Support in Intensive Medicine, WSEAS Transactions on Computers, 2009, ISSN: 1109-2750.
9. Pinto, F.M., Marques, A., Santos, M.F., Ontology Supported Database Marketing, Journal of Database Marketing & Customer Strategy Management, Palgrave Macmillan, 2009
10. João M. Fernandes, Ricardo J. Machado, Luís C. Lamb, Flávio R. Wagner. Recent Advances in Model-based Methodologies for Pervasive and Embedded Software. ACM SIGSOFT Software Engineering Notes (SEN), vol. 34, no. 5, pp. 37-39, September, 2009, ACM Press, New York, U.S.A., [ISSN-0163-5948].
11. Alexandre Bragança, Ricardo J. Machado. A Model Driven Approach for the Derivation of Architectural Requirements of Software Product Lines. Innovations in Systems and Software Engineering (ISSE), vol. 5, no. 1, pp. 65-78, March, 2009, Springer Verlag, London, U.K., [ISSN-1614-5046].
12. Ricardo J. Machado, Flávio R. Wagner, Rick Kazman. Introduction to Special Issue: Model Based Development Methodologies. Innovations in Systems and Software Engineering (ISSE), vol. 5, no. 1, pp. 1-3, March, 2009, Springer Verlag, London, U.K., [ISSN-1614-5046].
13. Catarino, Mária; Gonçalves, Dulce; Pereira, António; Varajão, João (2009) - Software projects' most important activities of quality management: A Delphi study. Communications of the IBIMA. ISSN: 1943-7765. 11, 7.
14. Martinho, R.; Varajão, J.; Domingos, Dulce (2009) - Modelling and learning controlled flexibility in software processes. International Journal of Knowledge and Learning. 5, 3.
15. Trigo, A.; Varajão, J.; Barroso, J. (2009) – A Practitioner's Roadmap to learning the available Tools for Information System Function Management. International Journal of Teaching and Case Studies. ISSN (Online): 1749-916X - ISSN (Print): 1749-9151. 2, 1.
16. Trigo, António; Varajão, João; Oliveira, Irene; Barroso, João (2009) - Chief Information Officer's activities and skills in Portuguese large companies. Communications of the IBIMA. ISSN: 1943-7765. 10, 9.
17. Varajão, J.; Trigo, A.; Barroso, J. (2009) – Motivations and trends for it/is adoption: insights from Portuguese companies. International Journal of Enterprise Information Systems. ISSN: 1548-1115. 5, 4.
18. Varajão, J.; Trigo, A.; Figueiredo, N.; Barroso, J.; Cruz, J. (2009) - Information systems services outsourcing reality in large Portuguese organizations. International Journal of Business Information Systems. ISSN (Online): 1746-0980 - ISSN (Print): 1746-0972. 4, 1, 125-142.
19. Nascimento, J. C.; P. Pimenta; S. Schroeder; E. Sjoer; E. McQuade; P. Fabian. Soft Skills for Young IS Professionals: A View From The Field, IADIS International Journal on Computer Science and Information System, ISSN: 1646-3692, p.p.158-174.
20. Baptista, A. A. (2009). Report on the 2nd Ibero-American Conference on Electronic Publishing in the Context of Scholarly Communication (CIPECC 2008). D-Lib Magazine, 15(3/4). doi: 10.1045/march2009-baptista. (Indexed by Scopus).

Other publications International

1. Ramos, I., Margarida Cardoso, João Vidal Carvalho and Ismael Graça (2009). "An action research on open knowledge and technology transfer", in The role of IS in leveraging the intelligence and creativity of SME's, Portugal, 21-24 June, 2009.
2. Souza, Liede; Isabel Ramos and José Esteves (2009) "Managing Risks of Crowdsourcing Innovation: an action research in progress". In 10th European Conference on Knowledge Management, Vicenza, Italy, 3-4 September, 2009.
3. Cardoso, Margarida & Ramos, Isabel (2009). "Open Innovation and the Solver Community", Proceedings of the ACM 2009 Group 9 International Conference on Supporting Group Work, Florida - USA, 10 de Maio, <http://portal.acm.org/citation.cfm?doid=1531674.1531730>.
4. R. Costa, N. Cachulo and P. Cortez. An Intelligent Alarm Management System for Large-Scale Telecommunication Companies. In L. Lopes et al. (Eds.), Progress in Artificial Intelligence, 14th Portuguese Conference on Artificial Intelligence (EPIA'2009), Lecture Notes in Artificial Intelligence 5816, pp. 386-399, Aveiro, Portugal, October, 2009. Springer. ISBN-10 3-642-04685-1. (ISI, DBLP)
5. P. Cortez, J. Teixeira, A. Cerdeira, F. Almeida, T. Matos and J. Reis. Using Data Mining for Wine Quality Assessment. In J. Gama et al. (Eds.), Discovery Science, 12th International Conference, DS 2009, Lecture Notes in Artificial Intelligence 5808, pp. 66-69, Porto, Portugal, October, 2009. Springer. ISBN-10: 3-642-04746-7. (ISI, DBLP)
6. Catarino, E., & Baptista, A. A. (2009). Integração das Folksonomias aos Metadados: um Perfil de Aplicação. In Encontro Nacional de Pesquisa em Ciência da Informação 10. Presented at the Encontro Nacional de Pesquisa em Ciência da Informação, Brasil, 2009, from <http://repositorium.sdum.uminho.pt/handle/1822/9697>.
7. Piedade, M. Beatriz, and Maribel Yasmina Santos, "Business Intelligence in Higher Education: Managing the Relationships with the Students", Proceedings of the International Conference on Knowledge Discovery and Information Retrieval, Madeira, Portugal, 6-8 October, pp. 297- 302, 2009 (ISBN 978-989-674-011-5).
8. Santos, Maribel Yasmina, and Adriano Moreira, "Conceptual Neighborhood Graphs for Topological Spatial Relations", Proceedings of the 2009 International Conference of Computational Intelligence and Intelligent Systems, World Congress on Engineering, Lecture Notes on Engineering and Computer Science, Volume I, London, UK, 1-3 July, pp. 12-18, 2009 (ISBN 978-988-17012-5-1). Best Paper Award.
9. Pinto, F., Santos, M.F., Alzira M., Ontology based Data Mining – A contribution to Business Intelligence, 10th WSEAS International Conference on Mathematics and Computers in Business and Economics (MCBE '09), Czech Republic, March 23-25, 2009.
10. Santos, M.F., Mathew, W., Kovaks, T., Santos, H., Supervised Learning Classifier Systems for Grid Data Mining. Proceedings of the 1st International Conference on Computational and Information Science, USA, April 30-May 2, 2009.
11. Gago, P., Pinto, F.M., Santos, M. F., INTCare: On-line Knowledge Discovery in the Intensive Care Unit, Proceedings da IEEE 13th International Conference on Intelligent Engineering Systems 2009, Barbados, April 16-18, 2009.
12. Pinto, F.M., Gago, P. Santos, M. F., Marketing Database Knowledge Extraction – Towards a Domain Ontology, Proceedings da IEEE 13th International Conference on Intelligent Engineering Systems 2009, Barbados, April 16-18, 2009.
13. Rios, Maria J.; Tenreiro de Magalhães, Sérgio; Santos, Leonel and Jahankhani, Hamid. 2009. "The Georgia's cyberwar", pp.35-42, 5th International Conference on Global Security, Safety & Sustainability, Jahankhani, H., Hessani, A., Feng, H. (eds.), Communications in Computer and Information Science, Springer-Verlag, London, ISBN-13: 978-3-642-04061-0
14. Sousa, Cristina; Pereira, Pedro T.; Tenreiro de M. S.; Santos, Leonel; Santos, Henrique. 2009. "RFID: Big Brother Global", In Proceedings of the 8th

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European Conference on Information Warfare and Security, Lisboa.

15. Tomé, P., Costa, E., and Amaral, L. "The Re-use of Experience Through the Use of CBR in Information Systems Modelling," ICAART - International Conference on Agents and Artificial Intelligence, Porto, Portugal, 2009.
16. Sofia Azevedo, Ricardo J. Machado, Dirk Muthig, Hugo Ribeiro. Refinement of Software Product Line Architectures through Recursive Modeling Techniques. Robert Meersman, Pilar Herrero, Tharam Dillon (Eds.), *On the Move to Meaningful Internet Systems: OTM 2009 Workshops*, pp. 411-422, LNCS Series vol. 5872, Springer-Verlag, Germany, November, 2009, [ISBN-978-3-642-05289-7].
17. André Ferreira, Ricardo J. Machado. Software Process Improvement in Multimodel Environments. *Proceedings of the 4th International Conference on Software Engineering Advances - ICSEA 2009, Session of SEDES'2009 Workshop, September, 2009*, pp. 512-517, IEEE Computer Society Press [ISBN-978-0-7695-3777-15].
18. Paula Monteiro, Ricardo J. Machado, Rick Kazman. Inception of Software Validation and Verification Practices within CMMI Level 2. *Proceedings of the 4th International Conference on Software Engineering Advances - ICSEA 2009, Session of SEDES'2009 Workshop, September, 2009*, pp. 536-541, IEEE Computer Society Press [ISBN-978-0-7695-3777-15].
19. Nuno Ferreira, Ricardo J. Machado, Dragan Gasevic. An Ontological Approach to Model-Driven Software Product Line Development. *Proceedings of the 4th International Conference on Software Engineering Advances - ICSEA 2009, Session of SEDES'2009 Workshop, September, 2009*, pp. 559-564, IEEE Computer Society Press [ISBN-978-0-7695-3777-15].
20. Martinho, Ricardo; Varajão, João; Domingos, Dulce (2009) - FlexSPMF: A Framework for Modelling and Learning Flexibility in Software Processes. In *Lecture Notes in Artificial Intelligence (WSKS)*. Greece: Springer.
21. Alves, P., Pires, J., Amaral, L., The Role of Learning Styles in Intelligent tutoring systems, *Proceedings of the First International Conference on Computer Supported Education*, pag. 315-320 vol I, ISBN: 978-989-8111-82-1, 2009, Lisboa (DBLP e SCOPUS).

Other publications National

1. A. Machado, P. Cortez e P. Sousa. Filtragem Colaborativa de Correio electrónico Não Solicitado. *Actas da 9ª Conferência sobre Redes de Computadores (CRC)*, Lisboa, Portugal, Outubro, 2009.
2. Santos, H., Podcasts e vodcasts: prós e contras, in *Actas do Encontro sobre Podcasts, CIEd, Braga, Portugal, 8 e 9 Julho, 2009*. ISBN: 978-972-8746-69-8.
3. Castro, José; Pires, Joaquim; Rijo, Rui; Varajão, João (2009) – Póster PAIS - Prosthesis Auto-Identification System. In *e-saúde 2009 – Encontro das tecnologias de informação na saúde.1º*. Lisboa, 2009.
4. Catarino, Márcia; Gonçalves, Dulce; Pereira, António; Varajão, João (2009) - Gestão de projectos de desenvolvimento de software – actividades determinantes no âmbito da gestão da qualidade. In *CAPSI – Conferência da Associação Portuguesa de Sistemas de Informação. 9ª*. Viseu, 2009.
5. Fernandes, Vítor; Varajão, João (2009) – Póster NutriME - Pervasive Monitoring & Advising System. In *e-saúde 2009 – Encontro das tecnologias de informação na saúde.1º*. Lisboa, 2009.
6. Pereira, Leandro; Varajão, João; Pinto, Tiago; Bentes, Isabel – Introdução à Teoria da Vulnerabilidade das Redes Hidráulicas de Abastecimento de Água (TVRHAA). In *ENEG2009 - Sustentabilidade na Gestão do Ciclo Urbano da água, Encontro Nacional de Entidades Gestoras de Água e Saneamento*. Lisboa, 2009. Associação Portuguesa de Distribuição e Drenagem de Águas.
7. Teles, Inês; Varajão, João; Tomé, Paulo (2009) – Referenciais de Arquitecturas de Sistemas de Informação. In *CAPSI – Conferência da Associação Portuguesa de Sistemas de Informação. 9ª*. Viseu, 2009.
8. Pinto, Liliana; Dominguez, Caroline; Cunha, António; Varajão, João (2009) - A certificação das empresas de construção civil no distrito de Braga – Principais motivações e dificuldades de implementação do SGQ ISO 9001. In *Engenharia'2009 - Inovação e Desenvolvimento*. Covilhã, 2009.
9. Pilar, Fernando; Paiva, Anabela; Dominguez, Caroline; Varajão, João (2009) - Principais causas de atrasos do plano de trabalho de uma obra de construção civil. In *Engenharia'2009 - Inovação e Desenvolvimento*. Covilhã, 2009.
10. A. Cruz e P. Cortez. Data Mining via Redes Neurais Artificiais e Máquinas de Vectores de Suporte. *Tékhné - Revista de Estudos Politécnicos*, ISSN 1654-9911, Dezembro 2009.
11. Martins, L., Santos, H., Nunes, P., Subsídios Para uma Eficaz Segurança da Informação nas Organizações, *Proelium (revista da Academia Militar)*, VI série, nº11, pp 131-154, ISSN: 1645-8826, Junho 2009.
12. Carvalho, J. A., Mesquita, A., (2009). e-CdP – Comunidade de Prática no Espaço Digital. Lisboa: APDSI.
13. Varajão, J.; Cardoso, J.; Gonçalves, D.; Cruz, J. (2009) – Gestão de aquisições na gestão de projectos, *Semana Informática*. 915, 10.
14. Varajão, J.; Cardoso, J.; Gonçalves, D.; Cruz, J. (2009) – Gestão do risco na gestão de projectos. *Semana Informática*. 916, 8.
15. Varajão, J.; Cardoso, J.; Gonçalves, D.; Cruz, J. (2009) – Encerramento do projecto na gestão de projectos. *Semana Informática*. 917, 7.
16. Varajão, J.; Cardoso, J.; Gonçalves, D.; Cruz, J. (2009) – Ranking de actividades na gestão de projectos. *Semana Informática*. 918, 11.
17. Varajão, J.; Cardoso, J.; Gonçalves, D.; Cruz, J. (2009) – Sucesso de um projecto na gestão de projectos. *Semana Informática*. 919, 10.

Master and Ph.D. thesis completed

PhD completed:

- M. Ferreira, Arquivos Históricos Digitais →
- E. Catarino, A Integração das Folksonomias nos Metadados
- D. Duque, Previsão e Identificação de Eventos de Quebra de Segurança em Vídeo-Vigilância
- P. Magalhães, Estudo de viabilidade de implementação de tecnologias biométricas comportamentais
- F. Pinto, Database Marketing Intelligence methodology
- J. Mamede, Um Metodologia para a Implementação de Comércio e Negócio Electrónico
- H. Campos, Código GOTOPS – Código de Governação Tecnocética
- P. Almeida, Uma metodologia para a integração das tecnologias de informação nas instituições de Ensino Superior
- R. Caldas, Unidades Culturais em Cidades Inteligentes

Group Productivity

A. Pereira, A medição da Competitive Intelligence

MSc completed:

S. Mendonça, Diplomacia Na Era Da Informação E Gestão Do Conhecimento

S. Videira, Prototipagem de um ambiente colaborativo em SharePoint

B. Rodrigues, Análise de Redes Sociais

V. Lopes, Social Tagging no DSpace

N. Gonçalves, Sistema de Social Bookmarking com Anotações Simples

E. Cardoso, Estudos sobre Repositórios Institucionais e Repositórios de Recursos Educativos

Â. Miranda, Estudos de Base para um Protocolo de Métricas de Uso para Repositórios Digitais

D. Gonçalves, Implementação de um Sistema de Business Intelligence

P. Freitas, Sistemas Espaciais de Suporte à Decisão - Apoio às Actividades de Negócio

L. Magaia, O papel dos sistemas de suporte à decisão na análise da qualidade da água

J. Costa, Padrões de comunicação em diferentes comunidades científicas

J. Pereira, Simulação de Processos em Projectos de Reengenharia Organizacional.

A. Pedro, Os museus e a Web 2.0

S. Tavares, Avaliação da Maturidade da Adopção e Difusão das TSI

A. Castro, Situação das tecnologias na Gestão da educação

F. Oliveira. Aspectos-chave no Domínio da Gestão da Segurança de Sistemas de Informação

J. Neves, Tomada de Decisão sobre Estratégias de Recuperação de Desastre em Tecnologias e Sistemas de Informação

A. Queiroga, Avaliação do Potencial Sucesso de Implementação de um Sistema ERP

J. Carvalho, Arquitectura de Sistemas de Informação para a Indústria de Serrações de Madeiras

T. Carvalho, Framework para Integração de Sistemas com ERP Microsoft Dynamics

V. Marques, Arquitectura de Processos para Sistemas de Informação no Sector Hoteleiro

F. Lima, Estudo da mortalidade associada às prioridades atribuídas pelo sistema de triagem de Manchester

M. Oliveira, Desenvolvimento da prática de avaliação com recurso a ferramentas de webassessment

V. Santos, O Jogo e a Alternância de Papéis Formando/Formador em e-learning

J. Pinto, Um Novo Modelo de Implementação de Serviços Partilhados

J. Teixeira, Previsão da qualidade de vinho verde via técnicas de data mining

A. Machado, Filtragem Colaborativa de Correio Electrónico não Solicitado

A. Correia, Análise de Correio Electrónico Não Solicitado (spam) Via Técnicas de Data Mining

J. Bigas, Intelligent Personalization of the Student Supervising In eLearning Environments

G. Pontes, CRM supported by Data Mining

Patents/propotypes

Patents:

SISTEMA DE APOIO À DECISÃO INTELIGENTE PARA MEDICINA INTENSIVA, INPI – Instituto Nacional de Propriedade Industrial Processo Nº 20091000016740, Código 0198 (Pending).

Organization of conferences

CENTERIS 2009 – Conference on ENTERprise Information Systems. João Varajão (Organization Chair). 7 a 9 de Outubro de 2009, Ofir, Portugal.

Knowledge Discovery and Business Intelligence (KDBI) thematic track, 14th Portuguese Conference on Artificial Intelligence (EPIA), Outubro, Aveiro, Portugal.

IFIP WG 8.2 working conference on the IS role in leveraging the intelligence and creativity of SME's, 21-24 June, Guimarães, Portugal.

ECIW 2009: The 8th European Conference on Information Warfare and Security, 6-7 July, Lisboa, Portugal.

3rd edition of the IEEE Global Programming Competition - IEEEExtreme 2009 (within the IEEE Student Activities Committee and the IEEE Computer Society).

4th International Conference on Software Engineering Advances - ICSEA 2009, September, Porto, Portugal.

6th International Workshop on Model Based Methodologies for Pervasive and Embedded Software - MOMPES'09 (within the 31st International Conference on Software Engineering - ICSE 2009), May, Canada.

BPM Lisbon 2009, April, Lisbon, Portugal.

9ª Conferência da Associação Portuguesa de Sistemas de Informação, 2009, Viseu, Portugal.

Dublin Core Metadata Initiative Social Tagging Workshop. Workshop at Elpub2009: 13th International Conference on Electronic Publishing : Rethinking Electronic Publishing : Innovation in Communication Paradigms and Technologies, Milan, Italy. URL: <http://dublincore.org/taggingwiki/2009DCSTworkshop>.

Industry contract research

Group Productivity

Avaliação CMMi ML3, PT-Inovação, Dec/2008-Out/2009, 100.310 EUR.

Prototipagem do Módulo de Gestão de Projectos da Primavera Business Software Solutions, Primavera Business Software Solutions, Nov/2008-Out/2009, 170.000 EUR.

Link@ME – Gestão de Conhecimento na Mota-Engil, May/2009-May/2010, 21 654 €.

AgillIeI2S: Incorporação do paradigma BPM nos processos de desenvolvimento de software, I2S, 97.500EUR, Set/2009-Ago/2010.

Internationalization

RG's internationalization evidences include collaborative publications and participation in international consortia that carry out R&D projects. The results in these 2 aspects are reasonable (cf. project and publications lists).

Some effort has been put in order to participate in networks associated to graduate education and training. The RG is involved in the national collaboration program between Portugal and the Carnegie Mellon University (software engineering stream). Other contacts have been established aiming to create (or to adhere to) international graduate programs in the areas of information systems, software engineering and management, and information services. Two ERASMUS MUNDUS students were recently integrated in the group.

Recognizing that internationalization relies on the strength of individual networking, some initiatives have been set up aiming at stimulating networking, e.g.: invite foreign researchers for visits to UMinho for teaching in the graduate programs and to collaborate with researchers; encourage RG members to participate in committees either related to the organization of events or related to international bodies (KISS group includes the National Representatives to IFIP TC8 and TC10); encourage researchers to use their sabbatical leaves to visit other institutions.

In terms of internationalization, the group also includes:

- a membership of IEEE-CS EAB (Educational Activities Board), the IEEE-CS Board responsible for the development, implementation and evaluation of all educational activities in the computer fields at all levels (since 2007);
- the chair of the Steering Committee of the international workshop series MOMPES (International Workshops on Model-Driven Methodologies for Pervasive and Embedded Software); co-sponsored by IFIP WG10.2; proceedings published by IEEE Computer Society Press;
- a representative in the Dublin Core Metadata Initiative Advisory Board.

Government/Organization contract research

Monitoring of the Information System Project of the Citizen Card, Agency for Administrative Modernization, started in Jan/2008 (€15.000). Members of the group are responsible for the certification of the project concerning information security and development process.

FCT Relatório Científico 2009 Print: 27-03-2011 23:23:27 [CENTRO ALGORITMI]

Group Description

Title of Research Group:	(RG-Norte-319-2184) Ubiquitous and Pervasive Computing, Graphics, and Software Methodologies
Principal Investigator:	Adriano Jorge Cardoso Moreira
Main Scientific Domain:	Engenharia Electrotécnica e Informática
Group Host Institution:	Universidade do Minho

Funding, source, dates

Funding, source, dates

During 2009, the group has been actively involved in the execution of a number of on-going funded research projects, more specifically:

- WESP-Web Security and Privacy: Weaving Together Technology Innovation with Human and Policy Considerations. Carnegie Mellon | PORTUGAL (CMU-PT/SE/0028/2008)
- WALC-Laboratório Assistido pela Web para o Ensino de Engenharia de Controlo. FCT (ref. PTDC/ESC/68069/2006)
- PostCaVET- Post-graduate Systems Development in Cape Verde and East-Timor. Edulink Program (9 ACP RPR 12#20)
- VirtualActor -Development of a software framework for animating 3D virtual characters, employing partially autonomous virtual actors. FCT (PTDC/EIA/69236/2006)
- BIOMOTION-Perception of biological motion – integrating psychophysics, neurophysiology and computational modelling. FCT (PTDC/SAU-BEB/68455 /2006)
- Wireless Network Technologies in Communication and Distance Learning Tecnologías de Redes Inalámbricas para Comunicación y Formación (TRIComFor)", CYTED 508RT0355 (2008/2011).

Objectives & Achievements

Objectives

The objectives of the group for the period 2007-2010 have been defined as follows:

- To produce world-class research results and become an international reference in the areas addressed by our research programs, more specifically urban computing, situated displays, systems software for ambient intelligence, interaction design and digital arts.
- To consolidate the role of multi-disciplinary research as a key driver for our own work, and especially for the structuring of our collaboration networks.
- To collaborate with other players in academia, industry and society to create sustainable, long-term deployments and infrastructures from which new communities of practice and open innovation may emerge, possibly within the framework of living labs.
- To extend our international links by integrating long-term international research initiatives, participating in training networks, and collaborating in the organization of events.
- To consolidate and internationalize our advanced training activities, both at MSc and PhD level, in order to sustain our own need for high-quality researchers and contribute towards the availability of professionals with competences in this area.

Further information about the activities of this group and research programs is available at: <http://ubicomp.algoritmi.uminho.pt> and <http://www.engagelab.org>

Main Achievements

Considering the above objectives, the main achievements are related with the consolidation of the group and its base activity. More specifically:

- The group has defined and consolidated its research programs that set the long-term research strategy of the group
- The group began a program of weekly seminars which has become an important element for fostering the identity of the group, promoting joint work, and promoting interactions between all its members, with particular emphasis on PhD students.
- The group has improved its internationalisation record (see below).
- The group has improved its publications record, including publications in high quality Conferences and Journals.
- The group started regular research collaboration with a few international research institutions (see internationalization).
- Members of this group have also been very active in promoting education and advanced training courses within their scientific areas of research, namely the MScs in Informatics, Computer Networks and Services, Technology and Digital Arts, the Integrated MSc in Communications Engineering, courses in Ubiquitous Systems, and the PhD Programmes in Telecommunications and Computer Science.

Group Productivity

Publications in peer review Journals

- Maribel Yasmina Santos and Adriano, Moreira, "Topological Relationships between a Circular Spatially Extended Point and a Line: Spatial Relations and their Conceptual Neighborhoods", IAENG International Journal of Computer Science, 36(4), December, 2009, pp. 301-312, ISSN 1819-9224 (online version) 1819-656X (print version)
- Nuno Otero, Rui José (2009). Worth and Human Values at the Centre of Designing Situated Digital Public Displays. International Journal of Advanced Pervasive and Ubiquitous Computing. Vol. 1, Issue 4.

Group Productivity**Other publications International**

Edition of Proceedings:

- Editor: Ido Iurgel, Nelson Zagalo, Paolo Petta: Interactive Storytelling, Second Joint International Conference on Interactive Digital Storytelling, ICIDS 2009, Guimarães, Portugal, December 9-11, 2009. Proceedings Springer 2009
- Ulrike Spierling, Ido Iurgel, Urs Richle, Nicolas Szilas: Workshop on Authoring Methods and Conception in Interactive Storytelling. ICIDS 2009: 356-357

Conference Papers and Book Chapters

- Aris Alissandrakis, Nuno Otero and Joe Saunders. "Helping Robots Imitate: Metrics and Technological Solutions Inspired by Human Behaviour". 18th IEEE International Symposium on Robot and Human Interactive Communication, Sep. 27 – Oct. 2, 2009, Toyama International Conference Center, Japan.
- Nuno Otero, Marcelo Milrad, António José Santos, Manuela Veríssimo, Nuno Torres. "Affective and Emotional Effects on External Representations in Seamless Learning". In Proceedings of 17th International Conference on Computers in Education, ICCE 2009.
- Nuno Vasco Lopes, Maria João Nicolau, Alexandre Santos, "QoS-Aware Architecture for FHMIP Micromobility", Proceedings da International Conference on Ultra Modern Telecommunications (ICUMT 2009), St. Petersburg, Russia, 12-14 de Outubro de 2009, ISBN: 978-1-4244-3941-6; IEEE Catalog Number: CFP0963G-CD, texto completo com revisão
- Nuno Vasco Lopes, Maria João Nicolau, Alexandre Santos, "Evaluating Rate-Estimation for a Mobility and QoS-Aware Network Architecture", Proceedings da 17th International Conference on Software, Telecommunications and Computer Networks (SoftCOM 2009), Hvar, Croatia,
- Ido Iurgel, Rogério E. da Silva, Pedro R. Ribeiro, Abel B. Soares, Manuel Filipe dos Santos: CREAATOR - An Authoring Framework for Virtual Actors. IVA 2009: 562-563
- Rogério E. da Silva, Ido Aharon Iurgel, Manuel Filipe Santos. Towards Virtual Actors - The Next Step for the Entertainment Industry. Proceedings SBGames 2009. VIII Brazilian Symposium on Games and Digital Entertainment Rio de Janeiro, RJ – Brazil, October, 8th-10th 2009: p. 105-108
- Filipe Meneses, Adriano Moreira, Chapter XIII, "Technology Enablers for Context-Aware Healthcare Applications", in Phillip Olla and Joseph Tan (editors), Mobile Health Solutions for Biomedical Applications, pp. 260-269, IGI Global, ISBN 978-1-60566-332-6, April 2009
- Santos, Maribel Yasmina, and Adriano Moreira, "How a Circular Spatially Extended Point is Topological Related with a Line?", Proceedings of the 2009 International Conference of Computational Intelligence and Intelligent Systems, World Congress on Engineering, Lecture Notes on Engineering and Computer Science, Volume I, London, UK, 1-3 July, pp. 25-30, 2009 (ISBN 978-988-17012-5-1)
- Santos, Maribel Yasmina, and Adriano Moreira, "Conceptual Neighborhood Graphs for Topological Spatial Relations", Proceedings of the 2009 International Conference of Computational Intelligence and Intelligent Systems, World Congress on Engineering, Lecture Notes on Engineering and Computer Science, Volume I, London, UK, 1-3 July, pp. 12-18, 2009 (ISBN 978-988-17012-5-1)
- Filipe Meneses, Adriano Moreira, "Building a Personal Symbolic Space Model from GSM CellID Positioning Data", Proceedings of The Second International ICST Conference on Mobile Wireless Middleware, Operating Systems, and Applications (Mobilware 2009), Berlin, Germany, 28-29 April, 2009, published as Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, Springer, pp. 309-324 (ISBN 978-3-642-01801-5 (Print) 978-3-642-01802-2 (Online)), (ISSN 1867-8211 (Print) 1867-822X (Online))
- Arlindo Santos and Helena Rodrigues, An Application Framework for a Situation-Aware System Support for Smart Spaces. In R. Meersman, P. Herrero, and T. Dillon, editors, On the Move to Meaningful Internet Systems: OTM 2009 Workshops, volume 5872 of Lecture Notes in Computer Science, pages 810–81, Springer, 2009.
- Adérito Marcos, Pedro Branco and Nelson Zagalo, "The Creation Process in Digital Art", (Book Chapter), in Borko Furht (Ed.), Handbook of Digital Media in Entertainment and Arts, Springer (978-0-387-89023-4), Chapter XXVII, pp.601-615 (doi.10.1007/978-0-387-89024-1-27)
- Adérito Marcos, Pedro Branco and João Carvalho, "The computer medium in digital art's creative process", (Book Chapter), in James Braman & Giovanni Vincenti (Eds.), Handbook of Research on Computational Arts and Creative Informatics: IGI Publishing (978-1-60566-352-4), Chapter I, pp.1-25.
- Sylla, C., Branco, P., Coutinho, C., Coquet, M. E., 2009. Storytelling through drawings: evaluating tangible interfaces for children. in Proceedings of CHI 2009 Extended Abstracts, Boston, MA, USA April 4-9 2009, 3461-3466.
- F. Reinaldo Ribeiro and Rui José. "Timeliness for Dynamic Source Selection in Situated Displays". Proc. of the 5th International Conference on Web Information Systems and Technologies (WEBIST). Lisboa, Portugal. 23-26 March 2009
- Rui José and Nuno Otero. "From Bluetooth naming to crowd interaction". In adjunct proceedings of the conference on Human factors in computing systems (CHI 2009), workshop on Crowd Computer Interaction, Boston, MA, USA, April 4 2009.
- Fernando Reinaldo Ribeiro and Rui José. "Place-aware content selection from dynamic web sources for public displays". The 5th International Conference on Signal Image Technology and Internet Based Systems (SITIS'09). Marrakech, Morocco, November 29 - December 3, 2009. IEEE Computer Society
- Jorge Cardoso and Rui José. "A framework for context-aware adaptation in public displays". On the Move to Meaningful Internet Systems: OTM 2009. Lecture Notes in Computer Science. Volume 5872/2009. Springer Berlin / Heidelberg. ISBN 978-3-642-05289-7. DOI 10.1007/978-3-642-05290-3_16. October 2009
- Nuno Otero, Alberto Rego and Rui José. Considering the Inclusion of Worth and Values in the Design of Interactive Artifacts. First International Conference on Integration of Design, Engineering and Management for innovation IDEMI09. Porto, Portugal. ISBN 978-972-752-117-3. 14-15 September 2009

Other publications National

- Urbano C., Magalhães L., Moura P., Bessa M., Marcos A., "Desenvolvimento de um operador de tone mapping para dispositivos com ecrã pequeno", In Actas de 17º Encontro Português de Computação Gráfica, Covilhã, 29-30 Out. 2009. ISBN: 972-98464-3-4. (pp.277-285).
- Martinho J., Sousa J., Branco P., Marcos A., "Global Terrorism Database Vizualization: um projecto de arte digital suportado por visualização de informação", In Actas de 17º Encontro Português de Computação Gráfica, Covilhã, 29-30 Out. 2009. ISBN: 972-98464-3-4. (pp.297-302).
- Silva F., Rodrigues N., Marcos A., João Ferreira M., "Sistema flexível de realidade aumentada de baixo custo com base em projecção estereoscópica", In Actas de 17º Encontro Português de Computação Gráfica, Covilhã, 29-30 Out. 2009. ISBN: 972-98464-3-4. (pp.19-28).
- Serna S., Silva, J., Stork A., Marcos A., "Effective Algorithm for Bulding and Solving Linear Systems", In Actas de 17º Encontro Português de

Group Productivity

Computação Gráfica, Covilhã, 29-30 Out. 2009. ISBN: 972-98464-3-4. (pp.143-148).

- Hugo Seixas, Nuno Salgado and Rui José. Wiinteraction: A study on smart spaces interaction using a wiimote. Inforum 2009. Lisboa, Portugal. 10-11 September 2009

Master and Ph.D. thesis completed

During 2009 there were no PhD thesis being completed.

Master thesis:

- Cadeia de Valor de Porter no Ensino Superior Gestão da Informação nos Mestrados de Sistemas de Informação da U.M.. André Feio. MEGSI
- Sistema de Monitorização Remota de Pacientes. Duarte César Rodrigues Pereira. MEGSI
- Interação Móvel em Sistemas de Domótica. Fernando Ricardo Mendes Ferreira. MEGSI
- Sistemas de localização em tempo real. Martinho Manuel Pinheiro Novais. MIECOM
- Benchmarking nas Telecomunicações – Serviço de Internet Móvel. Sérgio Daniel Carmo Fernandes. MIECOM
- Bluetooth Naming for Situated Interaction in Ubiquitous Environments. Francisco Cruz Bernardo. MI/MEI
- TUIs vs. GUIs: Comparing the Learning Benefits for Kindergarten Children. Cristina Sylla. MTAD
- Creation of a performance tool for a sonorous reconstruction of speech: The last words of Domenico. Vítor Lago Silva. MTAD

Organization of conferences

- The group will host and organize the AGILE 2010 conference in Guimarães. The AGILE conferences usually attract 175-200 participants from all over the world.
- "INForum 2009 - Simpósio de Informática (Computação Móvel e Ubíqua), 10-11 Setembro de 2009, Lisboa, Portugal. - Rui José(PC Member)"
- "INForum 2009 - Simpósio de Informática (Computação Móvel e Ubíqua), 10-11 Setembro de 2009, Lisboa, Portugal - Adriano Moreira(PC Member)"
- "IWAAL - International Workshop of Ambient Assisted Living. University of Salamanca, Spain. 10-12th June, 2009 - Rui José (PC Member)"
- "CISTI'2009 (4ª Conferência Ibérica de Sistemas e Tecnologias de Informação), 17-20 de Junho de 2009, Póvoa de Varzim. - Rui José (PC Member)"
- 5th International Workshop on Context-Aware Mobiles Systems (CAMS 2009), OTM Conferences and Workshops, Vilamoura, Portugal, November 2009 - Helena Rodrigues (PC Member)
- 5th International Workshop on Context-Aware Mobiles Systems (CAMS 2009), OTM Conferences and Workshops, Vilamoura, Portugal, November 2009 – Jason Pascoe (PC Member)
- Guimaramus 2009 - 3º Simpósio "Música e Músicos em Guimarães", Guimarães, em 17-18 Abril de 2009. - Adérito Marcos (Organizing Committee)
- GRAPP 2009 – 3rd International Conference on Computer Graphics Theory and Applications", Funchal, Madeira, 22-25 Janeiro 2009. - Adérito Marcos (PC Member)
- ICIDS - 2nd International Conference on Interactive Storytelling - Pedro Branco(Local Chair)
- 17º Encontro Português de Computação Gráfica, Covilhã 29-30 Outubro 2009 - Adérito Marcos(PC Member)
- e-Learning Baltics (eLBa) 2009 - eLBa Science - International Scientific e-Learning Conference, Rostock (Germany), June 18-19, 2009. - Adérito Marcos(PC Member)
- SIACG 2009 – Fourth Ibero-American Symposium on Computer Graphics", Isla Margerita, Venezuela, Junho 2009. - Adérito Marcos(PC Member)
- "9ª Conferência sobre Redes de Computadores (CRC 2009), Instituto Superior Técnico, Taguspark, Oeiras, Portugal, 15-16 de Outubro de 2009 - Maria João Nicolau(PC Member)"

Industry contract research

- Projecto Pagamentos Móveis 2.0, funded by Centro de Excelência em Desmaterialização de Transacções (CEDT);
- Sketch-Development of a sketch-based instructional laboratory for Digital Arts and Computer Graphics. Funding: HP Technology for Teaching Grant Initiative (ref. ID: 11446121), 36 months: UMinho Budget 118799€
- TeleportWall. Funding: Vale I&DT.
- Plataforma de Exibição e Interação com conteúdos Multimédia. Funding: Vale I&DT - Projecto Capital (ref. 2009/4665), 12 months
- Contacto Semi-automático em Ambiente Móvel. Funding: QREN (ref. 2009/6533), 12 months: UMinho Budget
- Datacar2010. Funding: QREN (ref. 2009/1480), 12 months: UMinho Budget 33000€
- RTLS. Funding: Private Company, 8 months

Internationalization

- Adérito Marcos member of the Executive Board of the Eurographics Association. Since Oct. 2008.
- Adérito Marcos, President of International Steering Committee Artech, international academic board responsible for organization of the Artech conference series. Since Oct. 2007.
- Adérito Marcos, scientific advisor of the European Commission (7 Framework; EPOCH NoE (FP6-IST-507382 – EPOCH); CASPAR IP (IST-2006-033572). Since Oct. 2005.
- Jason Pascoe, Seminar at Context-aware group, Freie Universität, Berlin, June 2009.
- The group has been involved in several collaboration activities with recognised international research groups which offer the group opportunities for intensify international. Those include cooperation with international groups such as:
- The Future Interaction Technology (FIT) laboratory at University of Swansea, UK, and Department of Computer Science, University of Waikato, New

Group Productivity

Zealand in the area of Context-aware systems and Context-aware Applications, with George Buchanan and Annika Hinze.

- Sheffield-Hallam University, UK, with Ann Light and CNRS - France Telecom, France with Beatrice Cahour in the area of User Experience Methodologies.
- The Pervasive Interaction Lab, Computing Department, Open University, UK with Professor Yvonne Rogers in the area of Human-Computer Interaction in a World Embedded with Ubiquitous Computer Technologies – Research network submitted to ESF.
- The Laboratorio de Tecnologías de la Información Geográfica at the Universidad Politécnica de Madrid, Spain and University of Wageningen, Netherlands in the area of Urban Computing and Exploratory Data Analysis (Spatial data analysis).
- The Institute of Media Design of the University of Arts Linz (Kunstuniversität Linz), Austria in the field of Digital and Interactive arts in order to design a joint doctoral program in this field.
- The Erasmus Mundus programme has been explored as a mechanism for international networking. In 2009 the following course has been taught:
 - System Support for Smart Spaces, 5 hours course, lectured at MoreLab - Mobility Research Lab at University of Deusto, in the context of the LLP/Erasmus Program by Helena Rodrigues
 - Media Lab Helsinki University of Art and Design Helsinki, Pedro Branco

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Group Description

Title of Research Group:	(RG-Norte-319-2959) Industrial electronics
Principal Investigator:	Carlos Alberto Caridade Monteiro e Couto
Main Scientific Domain:	Engenharia Electrotécnica e Informática
Group Host Institution:	Universidade do Minho

Funding, source, dates**Funding, source, dates**

1. 30.000€, Pinto Brasil SA, 01/12/2009-9 months
2. 442.300€, QREN -ID em Co-promoção - 1Q 2007 - 1583, 01/11/2009- 3 years
3. 1.260.423€, FP7/Research for SME/22231, 01/06/2008-31/05/2010
4. 30.000€, EFACEC, 01/10/2008-31/03/2010
5. 35.000€, QREN Vale IDT 2009/4790, 01/07/2009-30/06/2010
6. 60000€ (UM), QREN, 01/05/2009-30/04/2011, Projecto ECORAIL
7. 6.000.000€, CE - IST-2-003747-IP, 01/12/2004-15/05/2009
8. 16.000€, Ciência Viva VI 2008-82/383, /12/2008- 09/2009
9. 33.000€, QREN Vale IDT, 27/09/2009-one year, Sensor de trânsito
10. 194.000€, FCT, 01/09/2009-30/08/2012, Sistema Pectus
11. 33.000€, QREN Vale IDT 2009/4704, 22/04/2009-21/04/2010
12. 161.470€, FCT - PTDC/EEA-EEL/104569/2008, 01/12/2009-30/11/2012
13. 33.000€, QREN Vale IDT, 27/11/2009-one year, Urban Probe Appliances
14. 84.528€, FCT - MIT-Pt/EDAM-SMS/0030/2009-2012

Objectives & Achievements**Objectives**

This group congregates a relatively large number of researchers organized in 3 areas: 1-Control, Automation and Robotics; 2-Energy and Power Electronics; 3-Embedded Systems. The idea is that the researchers of these areas work in cooperative sub-groups, and that these sub-groups increase in size and competitiveness, becoming autonomous groups in the future.

1. Development of socially intelligent robots, i) to build dynamic control architectures to endow autonomous robots with the capacity of reading motor intention for human-robot interaction tasks; ii) development of learning schemes for social robotics; iii) Robots that provide assistance to disabled people; iv) Robotics, Automation and Virtual Games for Special Education Needs; v) Control architectures for legged robots with many DOFs and for movement coordination/cooperation between different platforms; vi) Research on algorithms and technologies suitable for the localization of mobile platforms, ex. for factory automation and mobile robotics.
2. Development and construction of new laboratorial (also with remote access) and industrial prototypes in the following areas:
 - Mechatronics systems
 - Computer vision and image processing
 - Instrumentation, acquisition, automations and control
 - Multisensor fusion and integration using soft computing techniques
3. Research in Collective Intelligence in Organizations (Modelling and software)
4. R&D development on: Shunt Active Power Filters and UPQCs (Unified Power Quality Conditioners); Low-Cost Power Quality Monitoring Systems; Optimized Interfaces for Renewable Energy Systems with the Power Grid; Power Electronics applied to Electric and Hybrid Vehicles. Start a new R&D line in the area of "Energy Harvesting/Scavenging".
5. Advance studies in modeling, simulating, and designing concurrent, real-time, embedded systems; Recognition as a top level R&D area at an international level; Cooperation with a small group of locally based SMEs in order to establish long term partnerships.

Main Achievements

The main achievements of the Industrial Electronics Group were:

1. To develop R&D on autonomous and cognitive robotics, autonomous mobile robots, jointly-acting autonomous systems (robot-robot, human-robot) that communicate and work intelligently on mutual tasks (e.g. joint transportation of objects, robotic football, joint construction): i) to build control architectures for multi-robot motion coordination, ii) to build neuron-cognitive inspired architectures that endow the robots with socially intelligent behaviour, iii) to investigate how such systems can be synthesized using methods from the theory of non-linear dynamical systems.
2. To develop R&D solutions on Mechatronics Systems, Computer Vision and Image Processing including the development of a virtual and remote laboratory for improving the under and pos-graduate teaching/learning process and also the industrial cooperation (R&D FCT project).
3. R&D development on: Shunt Active Power Filters and UPQCs (Unified Power Quality Conditioners); Low-Cost Power Quality Monitoring Systems; Optimized Interfaces for Renewable Energy Systems with the Power Grid; Power Electronics applied to Electric and Hybrid Vehicles.
4. To study, modelling, simulating, and designing concurrent, real-time, embedded systems. A major problem addressed was the design of a language

Objectives & Achievements

capable to describe development tools, such as, full systems simulators, debuggers and compilers. Other accomplishments were the development of a couple of industrial prototypes.

In quantitative terms our work can be expressed as:

- 6 papers in international journals
- 3 book/book chapters published;
- 42 papers in international conferences;
- 4 industrial prototypes;
- 1 scientific prize;
- 2 PhDs and 23 MScs already completed;
- 10 conferences/symposium organized;
- 8 industry research contract;
- participation in 2 european projects;
- 3 R&D projects with FCT;
- several collaborative research with national and international Universities/Entities;
- participation in 2 Networks of Excellence.

Group Productivity

Publications in peer review Journals

1. V. Carvalho, P. Cardoso, M. Belsley, R. Vasconcelos, Filomena Oliveira Soares, Yarn Irregularity Parameterization Using Optical Sensors, *Fibres & Textiles in Eastem Europe*. ISSN 1230-3666. 17:1 (Jan.-Mar. 2009) 26-32, (IP: 0.439, 5 years IP: 0.657).
2. V. Carvalho, M. Belsley, R. Vasconcelos, Filomena Oliveira Soares, Yarn Diameter and Linear Mass Correlation, in *Journal of Non-Destructive Evaluation*, Volume 28, Number 2 / June, 2009 (IP: 0.808, 5 year IP: 0.937)
3. V. Carvalho, M. Belsley, R. Vasconcelos, Filomena Oliveira Soares, Automatic Yarn Characterization System: Design of a Prototype, *IEEE Sensors Journal*, Vol. 9, N. 8, August 2009 (IP: 1.610, 5 year IP: 1.818).
4. António Marques Pinho e Jaime Francisco C. Fonseca, "Non-contact 3D acquisition system based on stereo vision and laser triangulation", *Machine Vision and Applications Journal*, doi: 10.1007/s00138-008-0166-7, ISSN 0932-8092, Maio 2009.
5. Carlos Manuel G. S. Lima, Adriano José C. Tavares e Jaime Ramos, "Detection of Small Bowel Tumors in Endoscopic Capsule Images by Modeling Non-Gaussianity of Texture Descriptors", *International Journal of Tomography and Statistics*, Summer 2010, Volume 14 (Special Volume), Number S1, pp. 41-55, Dezembro 2009.
6. Manuel João Ferreira, Cristina Manuela P. Santos e João Luís Marques Pereira Monteiro, "A Texture Segmentation Prototype for Industrial Inspection Applications Based on Fuzzy Grammar", *Sensor Review*, Volume: 29 Issue: 2, pp 163 - 1, Março 2009.

Other publications International

Books and books chapters:

1. Adriano Tavares et al. *Programação de Microcontroladores (MSC-51)*.
2. "Design and Development of a Fly-by-Wireless UAV Platform", *Aerial Vehicles*, Janeiro 2009.
3. Garrido, P., (2009). "Business Sustainability and Collective Intelligence". *The Learning Organization*, Vol. 16-3, pp. 208-222.

Conference proceedings (International conferences):

1. Peixoto P. Nuno, Cardoso G. Nuno, Cabral M.Jorge, Tavares J. Adriano, Mendes A. José, "A segmentation approach for object detection on highly dynamic aquatic environments", *The 35th Annual Conference of the IEEE Industrial Electronics Society-IEEE-IECON 2009*, November 3-5, 2009, Porto, Portugal
2. Domingos Gonçalves e João Luiz Afonso, "Comparison of Three Control Theories for Single-Phase Active Power Filters", *IECON 2009 - The 35th Annual Conference of the IEEE Industrial Electronics Society*, Porto, Portugal, 3-5 Novembro 2009.
3. João L. Vilaça, Jaime Francisco C. Fonseca e António Marques Pinho, "Automatic trajectory generation for the milling of sculpted surfaces acquired from laser scanning systems", *Proceedings of IECON 2009 The 35th Annual Conference of the IEEE Industrial Electronics Society*, Porto, Portugal, 3-5 Novembro de 2009.
4. Cristina Manuela P. Santos e Lino Costa, "Head Motion Stabilization During Quadruped Robot Locomotion: Combining Dynamical Systems and a Genetic Algorithm", *IEEE International Conference on Robotics and Automation (ICRA-2009)*, Kobe, Japan, 12 - 17 May, 2009.
5. Estela Guerreiro G. S. Bicho Erlhagen, Luis Louro, Nzoji Hipolito e Wolfram Erlhagen, "A dynamic field approach to goal inference and error monitoring for human-robot interaction", *International Symposium on New Frontiers in Human-Robot Interaction*, Edinburgh, Escócia, 8-9 Abril de 2009.
6. Filomena M. R. M. O. Soares, C.P.Leao, J.Machado, N.Carvalho e R.Silveira, "Platform WALC: design and development of a PLC network", *Virtual University 09*, Bratislava, Eslováquia, Dezembro 2009.
7. Sérgio Adriano Fernandes Lopes, Francisco Afonso, Adriano José C. Tavares e João Luís Marques Pereira Monteiro, "Framework Characteristics: A Starting Point for Addressing Reuse Difficulties", *International Conference on Software Engineering Advances (ICSEA09)*, Porto - Portugal, 20-25 Setembro 2009.
8. António Fernando Macedo Ribeiro, Agostinho Gil Teixeira Lopes, Tomé Silva, António Freitas e Luis Novais, "Mobility and agility with an improved sight", *RoboCup 2009*, Graz, Austria, 29 Junho a 5 Julho 2009.
9. Garrido, P. (2009). "Organizational Decision Support Systems", In M. Cunha and J. Varajão (Eds.) *Proceedings of CENTERIS 2009 – Conference on Enterprise Information Systems*, October 7-9, Ofir, Portugal, pp 563-571.
10. J. P. Carmo, P. M. Mendes, C. Couto, J. H. Correia, "A low-cost wireless sensor network for industrial applications", in *Proc. Wireless*

Group Productivity

Telecommunications Symposium 2009, Praga, Republica Checa, 22-24 Abril 2009, Session D-2, pp. 1-4.

Master and Ph.D. thesis completed

PhD thesis completed:

1. Francisco Carlos Afonso, Operating System Fault Tolerance Support for Real-Time Embedded Applications, Universidade do Minho, Doutoramento Electrónica Industrial, Junho 2009.
2. Fabian Chersi, "Learning through imitation: a biological approach to robotics", Doutoramento em Engenharia Electrónica Industrial, Escola de Engenharia da Universidade do Minho, Março 2009.

Master dissertations completed:

1. "Diagnóstico de retinopatia diabética recorrendo à classificação de imagens do fundo do olho", Carla Pereira, Julho de 2009.
2. "Aplicação de Comunicações Sem Fio em Ambiente Industrial e Doméstico", Patrício Teixeira, Novembro de 2009.
3. "Bancada de Testes para Sistema Micro-Eólico com Produção Optimizada de Energia Eléctrica", Luciana Moreira, Dezembro de 2009.
4. "Desenvolvimento de sensor de tráfego utilizando processamento de imagem", Filipe Alves, Novembro de 2009.
5. "Desenvolvimento de um Filtro Activo de Potência Paralelo Monofásico em Meia Ponte", Telmo Santos, Novembro de 2009.
6. "Desenvolvimento de um protótipo para o registo do movimento do corpo humano usando visão por computa", José Brito, Setembro de 2009.
7. "Desenvolvimento de um sistema de visão para a detecção e reconhecimento da etiqueta identificadora n", Carlos Silva, Setembro de 2009.
8. "Desenvolvimento de um Sistema Inteligente para Carregamento de Baterias", Vitor Monteiro, Dezembro de 2009.
9. "Desenvolvimento de uma Bengala Electronica", Antonio Costa, Novembro de 2009.
10. "Enhanced Control Algorithms for a gantry system based on autonomous linear axes", Sandrina Ribeiro, Novembro de 2009.
11. "Implementação e Teste de um Condicionador Activo Série Monofásico para Regulação de Tensão e Compens", Helder Carneiro, Novembro de 2009.
12. "Integração de Fontes de Energia Renováveis em Instalações Eléctricas para uso Doméstico", João Silva, Dezembro de 2009.
13. "Integração na Indústria automóvel de trabalhos de automação", Leonardo Pannuzo, Julho de 2009.
14. "Internet como Método Alternativo de Aprendizagem", Liliana Barbosa, Setembro de 2009.
15. "Inversor de Tensão Controlado por Corrente com Frequência de Comutação Fixa", Daniel Santos, Julho de 2009.
16. "Monitorização e controlo de sistema de refrigeração num estabelecimento comercial", Ricardo Freitas, Dezembro de 2009.
17. "Monitorização, gestão e controlo de uma rede de autómatos-caso de estudo", Julio Costa, Dezembro de 2009.
18. "Orientação de um quadrúpede: integração com a locomoção", Vítor Matos, Julho de 2009.
19. "Projecto e implementação de uma aplicação de pequena rede industrial para controlo de Etar", Tiago Gonçalves, Outubro de 2009.
20. "Sistema de geração de energia eléctrica aplicável a sistemas rotativos", Alcides Gonçalves, Julho de 2009.
21. "Trabalhos de Automação", Pedro Silva, Julho de 2009.
22. "Trabalhos de automação no âmbito de aparafusadoras", Gabriel Marques, Julho de 2009.
23. "Projecto de uma Instalação Solar Fotovoltaica de 1,5 MW", Isidro Vilaça, Outubro de 2009.

Patents/propotypes

Prototypes:

1. "Bidirectional Charging System for Electric Vehicles with sinusoidal current consumption", 2009
2. "MPPT system for microwind generator with test workbench", ...
3. "Laboratory prototype of a Single-Phase Shunt Active Power Filter in Half Bridge", 2009
4. "Laboratory prototype of a Single-phase UPQC – Unified Power Quality Conditioner", 2009

Organization of conferences

1. Estela Guerreiro G. S. Bicho Erlhagen, "New ways to learn science with enjoyment - Robotics as a challenge", Co-Chair for the track on Robotics & Mechatronics, IECON'09, Porto, Nov. 3-5 de 2009.
2. Carlos Couto, Chair, IECON2009, Porto, 3-5 Novembro de 2009.
3. Júlio S. Martins, Co-Chair para as finanças, IECON2009, Porto, 3-5 Novembro de 2009.
4. Sérgio Adriano Fernandes Lopes, "New ways to learn science with enjoyment - Robotics as a challenge", Co-Chair para a Logística, 4th International Conference on Software Engineering Advances (ICSEA 2009), Porto, Portugal, 20-25 Setembro 2009.
5. Sérgio Adriano Fernandes Lopes, "New ways to learn science with enjoyment - Robotics as a challenge", Comité de Programa da CENICS 2009, International Conference on Advances in Circuits, Electronics and Micro-electronics, Sliema, Malta, 11-16 Outubro 2009.
6. Sérgio Adriano Fernandes Lopes, "New ways to learn science with enjoyment - Robotics as a challenge", Comité de Programa da IBWAS 2009, Iberic Web Application Security Conference, Madrid, Espanha, 10-11 Dezembro 2009.
7. Sérgio Adriano Fernandes Lopes, "New ways to learn science with enjoyment - Robotics as a challenge", Comité de Programa da WCO&NTIHE 2009, WCO NTIHE 2009 - Workshop on Challenges, Opportunities and New Trends in Higher Education, CISTI 2009, Povoia de Varzim, Portugal, 17-20 Junho 2009.
8. Filomena M. R. M. O. Soares, "New ways to learn science with enjoyment - Robotics as a challenge", Organização do Simpósio Instrumentation and Engineering Measurement, IRF 2009, FEUP, Porto, Julho 2009.
9. António Fernando Macedo Ribeiro, "New ways to learn science with enjoyment - Robotics as a challenge", RoboCup 2009 - Middle Size League,

Group Productivity

RoboCup 2009, Graz, Austria, 29 Junho a 5 de Julho.

10. António Fernando Macedo Ribeiro, "New ways to learn science with enjoyment - Robotics as a challenge", RoboCup 2010 - Middle Size League, RoboCup 2010, Singapura, 19-25 Junho 2010.

Industry contract research

1. 30.000 €, Pinto Brasil SA, 01/12/2009-9 months, Consola Integrada Pinto Brasil - João Luís Marques Pereira Monteiro
2. 442.300€, QREN -ID em Co-promoção - 1Q Concurso 2007 – 1583, 01/11/2009- 3 years, GOLFmINHO - António Fernando Macedo Ribeiro
3. 30.000€, EFACEC, 01/10/2008-31/03/2010, Industrialização de Filtros Activos de Potência do Tipo Paralelo do Projecto SINUS pela EFACEC - João Luiz Afonso
4. 35.000€, Programa QREN Vale IDT-QREN Vale IDT 2009/4790, 01/07/2009-30/06/2010, Mordomus - Software de Gestão Domótica -José A. Mendes
5. 60000€ (UM), QREN, 01/05/2009-30/04/2011, Projecto ECORAIL (Energia Regenerativa em Comboios) - João Luiz Afonso
6. 33.000€, QREN Vale IDT, 27/09/2009-one year, Sensor de trânsito - Manuel João Ferreira
7. 33.000€, QREN (Quadro de Referência Estratégico Nacional) - Vale IDT 2009/4704, 22/04/2009-21/04/2010, TAVI - Tecnologia e Automação Valorizadas pela Inovação – TecMinho, João Sena Esteves
8. 33.000€, QREN Vale IDT, 27/11/2009-one year, Urban Probe Appliances - Cristina Santos

Internationalization

Collaborative research:

1. Donders Institute for Information, Cognition and Brain Sciences, Dept. of Cognitive Psychology, Radboud University, Nijmegen, Netherlands.
2. Power Electronics Group of the Federal University of Rio de Janeiro (UFRJ), Brazil
3. Department of Computer Science, Technical University of Munich, Germany.
4. Instituto di Fisiologia Umana, University of Parma, Italy.
5. Technical University of Bratislava, Slovak, in a Erasmus project, in the area of Virtual and Remote Laboratories.
6. Mechanical Eng Dept., Faculty of Engineering, University of Porto, in the area of Virtual and Remote Laboratories.
7. Collaboration Protocol with Escola Secundária Martins Sarmiento, Guimarães, in the area of Robotics.
8. Collaboration Protocol with Associação Amigos do Mar, Viana do Castelo, in the area of Robotics.
9. Collaboration Protocol with Associação de Pais e Amigos do Cidadão com Deficiência Mental de Gualtar, in the area of Robotics and Games for Special Education Needs.

Participation in Networks of Excellence:

1. EuCognition- European Network for the Advancement of Artificial Cognitive Systems"
2. EURON- European Network in Robotics.

Participation in Projects of International collaboration:

1. FP7/Research for SME/22231, 01/06/2008-31/05/2010, Hydract: Low-Energy Hydraulic Actuator for Valves in the Brewing, Dairy and Pharmaceutical Industries - José A. Mendes
2. Projecto Integrado Europeu JAST -Joint Action Science and Technology -Estela Guerreiro G. S. Bicho Erlhagan

Collaborative publications:

1. L. F. C. Monteiro, João L. Afonso, J. G. Pinto, E. H. Watanabe, M. Aredes, H. Akagi, "Compensation Algorithms based on the P-Q and CPC Theories for Switching Compensators in Micro-Grids", Revista Eletrônica de Potência – Associação Brasileira de Eletrônica de Potência – SOBRAEP, ISSN 1414-8862, Vol. 14, no. 4, November 2009, pp. 259-268.
2. H. Carneiro, L. F. C. Monteiro, João L. Afonso, "Comparisons between Synchronizing Circuits to Control Algorithms for Single-Phase Active Converters", IECON 2009 - The 35th Annual Conference of the IEEE Industrial Electronics Society, 3 5 November, Porto, Portugal.
3. L. F. C. Monteiro, João L. Afonso, J. G. Pinto, E. H. Watanabe, M. Aredes, Hirofumi Akagi, "Compensation Algorithms Based on the p-q and CPC Theories for Switching Compensators in Micro-Grids", COBEP 2009 - The 10th Brazilian Power Electronics Conference, Paper 1149, 27 September to 01 October 2009, Bonito, MS, Brazil, ISSN 2175-8603, pp. 32-40.

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Group Description

Title of Research Group: (RG-Norte-319-2976)
Micro/Nanotechnologies and Biomedical Applications

Principal Investigator: José Higinio Gomes Correia

Main Scientific Domain: Engenharia Electrotécnica e Informática

Group Host Institution: Universidade do Minho

Funding, source, dates**Funding, source, dates**

FCT/PTDC/EEA-TEL/65286/2006, MEMS: Micro-Antenna for Wireless Biomedical Devices, 2009-2011, 130.000,00 €.

MIT-Pt/EDAM-SI/0025/2008, Development of integrated systems for smart interiors, 2009-2011, 60.000,00 €.

MIT-Pt/EDAM-EMD/0007/2008, New technological solutions for smart cardiovascular medical devices: SenseCardioHealth, 2009-2011.

FCT/PTDC/BIO/70017/2006, Lab-on-a-chip with fluid acoustic microagitation, 2007-2010, 83.000,00 €.

FCT/PTDC/EEA-TEL/68625/2006 - Quality of service in wireless sensor and actuator networks, 2007-2010, 201086.000,00 €.

FCT/PTDC/EEA-ENE/66855/2006, Thermoelectric energy scavenging microsystem, 2007-2010, 120.000,00 €.

PTDC/CTM/69362/2006, POLIFILM - POLIFILM - Multifunctional films for flexible and plastic material applications, 2007-2010, 108.000,00 €.

PTDC/CTM/69316/2006 - Micro e nanocompósitos multiferroicos, magnetoeléctricos e metálicos baseados em polímeros electroactivos para aplicações avançadas, 2009-2011, 70.000 €

MAP- MicroAnalisador de Proteínas, ADI/QREN/2008, 2009-2011, 161.885,92 €.

AHRS – Desenvolvimento de um Sistema Inercial de Orientação, ADI/QREN/2008, 2008-2010, 61.749,63 €.

PTDC/SAU-BEB/68678/2006 - Sense4me - Discomfort monitoring and control system for handicaped, bed rest people and surgery patients, 146603,00 €.

Objectives & Achievements**Objectives**

Development, design, and fabrication of:

- 1) Wearable systems for monitoring human posture, heart-rate and respiratory frequency.
- 2) Neural microsystems for brain-computer interface.
- 3) Lab-on-a-chip for biological fluids.
- 4) X-rays microdetectors for medical imaging (digital radiography, CT).
- 5) Wireless sensor networks.
- 6) Chip-size antenna.
- 7) Energy scavenging thermoelectric microsystems.
- 8) RF transceivers in CMOS technology.

Therefore, the goals were to consolidate the biomedical devices developed in the past (lab-on-a-chip, neural electrodes, chip-size antenna for implantable devices) and to start the development of nanodevices, especially related with CarbonNanoTubes (CNT) for neural applications and food safety with the support of the International Nanotechnology Laboratory that will be located in Braga and it is sponsored by Portuguese and Spanish Governments, and European Commission as an European Laboratory. The final prototype of an implantable biomedical microsystem for neural prostheses, will have a tremendous impact in the development of the next generation of neuron recording/stimulation devices. A major interest in the areas of x-ray imaging sensors and piezoelectric polymer sensors and actuators.

Also, the setup of the Microtechnology Lab. and Biomedical Lab. with ultrasound system with the new equipment acquired was a priority.

Main Achievements

The setup of the Microtechnology Lab. with evaporator, silicon wet-bench, sputtering system, wafer-probe station, wire-bonding system, dicing and sawing system, mask aligner equipment, spin-coating system, SU-8 photoresist development system, clean cabin class 100, silicon bulk-micromachining system for fabricating 3D structures.

Development and validation of the β -PVDF piezoelectric polymer placed underneath the microfluidic structures of lab-on-a-chip devices for mixing and promoting fluids reaction; influence of the polymer thickness and area on the reaction rate of biological fluids; the better transparent conductive electrodes for using in the β -PVDF piezoelectric polymer.

Participation in projects included in the MIT-Portugal Portugal in 2 different Engineering systems fields: EDAM-Engineering Design and Manufacturing (Automotive smart flooring based in photonics) and Bio-Engineering Systems (wearable systems for biomedical applications).

Design of CMOS optical sensors optimized for measuring the fluorescence emission spectra of gastrointestinal tissues (at specific spectral bands), and readout electronics for data processing.

The setup of the Biomedical Lab. with ultrasound system – Doppler effect, EEG system for monitoring neural signals, computer tomography system, capsule endoscope system for diagnostic of the small bowel.

Group Productivity**Publications in peer review Journals**

Group Productivity

- Carlos Manuel G. S. Lima, Adriano José C. Tavares e Jaime Ramos, "Detection of Small Bowel Tumors in Endoscopic Capsule Images by Modeling Non-Gaussianity of Texture Descriptors", *International Journal of Tomography and Statistics*, Summer 2010, Volume 14 (Special Volume), Number S1, pp. 41-55, Dezembro 2009.
- J. G. Rocha, R. A. Dias, L. Goncalves, G. Minas, A. Ferreira, C. M. Costa, S. Lanceros-Mendez, "X-Ray Image Detector based on Light Guides and Scintillators", *IEEE Sensors Journal*, Vol. 9, N.9, 1154-1159, IP=1.340, Setembro 2009.
- José Gerardo V. Rocha, Luis Miguel Valente Gonçalves e P.F. Rocha, M.P. Silva, S. Lanceros-Mendez, "Energy Harvesting From Piezoelectric Materials Fully Integrated in Footwear", *IEEE Transactions on Industrial Electronics*, doi:10.1109/TIE.2009.2028360, IP=5.468, Dezembro 2009.
- Luis Miguel Valente Gonçalves e S. Ferdov and J.E. Bourée, "Deposition of silicon nitride thin films by hot-wire CVD at 100 °C and 250 °C", *Thin Solid Films*, 517, 3503, IP=1.884, Abril 2009.
- Luis Miguel Valente Gonçalves, José Higinio G. Correia e Carlos Alberto Caridade Monteiro e Couto, "Optimization of thermoelectric properties on Bi₂Te₃ thin films deposited by thermal co-evaporation", *Thin Solid Films*, IP=1.884, doi:10.1016/j.tsf.2009.08.038, Dezembro 2009.
- J.P. Carmo, L.M. Goncalves, and J.H. Correia, "Improved p- and n-type thin-film microstructures for thermoelectricity", *Electronic Letters*, Vol. 45, No. 15, pp. 803-805, IP=1.140., July 2009.
- J.P. Carmo, and J.H. Correia, "Low-power/low-voltage RF microsystems for wireless sensors networks", *Microelectronics Journal*, Vol. 40, No. 12, pp. 1746-1754, IP=0.859, December 2009.
- J. P. Carmo, R. P. Rocha, A. F. Silva, L. M. Goncalves, J. H. Correia "A thin-film rechargeable battery for integration in stand-alone microsystems", in *Procedia Chemistry*, 2009, Elsevier Science, pp. 453-456. September 2009.

Other publications International

- C.P. Figueiredo, J. Cardona, K.-P. Hoffmann e Paulo Mateus Mendes, "Wearable and Ultra Low Power Wireless System for Physiological Monitoring", 11th World Congress on Medical Physics and Biomedical Engineering, Munich, Germany, September 7-12, 2009.
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Industry contract research

Project MagTAG, contract with Nonius Software, PI: Paulo Mateus Mendes, 25 000,00 €, Feb 2009-Feb 2010, the goal is the development of a localization device with wireless recharging.

Internationalization

Collaborative publications, exchange of investigators and research in European Networks with Delft University of Technology, The Netherlands in Lab-on-a-chip devices and chip-size antenna. RWTH-Aachen, Germany, in technology for fabrication of bioelectrodes. CNM-Barcelona and Universidade Miguel Hernandez, Alicante, Spain in CarbonNanoTubes (CNT) for neural implants and neural diagnostic. Pennsylvania State University, State College, USA, in brain-computer interfaces and EEG systems. University of Cardiff, UK, in design and fabrication of thermoelectric microsystems.

Celso Figueiredo started his PhD work in collaboration with Fraunhofer IBMT Institute, at St. Ingbert, Germany.

Therefore, the goals for the next years is the development of nanodevices, especially related with CarbonNanoTubes (CNT) for neural applications and food safety with the support of the International Nanotechnology Laboratory that will be located in Braga and it is sponsored by Portuguese and Spanish Governments, and European Commission as an European Laboratory. Collaboration with the group of CNM-Barcelona and University of Barcelona will be appointed.

Mariana S. Fernandes started her collaboration with RLE Lab. at MIT/USA, to perform the work related to her PhD degree.

Débora Ferreira started her collaboration with the Spectroscopy Laboratory in the Laser Biomedical Research Center, at the Massachusetts Institute of Technology, to perform the work related to her PhD degree.