

Jorge Carvalho Gomes

☎ (+351)968182145 | ✉ jorgemcgomes@gmail.com | 🏠 www.jcgomes.pt |
📍 jorgemcgomes | 🌐 jorgemcgomes | Full curriculum: <https://jcgomes.pt/about>



A blend of scientist, engineer, and problem solver, with experience in several fields of artificial intelligence, including data analysis and visualization, optimization, evolutionary computation, neural networks, big data, machine learning, and autonomous agents. I am focused on developing innovative solutions for complex problems, and bringing the state-of-the-art closer to real-world application. Experience communicator, with over 30 publications in top journals and international conferences in AI, frequent participation in conferences, 3+ years of university lecturing, and writing of several national and European research proposals.

Experience

Chief Scientist

Sonodot Ltd.

London / Lisbon

Jun. 2018 – Present

- Head of research and development at Sonodot, a startup aimed at building a platform for enabling smart warehouses.
- Strategic planning of software and product development; leading the development team, including supervision and training of interns; developing the platform for ingestion of large volumes of data from IoT devices, real-time cleaning and pre-processing of data, and real-time analytics and visualization.

Invited Assistant Professor

Faculty of Sciences, University of Lisbon

Lisbon, Portugal

Sep. 2017 – May 2018

- *Teaching:* Programming I & II (Python), Algorithms and Data Structures (Java), Theory of Computation.
- *Research:* Pushing the state of the art on innovative optimisation methods (diversity-driven evolutionary computation), and their application to the control of autonomous agents.

Doctoral Researcher / Integrated member

BioISI – Biosystems and Integrative Sciences Institute, MAS Group

Lisbon, Portugal

Feb. 2013 – Dec. 2018

- BioISI co-hosted the PhD research project. Full integrated member starting on Oct. 2017.
- Preparation of research proposal for ModEst – Student flow modelling in the Portuguese School System (funded, 2018).

Doctoral / Postdoctoral Researcher

Instituto de Telecomunicações, BioMachines Lab

Lisbon, Portugal

Oct. 2012 – Aug. 2017

- Collaboration in research projects in the field of evolutionary computation and multi-robot systems (see *Projects* section). Recipient of four research grants, including the PhD research grant.

Co-founder

Ocean Swarm Lda.

Lisbon, Portugal

Mar. 2016 – Sep. 2016

- High-tech startup developing multirobot systems for marine environments.
- Preparation and submission of two Horizon 2020 (European Commission) project proposals.
- Market and product analysis, development of a business plan.

Invited Teaching Assistant

Departamento de Informática da Faculdade de Ciências da Universidade de Lisboa

Lisbon, Portugal

Sep. 2013 – Dec. 2015

- Computer Systems Architecture, Programming Laboratories.

Research Assistant

LabMAG – Agent Modeling Laboratory

Lisbon, Portugal

Jan. 2009 – Nov. 2012

- Collaboration in projects in the field of artificial intelligence (see *Projects* section). Recipient of four research grants.

Education

Ph.D. in Informatics Engineering

Faculdade de Ciências da Universidade de Lisboa

Lisbon, Portugal

Apr. 2013 – May 2017

- *Dissertation title:* Novel Approaches to Cooperative Coevolution of Heterogeneous Multiagent Systems
- *Research:* Evolutionary computation, multi-robot and multi-agent systems, neural networks
- Approved with the highest grade (*Distinção e Louvor*)

Act by COTEC – COHiTEC

COTEC Portugal / North Carolina State University

Lisbon, Portugal

Feb. 2015 – Jul. 2015

- Technology commercialization training program with 100+ hours of sessions and mentoring including IP, business models, and financials.
- Participation with the team that went on to found Ocean Swarm Lda.

M.Sc. in Informatics Engineering

Faculdade de Ciências da Universidade de Lisboa

Lisbon, Portugal

Sep. 2010 – Nov. 2012

- *Specialisation*: Knowledge and Interaction (focus on Artificial Intelligence)
- *Dissertation title*: Evolution of Self-Organising Behaviours with Novelty Search (grade: 20/20)
- *Final M.Sc. grade*: 19.1/20

B.Sc. in Informatics Engineering

Faculdade de Ciências da Universidade de Lisboa

Lisbon, Portugal

Sep. 2007 – Jul. 2010

- *Final B.Sc. grade*: 18.4/20

Technical Skills

Programming	Python, R, Java
Artificial Intelligence	Evolutionary computation, neural networks, deep learning, machine learning, robotics, autonomous agents & multiagent systems, swarm intelligence, simulation
Data Engineering	Real-time data pipelines (Kafka, Redis), real-time analytics, REST API development, asynchronous programming, interactive data visualization (Plotly), data wrangling (Pandas, Numpy)
Research & Science Languages	Scientific writing, data processing and visualization, statistical analysis, grid computing Portuguese (native), English (full professional proficiency)

Honors & Awards

2013–2018	4 Best Paper Award Nominations	GECCO 2013, ECAL 2015, PPSN 2016, CEC 2018	
2016	Innovation Award	Honourable mention to Ocean Swarm	Exame Informática
2016	Best Robot Video	<i>A Sea of Robots</i> , AAI Video Competition	AAAI
2014, 2016	2 Excellence Awards in Informatics	Best student in the PhD programme	Maxdata / DI-FCUL
2014	Best Student Presentation	Nature-inspired Robots workshop (NIR) at PPSN	FoCAS (FET)
2010	2nd Best BSc Finalist Award	Finalists at FCUL in 2009/2010	FCUL
2008–2010	3 Merit Scholarships	Top 7 (0.2%) students in FCUL in 2008, 2009, and 2010	University of Lisbon
2008	Prémio Fundação da FCUL	For a grade over 18/20 in the first year of the BSc	FCUL

Research Projects (selected)

For the complete list of projects, please refer to the full CV at <https://jcgomes.pt/about/>.

ModEst – Student flow modelling in the Portuguese School System

Fundação para a Ciência e Tecnologia / BioISI

Jun. 2018 – Dec. 2018

- *Project*: The project aims to produce reliable estimates of the relevant variables describing the student movements on the Portuguese educational system, leveraging the large volumes of data owned by DGEEC for 2M+ students.
- *Role*: Proposal writing and project planning. Project funded for 250k€.

Novel Approaches to Cooperative Coevolution of Heterogeneous Multiagent Systems

Fundação para a Ciência e Tecnologia / BioISI / Instituto de Telecomunicações

Apr. 2013 – Mar. 2017

- *Project*: Study and development of new cooperative coevolutionary algorithms for the evolution and optimisation of control for heterogeneous multiagent systems
- *Role*: PhD student / leading researcher

Control of Aquatic Drones for Maritime Tasks (CORATAM)

BioMachines Lab / Instituto de Telecomunicações

Apr. 2014 – Jul. 2015

- *Project*: Design and control of an autonomous aquatic multirobot system for maritime tasks
- *Role*: Researcher in a team of 7 people, working on the optimisation of control for the multirobot system using evolutionary algorithms

PREVER – Forecast and Simulation System for Mobile Workforce

Faculty of Sciences of University of Lisbon

Sep. 2011 – Aug. 2012

- *Project:* Forecast system for mobile workforce needs. Usage of data mining and machine learning to forecast grid failures for Portugal's largest electricity operator
- *Role:* Researcher in charge of the evaluation of machine learning algorithms for the forecast system

City Induction: a Model for Formulating, Evaluating, and Generating Urban Designs

Faculty of Architecture of Lisbon (FA-UTL)

Oct. 2010 – Jul. 2011

- *Project:* Design and development of a tool for assisting the urban development process, to promote the generation of more sustainable urban environments
- *Role:* Researcher in a multidisciplinary team, in charge of the development of a semantic-web application (4CityPlan) for the categorization and analysis of urban intervention zones, and optimization of urban plans

Publications

- International publications: **9** journal publications, **21** conference publications, **7** workshop publications
- Complete publication list at ResearchGate: https://www.researchgate.net/profile/Jorge_Gomes10
- Over 500 citations, *h-index* of 13. Google Scholar profile: <https://goo.gl/o41kHk>
- Reviewer and Program Committee member for major journals and conferences: <http://publons.com/a/1286353/>

International Journal Publications

- IJ9 J. Gomes, P. Mariano, and A. L. Christensen (2019). “Challenges in cooperative coevolution of physically heterogeneous robot teams”. In: *Natural Computing* 18 (1), pp. 29–46. **Invited paper**
- IJ8 J. Gomes, S. M. Oliveira, and A. L. Christensen (2018a). “An approach to evolve and exploit repertoires of general robot behaviours”. In: *Swarm and Evolutionary Computation* 43, pp. 265–283
- IJ7 J. Gomes, P. Mariano, and A. L. Christensen (2018b). “Dynamic Team Heterogeneity in Cooperative Coevolutionary Algorithms”. In: *IEEE Transactions on Evolutionary Computation* 22 (6), pp. 934–948
- IJ6 M. Duarte, J. Gomes, S. M. Oliveira, and A. L. Christensen (2018). “Evolution of repertoire-based control for robots with complex locomotor systems”. In: *IEEE Transactions on Evolutionary Computation* 22 (2), pp. 314–328
- IJ5 J. Gomes, P. Mariano, and A. L. Christensen (2017). “Novelty-driven Cooperative Coevolution”. In: *Evolutionary Computation* 25 (2), pp. 275–307
- IJ4 M. Duarte, V. Costa, J. Gomes, T. Rodrigues, F. Silva, S. M. Oliveira, and A. L. Christensen (2016a). “Evolution of Collective Behaviors for a Real Swarm of Aquatic Surface Robots”. In: *PLoS ONE* 11 (3), e0151834
- IJ3 J. Gomes, P. Urbano, and A. L. Christensen (2014b). “PMCNS: Using a Progressively Stricter Fitness Criterion to Guide Novelty Search”. In: *International Journal of Natural Computing Research* 4, pp. 1–19. **Invited paper**
- IJ2 J. Gomes, P. Urbano, and A. L. Christensen (2013). “Evolution of swarm robotics systems with novelty search”. In: *Swarm Intelligence* 7 (2–3), pp. 115–144
- IJ1 N. Montenegro, J. Gomes, P. Urbano, and J. Duarte (2012). “A Land Use Planning Ontology: LBCS”. in: *Future Internet* 4 (1), pp. 65–82

International Conference Publications (selected)

- IC8 J. Gomes and A. L. Christensen (2018). “Comparing approaches for evolving high-level robot control based on behaviour repertoires”. In: *IEEE Congress on Evolutionary Computation (CEC)*. IEEE, pp. 1–6 **Nominated for best paper**
- IC7 M. Duarte, J. Gomes, S. M. Oliveira, and A. L. Christensen (2016b). “EvoRBC: Evolutionary Repertoire-based Control for Robots with Arbitrary Locomotion Complexity”. In: *Genetic and Evolutionary Computation Conference (GECCO)*. ACM Press, pp. 93–100
- IC6 J. Gomes, M. Duarte, P. Mariano, and A. L. Christensen (2016). “Cooperative Coevolution of Control for a Real Multirobot System”. In: *Parallel Problem Solving from Nature (PPSN)*. Springer, pp. 591–601. **Nominated for best paper**
- IC5 J. Gomes, P. Mariano, and A. L. Christensen (2015a). “Cooperative Coevolution of Morphologically Heterogeneous Robots”. In: *European Conference on Artificial Life (ECAL)*. MIT Press, pp. 312–319. **Nominated for best paper**
- IC4 J. Gomes, P. Mariano, and A. L. Christensen (2015c). “Devising Effective Novelty Search Algorithms: A Comprehensive Empirical Study”. In: *Genetic and Evolutionary Computation Conference (GECCO)*. ACM Press, pp. 943–950
- IC3 J. Gomes, P. Mariano, and A. L. Christensen (2015b). “Cooperative Coevolution of Partially Heterogeneous Multiagent Systems”. In: *International Conference on Autonomous Agents & Multiagent Systems (AAMAS)*. IFAAMAS, pp. 297–305
- IC2 J. Gomes, P. Mariano, and A. L. Christensen (2014a). “Avoiding Convergence in Cooperative Coevolution with Novelty Search”. In: *International Conference on Autonomous Agents & Multiagent Systems (AAMAS)*. IFAAMAS, pp. 1149–1156
- IC1 J. Gomes and A. L. Christensen (2013). “Generic Behaviour Similarity Measures for Evolutionary Swarm Robotics”. In: *Genetic and Evolutionary Computation Conference (GECCO)*. ACM Press, pp. 199–206. **Nominated for best paper**