

# PEDRO SEQUEIRA – CURRICULUM VITAE

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## SUMMARY

I am a post-doctoral associate since 2013 at the Intelligent Agents and Synthetic Characters Group (GAIPS) / INESC-ID Lisbon, in Porto Salvo, Portugal. In September 2013, I completed the Ph.D. Program in Information Systems and Computer Engineering at the Instituto Superior Técnico (IST), University of Lisbon in Portugal, under the supervision of Prof. Ana Paiva and Prof. Francisco S. Melo. My thesis focused on building more flexible and robust reward mechanisms for autonomous reinforcement learning (RL) agents. My interests are in the area of artificial intelligence, particularly related with autonomous and adaptive systems (e.g. agents and multiagent systems) involving learning and evolutionary mechanisms. My approach has been greatly inspired by adaptive biological mechanisms. I've been a researcher at GAIPS since 2005, during which I have participated in several collaborative projects, including: INSIDE (CMU-Portugal), EMOTE (EU-FP7), FearNot! and Orient (EU-FP6) and CoWriter (EPFL). I also worked as a lab assistant, teaching practical classes for the Human-Computer Interaction and Computer Graphics courses at IST.

## EDUCATION

- Instituto Superior Técnico, University of Lisbon  
**Ph.D. in Information Systems and Computer Engineering** **2008 – 2013**  
*Socio-Emotional Reward Design for Intrinsically Motivated Learning Agents*  
Supervisors: Dr. Ana Paiva, Dr. Francisco S. Melo  
Thesis Committee: Dr. Douwe Broekens, Dr. Manuel Lopes, Dr. Pedro Lima, Dr. Eugénio Oliveira
- Instituto Superior Técnico, University of Lisbon  
**Master (M.Sc.) in Information Systems and Computer Engineering (after-Bolonha)** **2006 – 2007**  
*Learning To Interact: Connecting Perception with Action in Virtual Environments*
- Instituto Superior Técnico, University of Lisbon  
**Degree (5 years) in Information Systems and Computer Engineering (before-Bolonha)** **2001 – 2006**  
*"What Can I Do With This?" Finding Possible Interactions Between Characters and Objects*

## OTHER TRAINING

- 18th Machine Learning Summer School (MLSS'11)** **2011**  
Organization: INRIA and PASCAL, Bordeaux, France.  
Topics: Learning Theory, Bayesian inference, Monte Carlo Methods, Sparse Methods, Reinforcement Learning, Robot Learning, Convex Optimization, Graphical Models, etc.
- FIAS Winter School on Intrinsic Motivations: From Brains to Robots** **2012**  
Organization: Frankfurt Institute for Advanced Studies (FIAS), Frankfurt am Main, Germany.

Topics: Intrinsic Motivations (biological and computational perspective), Robot Control, Developmental Robotics, Reinforcement Learning, Self-Organizing Complex Robotics, Action Discovery in Animals, etc.

## PROFESSIONAL EXPERIENCE

Intelligent Agents and Synthetic Characters Group (GAIPS) at INESC-ID, Lisbon

### Postdoctoral Associate

Nov. 2013 – Present

Research on the field of reinforcement learning in multiagent systems and robotics, and on evolutionary game theory. Currently involved in the CMU-Portugal project *INSIDE* in the study of social mechanisms for the emergence of cooperation in populations of self-interested agents and in the EU-funded FP7 project *EMOTE* in the development of AI and machine learning techniques to manage the game-play and autonomous interactive behavior of a robotic tutor in the context of a scenario involving the energy-awareness *Enercities* game. Participation in the *CoWriter* project in collaboration with the CHILI lab at EPFL in the context of using robots to aid in the development of children's writing skill. Preparation and conductance of a wizard-of-Oz study with children (aged 6-8) about the impact of a robotic entity in the management of a writing activity.

### Research Assistant

2005 – 2013

Research on the field of reinforcement learning and biologically-inspired learning models.

Institute for Creative Technologies (ICT) / University of Southern California (USC)

### Internship Researcher

2009

Research intern at the Institute of Creative Technologies under the supervision of Prof. Stacy Marsella, during which I investigated the influence of emotions, social and cultural factors in the human learning process.

Intelligent Agents and Synthetic Characters Group (GAIPS) at INESC-ID, Lisbon

### Developer / Researcher

2006 – 2008

Participation in the European Union-funded *FearNot!* and *Orient* projects as a software developer and researcher. Development of a framework for the integration of the autonomous agents' architecture with the graphical engine responsible for the representation and coordination of all the characters, objects, sets and cameras of the 3D virtual environment.

## TEACHING EXPERIENCE

Instituto Superior Técnico, University of Lisbon

### Invited Assistant Professor

2016 – Present

Responsible for teaching in some theoretical classes and supervising and grading laboratory classes for the *Autonomous Agents and Multi-Agent Systems* course, corresponding to the 1<sup>st</sup> year of the Master Degree in Information Systems and Computer Engineering.

### Teaching Assistant

2006 – 2007

Responsible for teaching, supervising and grading laboratory and home assignments for the *Human-Computer Interaction* and *Computer Graphics* courses, corresponding respectively to the 3<sup>rd</sup> and 2<sup>nd</sup> years of the B.Sc. Degree in Information Systems and Computer Engineering.

## SELECTED PUBLICATIONS

### REFEREED JOURNAL ARTICLES

P. Sequeira, F. S. Melo, and A. Paiva, "**Emergence of emotional appraisal signals in reinforcement learning agents,**" *Autonomous Agents and Multi-Agent Systems*, vol. 29, no. 4, pp. 537–568, Jul. 2015.

P. Sequeira, F. S. Melo, and A. Paiva, "**Learning by appraising: an emotion-based approach to intrinsic reward design,**" *Adaptive Behavior*, vol. 22, no. 5, pp. 330–349, 2014.

### REFEREED CONFERENCES & WORKSHOP PAPERS

- P. Sequeira, P. Alves-Oliveira, T. Ribeiro, E. Di Tullio, S. Petisca, F. S. Melo, G. Castellano, and A. Paiva, **“Discovering Social Interaction Strategies for Robots from Restricted-Perception Wizard-of-Oz Studies,”** in *Proceedings of the 11th ACM/IEEE International Conference on Human-Robot Interaction (HRI)*, 2016, pp. 197–204. **Best Paper Award on HRI Interaction Design**
- P. Sequeira, F. S. Melo, and A. Paiva, **“Let’s Save Resources!': A Dynamic, Collaborative AI for a Multiplayer Environmental Awareness Game,”** in *Proceedings of the 2015 IEEE Conference on Computational Intelligence and Games (IEEE CIG)*, 2015, pp. 399–406.
- P. Sequeira, S. Mascarenhas, F. S. Melo, and A. Paiva, **“The Development of Cooperation in Evolving Populations through Social Importance,”** in *Proceedings of the 5th International Conference on Development and Learning and on Epigenetic Robotics (ICDL-EpiRob)*, 2015, pp. 308–313.
- P. Sequeira, S. Mascarenhas, F. S. Melo, and A. Paiva, **“The ‘Favors Game’: A Framework to Study the Emergence of Cooperation through Social Importance (Extended Abstract),”** in *Proc. of the 14th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2015, pp. 1899–1900.
- P. Sequeira, F. S. Melo, and A. Paiva, **“The Influence of Social Display in Competitive Multiagent Learning,”** in *Proceedings of the 4th International Conference on Development and Learning and on Epigenetic Robotics (ICDL-EpiRob)*, 2014, pp. 64–69.
- P. Sequeira, F. S. Melo, and A. Paiva, **“An Associative State-Space Metric for Learning in Factored MDPs,”** in *Proceedings of the 16th Portuguese Conference on Artificial Intelligence (EPIA)*, 2013, pp. 163–174.
- P. Sequeira, F. S. Melo, and A. Paiva, **“Emotion-Based Intrinsic Motivation for Reinforcement Learning Agents,”** in *Affective Comp. and Intelligent Interaction (ACII)*, 2011, vol. 6974, pp. 326–336. **Best Paper Award**
- P. Sequeira, F. S. Melo, R. Prada, and A. Paiva, **“Emerging social awareness: Exploring intrinsic motivation in multiagent learning,”** in *Proceedings of the 1st Joint IEEE International Conference on Development and Learning and on Epigenetic Robotics (ICDL-EpiRob)*, 2011, vol. 2, pp. 1–6. **Best Poster Award**
- P. Sequeira and C. Antunes, **“Real-Time Sensory Pattern Mining for Autonomous Agents,”** in *6th International Workshop on Agents and Data Mining Interaction (ADMI)*, 2010, vol. 5980, pp. 71–83
- P. Sequeira and A. Paiva, **“Learning to Interact: Connecting Perception with action in Virtual Environments (Extended Abstract),”** in *Proceedings of the 7th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2008, pp. 1257–1260.
- P. Sequeira, M. Vala, and A. Paiva, **“What Can I Do With This?: Finding Possible Interactions Between Characters And Objects,”** in *Proceedings of the 6th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS)*, 2007, pp. 14-18.

### THESIS

- P. Sequeira, **“Socio-Emotional Reward Design for Intrinsically Motivated Learning Agents,”** Ph.D. Thesis, Instituto Superior Técnico, Universidade de Lisboa, 2013.

### AWARDS

- Best Paper Award on HRI Interaction Design** at the 11<sup>th</sup> Int. Conf. on Human-Robot Interaction (HRI 2016)
- Best Paper Award** at the 4<sup>th</sup> Int. Conference on Affective Computing and Intelligent Interaction (ACII 2011)
- Best Poster Award** at the 1<sup>st</sup> Int. Conf. on Develop. and Learning and on Epigenetic Robotics (ICDL-EpiRob 2011)

**Best Demo Award** at the 6<sup>th</sup> Int. Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS'07)

## CONTRIBUTIONS TO MY FIELD

### REVIEWING & PROGRAM COMMITTEES

Artificial Intelligence

International Joint Conference on Artificial Intelligence, IJCAI (PC member)

International Conference on Machine Learning, ICML

Advances in Neural Information Processing Systems, NIPS

International Joint Conference on Autonomous Agents and Multiagent Systems, AAMAS (PC member)

Computer Animation and Virtual Worlds

International Conference on Intelligent Robots and Systems, IROS

International Conference on Human-Robot Interaction, HRI

### STUDENT VOLUNTEER

6th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS'07)

7th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS'08)

## TECHNICAL SKILLS

**Programming and Technologies:** C#, C, C++, python, ROS, Matlab, Java, Lisp, and others.

**3D Modeling, Rendering and Programming Tools:** Unity Game Engine, Ogre 3D, 3DS Max, and others.

**Web and Graphical Design:** D3.js, HTML, JavaScript, PHP, CSS, and others.

## LANGUAGES

Portuguese – native language

English – speak fluently and read/write with high proficiency

French and Spanish – speak, read, and write with basic competence

## REFERENCES

Prof. Ana Paiva

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Prof. Francisco S. Melo

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