

E-Mail: [miraldo@kth.se](mailto:miraldo@kth.se);

Webpage: <https://people.kth.se/~miraldo>.

*Last updated on April 12, 2019*

## Activities

[2018-] **Post-Doctoral Researcher**: Decision and Control Systems, KTH Royal Institute of Technology, Stockholm, Sweden;

[2017-2018] **“Colaborador Docente”**: Computer Science and Engineering, “Instituto Superior Técnico, Universidade de Lisboa”, Portugal. Group of Computer Graphics and Multimedia;

[2015-2017] **Invited Assistant Professor**: Electrical and Computer Engineering, “Instituto Superior Técnico, Universidade de Lisboa”, Portugal. Group of Systems, Decision and Control;

[2014-2018] **Post-Doctoral Researcher**: Intelligent Robots and Systems Group (IRSg) from the “Instituto de Sistemas e Robotica”, “Instituto Superior Técnico”, University of Lisbon, Portugal;

[2014] **Teaching Assistant**: Electrical and Computer Engineering, University of Coimbra, Portugal;

[2009-2014] **Research Assistant**: “Instituto de Sistemas e Robótica”, University of Coimbra, Portugal”;

## Education

[2009-2013] **PhD Degree**: Electrical Engineering (specialization in Informatics), University of Coimbra, Portugal. Mark: “Distinção e Louvor” (the highest degree). Supervised by Prof. Helder Araujo;

[2003-2008] **Integrated MSc degree (five years)**: Electrical and Computer Engineering (specialization area of automation), University of Coimbra, Portugal;

## Awards

[2003-2008] **(four times) Academic merit**: Years 2004/2005, 2005/2006, 2006/2007, and 2007/2008. Name of the award: “Prémio 3% dos Melhores Estudantes, Universidade de Coimbra”;

[2018] **Outstanding Reviewer Award**, Computer Vision and Image Understanding (CVIU): 2018;

## Research Grants

[2016] **Individual Post-Doctoral grant (~106K EUR)**: Awarded by the “Fundação para a Ciência e Tecnologia”. With reference SFRH/BPD/111495/2015;

[2009] **PhD grant (~57K EUR)**: Awarded by the “Fundação para a Ciência e Tecnologia”. With reference SFRH/BD/49054/2008;

# Publications

## Journal Papers

- [1] A. Mateus, D. Ribeiro, **P. Miraldo**, and J. C. Nascimento (2018). *Efficient and Robust Pedestrian Detection using Deep Learning for Human-Aware Navigation*, Robotics and Autonomous Systems (RAS), **113**:23-37 [[arXiv:1607.04441](#), [doi](#)];
- [2] R. Rodrigues, M. Basiri, A. P. Aguiar, and **P. Miraldo** (2018). *Low-level Active Visual Navigation: Increasing robustness of vision-based localization using potential fields*, IEEE Robotics and Automation Letters (RA-L), Submission for RA-L and ICRA, **3**(3):2079-2086 [[arXiv:1801.07249](#), [doi](#)];
- [3] X. Liu, Z. Li, K. Zhong, Y. Chao, **P. Miraldo**, and Y. Shi (2018). *Generic distortion model for metrology under optical microscopes*, Optics and Lasers in Engineering (OLEN), **103**:119-126 [[doi](#)];
- [4] X. Liu, Z. Li, **P. Miraldo**, K. Zhong, and Y. Shi (2016). *A framework to calibrate the scanning electron microscope under any magnifications*, IEEE Photonics Technology Letters (PT-L), **28**(16):1715-1718 [[doi](#)];
- [5] T. Dias, **P. Miraldo**, and N. Gonçalves (2016). *Augmented Reality on Robot Navigation using Non-Central Catadioptric Cameras*, Springer J. Intelligent & Robotic Systems (JINT), **83**(3):359-373 [[doi](#)];
- [6] F. Amigoni, J. Berghofer, A. Bonarini, G. Fontana, N. Hochgeschwender, L. Iocchi, G. K. Kraetzschmar, P. Lima, M. Matteucci, **P. Miraldo**, D. Nardi, and V. Schiaonati (2015). *Competitions for Benchmarking: Task and Functionality Scoring Complete Performance Assessment*, IEEE Robotics & Automation Magazine (RAM), **22**(3):53-61 [[doi](#)];
- [7] **P. Miraldo** and H. Araujo (2015). *Pose Estimation for Non-Central Cameras Using Planes*, Springer J. Intelligent & Robotic Systems (JINT), **80**(3):595-608 [[doi](#)];
- [8] **P. Miraldo** and H. Araujo (2015). *Generalized Essential Matrix: Properties of the Singular Value Decomposition*, Elsevier Image and Vision Computing (IMAVIS), **34**:45-50 [[doi](#)];
- [9] **P. Miraldo**, H. Araujo, and N. Gonçalves (2015). *Pose Estimation for General Cameras Using Lines*, IEEE Trans. Cybernetics (T-CYB), **45**(10):2156-2164 [[doi](#)];
- [10] **P. Miraldo** and H. Araujo (2015). *Direct Solution to the Minimal Generalized Pose*, IEEE Trans. Cybernetics (T-CYB), **45**(3):404-415 [[doi](#)];
- [11] **P. Miraldo** and H. Araujo (2013). *Calibration of Smooth Camera Models*, IEEE Trans. Pattern Analysis and Machine Intelligence (T-PAMI), **35**(9):2091-2103 [[doi](#)];

## Book Chapters

- [12] L. Iocchi, G. Kraetzschmar, D. Nardi, P. U. Lima, **P. Miraldo**, and E. Bastianelli (2017). *RoCKIn@Home: Domestic Robots Challenge* (boot title *RoCKIn - Benchmarking Through Robot Competition*), InTechOnline Chapter, pp: 25-46 [[doi](#)];

## Conference Papers

- [13] **P. Miraldo**, S. Saha, and S. Ramalingam (2019). *Minimal Solvers for Mini-Loop Closures in 3D Multi-Scan Alignment*, IEEE/CVF Conf. Computer Vision and Pattern Recognition (CVPR), pp. [[arXiv:1904.03941](#), [doi](#)];
- [14] A. Mateus, O. Tahri, and **P. Miraldo** (2019). *Active Estimation of 3D Lines in Spherical Coordinates*, American Control Conference (ACC) [[arXiv:1902.00473](#), [doi](#)];

- [15] G. Pais, J. C. Nascimento, and **P. Miraldo** (2019). *OmniDRL: Robust Pedestrian Detection using Deep Reinforcement Learning on Omnidirectional Cameras*, IEEE Int’l Conf. Robotics and Automation (ICRA) [[arXiv:1903.00676](#), [doi](#)];
- [16] J. Campos, J. R. Rodrigues, and **P. Miraldo** (2019). *POSEAMM: A Unified Framework for Solving Pose Problems using an Alternating Minimization Method*, IEEE Int’l Conf. Robotics and Automation (ICRA) [[arXiv:1904.04858](#), [doi](#)];
- [17] **P. Miraldo**, T. Dias, and S. Ramalingam (2018). *A Minimal Closed-Form Solution for Multi-Perspective Pose Estimation using Points and Lines*, European Conf. Computer Vision (ECCV), pp. 490-507 [[arXiv:1807.09970](#),[doi](#)];
- [18] A. Mateus, O. Tahri, and **P. Miraldo** (2018). *Active Structure-from-Motion for 3D Straight Lines*, IEEE/RSJ Int’l Conf. Intelligent Robots and Systems (IROS), pp: 5819-5825 [[arXiv:1807.00753](#),[doi](#)];
- [19] **P. Miraldo**, F. Eiras, and S. Ramalingam (2017). *Analytical Modeling of Vanishing Points and Curves in Catadioptric Cameras*, IEEE/CVF Conf. Computer Vision and Pattern Recognition (CVPR), pp: 2012-2021 [[arXiv:1804.09460](#),[doi](#)];
- [20] R. Rodrigues, M. Basiri, A. P. Aguiar, and **P. Miraldo** (2017). *Feature Based Potential Field for Low-level Active Visual Navigation*, Iberian Robotics Conf. pp: 791-800, [[arXiv:1709.04687](#),[doi](#)];
- [21] D. Ribeiro, A. Mateus, **P. Miraldo**, and J. C. Nascimento (2017). *A Real-Time Deep Learning Pedestrian Detector for Robot Navigation*, IEEE Int’l Conf. on Autonomous Robot Systems and Competitions (ICARSC), pp: 165-171 [[arXiv:1607.04436](#),[doi](#)];
- [22] T. Dias, H. Araujo, and **P. Miraldo** (2016). *3D Reconstruction with Low-Resolution, High Radial Distortion Stereo Images*, ACM Int’l Conf. on Distributed Smart Cameras (ICDSC), pp: 98-103 [[arXiv:1709.06451](#),[doi](#)];
- [23] J. Cardoso, **P. Miraldo**, and H. Araujo (2016). *Plcker correction problem: Analysis and improvements in efficiency*, IEEE/IAPR Int’l Conf. on Pattern Recognition (ICPR), pp: 2796-2801 [[arXiv:1602.05990](#),[doi](#)];
- [24] J. Iglésias, **P. Miraldo**, and R. Ventura (2016). *Towards an Omnidirectional Catadioptric RGB-D Camera*, IEEE/RSJ Int’l Conf. Intelligent Robots and Systems (IROS), pp: 2506-2513 [[doi](#)];
- [25] T. Veiga, **P. Miraldo**, R. Ventura, and P. Lima (2016). *Efficient Object Search for Mobile Robots in Dynamic Environments: Semantic Map as an Input for the Decision Maker*, IEEE/RSJ Int’l Conf. Intelligent Robots and Systems (IROS), pp: 2745-2750 [[doi](#)];
- [26] R. Ventura, M. Basiri, A. Mateus, J. Garcia, **P. Miraldo**, P. Santos, and P. U. Lima (2016). *A Domestic Assistive Robot Developed Through Robotic Competitions*, WS Autonomous Mobile Service Robots, joint with Int’l Joint Conference on Artificial (IJCAI) [[doi](#)];
- [27] A. Mateus, **P. Miraldo**, P. Lima, and J. Sequeira (2015). *Human-Aware Navigation using External Omnidirectional Cameras*, Iberian Robotics Conf. (ROBOT), pp: 283-295 [[doi](#)];
- [28] T. Dias, **P. Miraldo**, N. Gonçalves, and P. Lima (2015). *Augmented Reality on Robot Navigation using Non-Central Catadioptric Cameras*, IEEE/RSJ Int’l Conf. Intelligent Robots and Systems (IROS), pp: 4999-5004 [[doi](#)];
- [29] T. Dias, **P. Miraldo**, and N. Gonçalves (2015). *A Framework for Augmented Reality using Non-Central Catadioptric Cameras*, IEEE Int’l Conf. on Autonomous Robot Systems and Competitions (ICARSC), pp: 213-220 [[doi](#)];
- [30] **P. Miraldo** and H. Araujo (2014). *Planar Pose Estimation for General Cameras using Known 3D Lines*, IEEE/RSJ Int’l Conf. Intelligent Robots and Systems (IROS), pp: 4234-4240 [[doi](#)];
- [31] **P. Miraldo** and H. Araujo (2014). *Pose Estimation for Non-Central Cameras Using Planes*, IEEE Int’l Conf. on Autonomous Robot Systems and Competitions (ICARSC), pp: 104-109 [[doi](#)];

- [32] **P. Miraldo** and H. Araujo (2014). *A Simple and Robust Solution to the Minimal General Pose Estimation*, IEEE Int'l Conf. Robotics and Automation (ICRA), pp: 2119-2125 [doi];
- [33] **P. Miraldo**, H. Araujo, and J. Queiró (2011). *Point-based Calibration Using a Parametric Representation of General Imaging Models*, IEEE Int'l Conf. Computer Vision (ICCV), pp: 2304-2311 [doi];

## Press Coverage

[2018] Our work in Human-Aware Navigation [21, 1] (with D. Ribeiro, A. Mateus, and J. C. Nascimento) have been mentioned in a Matlab Community Video., Link: [here](#).

## Invited Talks

[03/2018] Department of Automatic Control, KTH Royal Institute of Technology, Stockholm;

## Research Projects

[2016-2018] **RockUE2**: Robotics coordination action for Europe two [link];  
Founding: European Commission, with Ref: H2020-ICT24-688441 (~132K EUR);  
Publications: N/A;

[2014-2015] **RoCKIn**: Robot competitions kick innovation in cognitive systems and robotics [link];  
Founding: European Commission, with Ref: FP7-EU-601012 (~361K EUR);  
Publications: [6, 12];

[2018- ] **COIN**: Co-adaptive human-robot interactive systems [link];  
Founding: SSF (Swedish Science Foundation);  
Publications: N/A;

[2016-2019] **HaRoDE**: Human-aware service robots for domestic environments [link];  
Founding: Portuguese Foundatin for Science and Technology (FCT),  
with Ref: FCTPTDC/EEI-SII/4698/2014 (~180K EUR);  
Publications: [27, 26, 25, 24, 19, 17, 16, 15];

[2014-2016] **SocRob**: Soccer Robots and Society of Robots [link];  
Founding: ISR (LARSyS) from Instituto Superior Técnico,  
through the FCT project with Ref: UID/EEA/50009/2013;  
Publications: [27, 6, 26];

[2013-2014] “Novas Tecnologias para apoio à Saúde e Qualidade de Vida: Projecto A-Cirurgia e Diagnóstico Assistido por Computador Usando Imagem”;  
Founding: “QREN-MaisCentro”, with Ref: Centro-SCT-2011-01 (~172K EUR);  
Publications: [31, 30, 29, 10, 9, 8, 7];

[2012-2015] Calibration and 3D Reconstruction in Omnidirectional Catadioptric Systems [link];  
Founding: Portuguese Foundatin for Science and Technology (FCT),  
with Ref: PTDC/EIA-EIA/122454/2010 (~78K EUR);  
Publications: [32, 31, 30, 11, 10, 9, 8, 7];

[2011-2012] Automatic heart scan with ultrasound using visual servoing techniques;  
Founding: Portuguese Foundatin for Science and Technology (FCT),  
wit Ref: PHC/PESSOA 2011/2012, Code Projet : 25116ND (~5K EUR);  
Publications: N/A;

[2010-2013] **UniProjection**: Unified Projection Model of Non SVP Systems – Application to Endoscopy and Graphics [[link](#)];  
Founding: Portuguese Foundatin for Science and Technology (FCT),  
wit Ref: PTDC/EIA-CCO/109120/2008 (~93K EUR);  
Publications: [[33](#), [32](#), [11](#)];

## Event Management

**Program Committee** (2019). ACM/SIGAPP Symposium On Applied Computing – Track on Intelligent and Multi-Agent Systems, at Limassol, Cyprus;

**Program Committee** (2018). ACM/SIGAPP Symposium On Applied Computing – Track on Intelligent and Multi-Agent Systems, at Pau, France;

**Local Organization** (2017). The 4<sup>th</sup> Lucia PhD School on “Artificial Intelligence and Robotics” (September 4th: The Triumph of Light), at Instituto Superior Técnico, Lisboa;

**Session Chair, Omnidirectional Vision** (2016). IEEE/RSJ Int’l Conf. Intelligent Robots & Systems (IROS), at Daejeon, Korea;

**@Home Organization and Technical Committee Chair** (2015). RoCKIn Challenge 2015 (Robot Competitions Kick Innovation in Cognitive Systems and Robotics), at Lisboa, Portugal;

**Organization Committee** (2015). RoCKIn Camp (Robot Competitions Kick Innovation in Cognitive Systems and Robotics), at Peccioli, Italy;

**Technical Committee** (2014). RoCKIn Challenge (Robot Competitions Kick Innovation in Cognitive Systems and Robotics), at Toulouse, France;

## Reviewer for Journal Papers

Springet Journal of Mathematical Imaging and Vision (JMIV): 2018(#1),2019(#1);

Elsevier Pattern Recognition Letters (PR-L): 2016(#1),2017(#1),2018(#2);

IEEE Trans. Industrial Electronics (T-IE): 2018(#1);

Elsevier Computer & Graphics (CAG): 2018(#2);

Wiley Journal of Field Robotics: 2017(#2), 2018(#3);

IEEE Trans. Pattern Analysis and Machine Intelligence (T-PAMI): 2017(#2);

IEEE Robotics and Automation Letters (L-RA): 2016(#1) ,2017(#3);

Elsevier Computer Vision and Image Understanding (CVIU): 2017(#3);

Springer Multidimensional Systems and Signal Processing: 2017(#1);

Elsevier Robotics and Autonomous Systems (RAS): 2016(#1);

Springer Journal of Intelligent and Robotic Systems (JINT): 2017(#2);

## Reviewer for Conferences

IEEE/CVF Int’l Conf. Computer Vision (ICCV): 2019(#);

IEEE/CVF Conf. Computer Vision and Pattern Recognition (CVPR): 2019(#5);

IEEE Int'l Conf. Robotics & Automation (ICRA): 2016(#1), 2017(#2), 2018(#1), 2019(#1);  
IEEE/RSJ Int'l Conf. Intelligent Robots & Systems (IROS): 2015(#3), 2016(#1), 2017(#3), 2018(#2), 2019(#7);  
AACC American Control Conf. (ACC): 2019(#1);  
Indian Conference on Computer Vision, Graphics and Image Processing (ICVGIP): 2018(#5);  
Int'l Joint Conf. Artificial Intelligence (IJCAI): 2016(#1);  
European Conf. Artificial Intelligence (ECAI): 2016(#2);

## Teaching

[2017-2018] **Computer Graphics** (CS&E);  
[2016-2017] **Algorithms & Data Structures** (ECE);  
[2015-2016] **Automatic Control** (ECE);  
[2014] **Computer Vision; and Mobile Robotics** (ECE);

## Students

### Ongoing PhD

[2018- ] **Tiago Dias**: *Computer Vision & Graphics* (with Jacinto C. Nascimento)  
Results [29, 28, 22, 5, 17]  
[2017- ] **André Mateus**: *Mobile Robot Control using Computer Vision* (with Pedro U. Lima)  
Results [27, 26, 21, 18, 1, 14]

### Other Research Grants (Graduate and Undergraduate)

[2017-2018] João Campos (Research Assistant with a **MSc**), on “*3D Computer Vision*”, papers: [16];  
[2017-2018] Francisco Eiras (Research Assistant with a **BSc**), on “*3D Computer Vision*”, papers: [19];  
[2016-2017] Rômulo Rodrigues (Research Assistant with a **MSc**), on “*Robotics*”, papers: [20, 2];  
[2015-2017] José Iglesias (Research Assistant with a **BSc**), on “*3D Vision*”, papers: [24];

### Completed MSc Students

[05/2018] Gonçalo José Dias Pais (as a supervisor);  
Title: OmniDRL: Robust Pedestrian Detection using Omnidirectional Cameras and Deep RL [link];  
Mark: **18/20**;  
[11/2017] Soraia Mendes Ferreira (as a supervisor);  
Title: Mobile Arm Visual Servoing for Object Manipulation [link];  
Mark: **15/20**;  
[11/2017] José António Carvalho Mendes (as a co-supervisor);  
Title: Forensic use of Mobile Phone Cameras: Measuring the Height of a Person [link];  
Mark: **16/20**;  
[11/2016] Luís Carlos Barreira Luz (as a supervisor);

Title: Cooperative Perception for People Tracking and Human-Aware Navigation [[link](#)];

Mark: **17/20**;

[11/2016] Diogo Emanuel Parreira Maximino (as a supervisor);

Title: Improvement of Non-Central Catadioptric Cameras Pose Estimation Using 3D Lines [[link](#)];

Mark: **14/20**;

[10/2015] João Miguel Camiso Soares de Goyri O'Neill (as a co-supervisor);

Title: Semantic Maps for Domestic Robots [[link](#)];

Mark: **14/20**;

[5/2015] António Pedro Pinto Ribeiro (as a co-supervisor);

Title: Odometria Visual usando campos visuais não sobrepostos [[link](#)];

Mark: **17/20**;

[09/2014] Tiago José Simões Dias (as a co-supervisor);

Title: Augmented Reality using Non-Central Catadioptric Imaging Devices [[link](#)];

Mark: **19/20**;

## **MSc Thesis Jury**

[2018] Patrícia Silva, with the thesis:

*Detection and Tracking in Airborne Image Sequences*, as **Opponent**;

[2018] Gonçalo Pais, with the thesis:

*OmniDRL: Robust Pedestrian Detection using Omnidirectional Cameras and Deep Reinforcement Learning*, as **Supervisor**;

[2017] Soraia Ferreira, with the thesis:

*Mobile Arm Visual Servoing for Object Manipulation*, as **Supervisor**;

[2017] Ana Solas, with the thesis:

*Adaptive Illumination: Vehicle Tracking in Bridges with Surveillance Cameras*, as **Opponent**;

[2017] João Salvado, with the thesis:

*Detection of Interaction Intention and Engagement in HRI using Joint Gaze and Gesture Analysis*, as **Opponent**;

[2017] Ana Almeida, with the thesis:

*Deep Networks for Human Visual Attention: A hybrid model using foveal vision*, as **Opponent**;

[2016] Diogo Maximino, with the thesis:

*Improvement of Non-Central Catadioptric Cameras Pose Estimation using 3D Lines*, as **supervisor**;

[2016] Miguel Bastos, with the thesis:

*Eye Tracking on Human's Visual Search*, as **Opponent**;

[2016] Luís Luz, with the thesis:

*Human-Aware Navigation*, as **Supervisor**;