

# Fernando Silva

RESEARCHER · SCIENTIST · ENGINEER · ENTREPRENEUR

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## Summary

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Nationality: Portuguese

Date of birth: November 6, 1989

Innovative researcher, scientist, and engineer with extensive experience. Has a track record of quickly conquering new challenges, and is the recipient of numerous awards for scientific and academic performance. Proficient communicator: has authored and co-authored 30+ scientific publications, and has three and a half years of university lecturing experience. Skilled entrepreneur: has co-founded a high-tech startup on multirobot systems for marine environments. Fan of disruptive innovation, open educational resources, open science, and open source software.

Areas of expertise include machine learning, data science, data-driven decision making, artificial intelligence, software engineering, cloud engineering, modelling and simulation, neural networks, robotics, distributed control, evolutionary computation, and scientific writing.

## Education

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### PhD in Informatics

Lisbon, Portugal

FACULTY OF SCIENCES, UNIVERSITY OF LISBON (FC/UL)

Jan. 2013 - Jun. 2017

- Approved with the highest distinction by unanimous decision (*Distinção e Louvor*)
- Thesis title: Evolutionary Online Behaviour Learning and Adaptation in Robotic Systems
- Areas of research: Machine Learning and Robotics
- Topics: Collective robotics, distributed control, online machine learning, evolutionary computation, neural networks, hyper-heuristics, racing.

### Act by Cotec – COHiTEC Entrepreneurship Program

Lisbon, Portugal

INDEG BUSINESS SCHOOL, IN COLLABORATION WITH COTEC PORTUGAL AND NORTH CAROLINA STATE UNIVERSITY, US

Feb. 2015 – Jul. 2015

- Technology commercialisation accelerator aimed at supporting the valuation of knowledge produced in Portuguese R&D institutions. Topics of interest include: intellectual property rights, business models, financials, funding, go-to-market strategies, and market analysis, among others.
- Participation in the program with the *Ocean Swarm* project.
- Development of a business plan and pitch to investors.

### MSc in Informatics Engineering

Lisbon, Portugal

FACULTY OF SCIENCES, UNIVERSITY OF LISBON (FC/UL)

Sept. 2010 - Nov. 2012

- Grade average: 18/20
- Specialisation in Knowledge and (Human-Machine) Interaction
- Thesis title: Online Evolution of Robot Behaviour

### BSc in Informatics Engineering

Lisbon, Portugal

FACULTY OF SCIENCES, UNIVERSITY OF LISBON (FC/UL)

Sept. 2007 - Jul. 2010

- Grade average: 16/20

## Industry Experience

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### Vodafone Portugal – Comunicações Pessoais, S.A.

Lisbon, Portugal

SENIOR DATA SCIENTIST

Apr. 2018 - now

- Vodafone Portugal – Comunicações Pessoais, S.A. is a full subsidiary of the Vodafone Group.
- Role: Member of the *Big Data & Analytics* team.

### COFCO International

Lisbon, Portugal

SENIOR DATA SCIENTIST & TECHNICAL LEAD

Sep. 2017 - Mar. 2018

- COFCO Agri, Ltd is the Swiss-based international trading arm of the COFCO group. COFCO Agri engages in worldwide agricultural trading and processing businesses, including oilseed processing in China; oilseed crushing, refining, and biodiesel operations in Brazil, Argentina, South Africa, Ukraine, and India, and other types of operations in countries such as Australia, Saudi Arabia, Jordan, Dubai, Egypt, Ukraine and Russia.
- Role: Leading data-driven maritime intelligence at COFCO Agri's freight research department. Reporting to the head of freight research. Job duties include: architect and implement a cloud-based analytics platform; evaluate quality of data sources; develop methods to extract, transform, and load large amounts of both structured data and unstructured data; design data management & data retention policies; research data mining and machine learning techniques to sort through information (e.g. clustering and geo-clustering procedures, regression analysis, kernel density estimation); develop data visualizations, dashboards, and web applications to aid in business decisions. Architected and carried out migration strategies for data and applications.
- Two internal products developed: **vessel tracking system** – includes automatic estimation of ports, berths, and congestion/waiting areas; **ship profile explorer** – includes automatic classification of ships with a suspicious profile (operational factors and/or ship capabilities).
- Practices: Agile (Scrum and Kanban), build automation (Maven), version control (Git).
- Tech stack (selected): RESTful APIs, Java, R, R markdown, Python, SQL (MySQL), Tableau, Shiny, Flexdashboard, Leaflet, Quartz Job Scheduler, Spring Integration, Docker, Amazon Web Services (RDS, DynamoDB, EC2, S3, Lambda, Cloudwatch, Simple Email Service), Bugsnag, Nginx, Selenium, Google Cloud Platform (Cloud SQL, Compute Engine, Cloud Storage).

## Talkdesk, Inc

Lisbon, Portugal

DATA SCIENCE SPECIALIST

Apr. 2017 - Sep. 2017

- Talkdesk is a world-leading, cloud-based call centre software solution focused on improving customer interactions and reducing costs.
- Role: Designing and developing pipelines for data-driven decision making. Data mining & data analysis. Building models to forecast the availability of Talkdesk's applications and to infer customer satisfaction after a call has been made. Part of a task force assembled for increasing the robustness of Talkdesk's main commercial product, including recovering from failures in critical services (internal and third-parties).
- Practices: Agile (Scrum, Kanban), test-driven development (JUnit, Mockito, Spek), build automation (Maven, Gradle), version control (Git).
- Tech stack (selected): RESTful APIs, Java, Kotlin, SQL, Docker, Apache Storm, Redis, RabbitMQ, MongoDB, Heroku, Amazon Web Services (Athena, ALB/ELB, EC2, S3, SQS), Google Cloud Platform (Kubernetes), Looker, Datadog, Bugsnag.

## Ocean Swarm, Lda

Lisbon, Portugal

CO-FOUNDER

Mar. 2016 - Sep. 2016

- Ocean Swarm is an award-winning high-tech startup developing multirobot systems for marine environments.
- Role: Software and hardware development. Synthesis of controllers for robots based on artificial intelligence techniques. Prospect funding opportunities (P2020, H2020).

## Teaching Experience

### Faculty of Sciences, University of Lisbon

Lisbon, Portugal

INVITED TEACHING ASSISTANT

Sep. 2013 - Aug. 2015

- Programming Laboratories, BSc in Informatics Engineering (2 semesters, 2013/2014 and 2014/2015).
- Computing Systems Architectures, BSc in Informatics Engineering (1 semester, 2014/2015).
- Introduction to Computing Systems, BSc in Informatics Engineering (1 semester, 2013/2014).

COLLABORATOR

Feb. 2013 - Dec. 2014

- Mobile Robots, MSc in Informatics Engineering/Informatics, PhD in Informatics.
- Artificial Life, Computing Models, Natural Computation. MSc in Informatics Engineering/Informatics/Cognitive Science, PhD in Cognit. Science.

UNDERGRADUATE TEACHING ASSISTANT

Sep. 2010 - Sep. 2011

- Introduction to Computing Systems, BSc in Informatics Engineering.
- Programming Elements, BSc in Mathematics, BSc in Applied Mathematics.

## Research Experience

### Biosystems & Integrative Sciences Institute, Faculty of Sciences, University of Lisbon

Lisbon, Portugal

RESEARCHER

Jan. 2015 - now

- Member of the Agent and Systems Modelling (MAS) group and of the Artificial Life group (GruVA)

### Bio-inspired Computation and Intelligent Machines Lab, Lisbon, Portugal

Lisbon, Portugal

RESEARCHER

Sep. 2014 - now

### Instituto de Telecomunicações, Lisbon, Portugal

Lisbon, Portugal

RESEARCHER

Oct. 2012 - now

- Member of the Information Technology group

### Laboratory of Agent Modelling, Faculty of Sciences, University of Lisbon

Lisbon, Portugal

RESEARCHER

Sep. 2009 - Dec. 2014

- Member of the Artificial Life group (GruVA)

## Honours, Awards, & Nominations

2017	<b>Highest Distinction by Unanimous Decision, PhD thesis</b> , "Evolutionary Online Behaviour Learning and Adaptation in Robotic Systems"	FC/UL
2017	<b>Notable Article</b> , "Open Issues in Evolutionary Robotics": <a href="http://www.computingreviews.com/recommend/bestof/notableitems.cfm?bestYear=2016">http://www.computingreviews.com/recommend/bestof/notableitems.cfm?bestYear=2016</a>	21st Annual Best of Computing by ACM
2016	<b>Innovation Award (Honourable mention)</b> , Prémios Exame Informática	Exame Informática
2016	<b>Best Robot Video Award</b> , "A Sea of Robots", AAAI Video Competition	AAAI
2016	<b>Best Student Paper Award</b> , "Online Hyper-Evolution of Controllers in Multirobot Systems"	10th IEEE SASO
2016	<b>Best Paper Award</b> , "Leveraging Online Racing and Population Cloning in Evolutionary Multirobot Systems"	EvoROBOT/EvoStar
2016	<b>Bursary Award</b> , "Leveraging Online Racing and Population Cloning in Evolutionary Multirobot Systems"	EvoStar
2015	<b>FoCAS Award</b> , relevant research in collective adaptive systems: <a href="http://focas.eu/aamas-2015/">http://focas.eu/aamas-2015/</a>	AAMAS
2015	<b>IFAAMAS Scholarship</b> , "R-Hybrid: Evolution of Agent Controllers with a Hybridisation of Indirect and Direct Encodings"	AAMAS
2014	<b>Bursary Award</b> , "Speeding Up Online Evolution of Robotic Controllers with Macro-neurons"	EvoStar

2013	<b>Nominated for Best Paper</b> , “Dynamics of Neuronal Models in Online Neuroevolution of Robotic Controllers”	EPIA
2013	<b>Nominated for Best Student Paper</b> , “Dynamics of Neuronal Models in Online Neuroevolution of Robotic Controllers”	EPIA
2013	<b>Top Paper</b> , “Dynamics of Neuronal Models in Online Neuroevolution of Robotic Controllers”	ALEA/EPIA
2012	<b>Best Paper Award (tied)</b> , “odNEAT: An Algorithm for Distributed Online, Onboard Evolution of Robot Behaviours”	Collective Dynamics - ALIFE’13
2012	<b>Bursary Award</b> , “odNEAT: An Algorithm for Distributed Online, Onboard Evolution of Robot Behaviours”	ALIFE’13
2012	<b>Excellent MSc</b> , Informatics Engineering	FC/UL
2010	<b>Academic Merit Award</b> , top 3 finalists of the BSc in Informatics Engineering	FC/UL

## Research Projects

### Evolutionary Online Behaviour Learning and Adaptation in Robotic Systems

Lisbon, Portugal

ROLE: PHD STUDENT/RESEARCHER

Oct. 2012 - Mar. 2017

- Funding: Grant PEst-OE/EEI/LA0008/2011 from IT (Oct. 2012 - Feb. 2013; ≈ € 3 K) and FCT doctoral grant SFRH/BD/89573/2012 (Apr. 2013 - Mar. 2017; ≈ € 47 K to student, € 11 K to FC/UL in tuitions)
- Supervisors: Anders Lyhne Christensen, ISCTE-IUL/IT, and Luís Correia, BioISI - FC/UL
- Objective: One radical and open-ended approach to learning in robotic systems is online evolution. Online evolution employs evolutionary computation, a nature-inspired approach that mimics Darwinian evolution. Instead of a robot engineer manually programming the robots to carry out a mission, an evolutionary algorithm is executed onboard each robot in order to create and continuously optimise its behavioural control logic. The different instances of the evolutionary algorithm execute autonomously without any external supervision or human intervention. Online evolution can thus automatically generate the artificial intelligence that controls each robot, and gives robots the capacity to cope with unforeseen changes. In this research, we study new ways to enable efficient online evolution in real robots and in simulated robots.

### Agent-based Monitoring and Decision Models in Distributed Computational Environments

Lisbon, Portugal  
and Kraków, Poland

ROLE: RESEARCHER

Jan. 2015 - Dec. 2016

- Internal cooperation in Science between Portugal and Poland, 8 researchers.
- Local coordinator: Luís Correia, BioISI - FC/UL
- Funding: € 4K
- Objective: This project focuses on integrating a multi-agent system with a distributed system dedicated to big data processing. The deployment and provision of the management of big data applications is expected to benefit from an intelligent middleware infrastructure, which can be formulated to create hybrid distributed computational environments (such as hybrid grids and clouds) consisting of multiple public (municipalities, research organisations) and private infrastructure providers to deliver on-demand access to a variety of applications.

### Heterogeneous Ad-hoc Network for the Coordination of Aquatic Drones (HANCAD)

Lisbon, Portugal

ROLE: RESEARCHER

Apr. 2014 - Mar. 2016

- Internal IT project, 15 researchers.
- Coordinator: Anders Lyhne Christensen, ISCTE-IUL/IT
- Funding: € 40 K
- Objective: In this project, we will design, implement, and test a novel network architecture that enables decentralised coordination between autonomous drones, and to maintain communication links between the drone collective and a base station. We will study a heterogeneous network architecture comprised of (i) low-range and low-power communication technologies (ZigBee, Wi-Fi) that enable drones to communicate and coordinate with their neighbours, and (ii) long-range technologies (3G/GPRS) that enable a subset of the drones with extra large batteries to relay messages to a base station that could be located on land or at sea.

### Control of Aquatic Drones for Maritime Tasks (CORATAM)

Lisbon, Portugal

ROLE: RESEARCHER

Apr. 2014 - Jul. 2015

- FCT project EXPL/EEIAUT/0329/2013, 8 researchers.
- Coordinator: Anders Lyhne Christensen, ISCTE-IUL/IT
- Funding: € 47 K
- Objective: The sea represents one of Portugal’s main resources. Novel ways of exploring and exploiting maritime opportunities are of particular interest given the proposed expansion of Portugal’s continental shelf, which is expected to be ratified by the UN in 2014. Collectives of aquatic drones have the potential to take on essential tasks such as prospecting sites for aquaculture, environmental monitoring, sea life localisation, bridges inspection, sea border patrolling, and so on. Many of these tasks require distributed sensing, scalability, and robustness to faults, which can be facilitated by collectives of robots with decentralised control based on principles of self-organization. In this project, we explore the applicability of a novel hybrid approach to the synthesis of control systems for a collective of aquatic drones.

### Animal and robot Societies Self-organise and Integrate by Social Interaction (ASSISibf)

Lisbon, Portugal

ROLE: RESEARCHER

Feb. 2013 - Mar. 2014

- FP7-ICT large-scale integrating project, no. 601074, 6 partners.
- Coordinator: Thomas Schmittl, Karl Franzens University, Graz, Austria - Artificial Life Lab
- Funding: EU contribution - € 6.0 M; total cost - € 7.66 M
- Objective: The ASSISibf project focuses on self-organising mixed societies of real social animals, namely bees and fish, and artificial systems (robots). The ultimate goal of the project is to develop a new field of science concerning self-adapting engineered systems able to integrate themselves in existing natural societies, and introduce novel methods in fields such as agriculture and environmental sustainability.

## Online Evolution of Robot Behaviour

ROLE: MSc STUDENT/RESEARCHER

- Supervisors: Anders Lyhne Christensen, ISCTE-IUL/IT, Paulo Urbano, LabMAG - FC/UL.
- Objective: Development of novel algorithms for online evolution of behavioural control in groups of simulated robots.

*Lisbon, Portugal*

*Sep. 2011 - Sep. 2012*

## PREVER

ROLE: RESEARCHER

- QREN project no. 13776, 4 partners
- Supervisor: Paulo Urbano, LabMAG - FC/UL.
- Funding: € 609 K
- Objective: Development of a forecasting system for mobile workforces demand. Project in conjunction with EDP - Energias de Portugal (electricity and gas operations company).

*Lisbon, Portugal*

*Sep. 2011 - Aug. 2012*

## Asynchronous Cellular Automata

ROLE: RESEARCHER

- Internal LabMAG project.
- Supervisor: Luís Correia, LabMAG - FC/UL
- Objective: Design and implementation of a simulation platform for modelling and studying discrete dynamical systems. Study the temporal and spatial dynamics of asynchronous cellular automata.

*Lisbon, Portugal*

*Sep. 2009 - Aug. 2011*

## Execution of Symbolic Neural Networks

ROLE: RESEARCHER

- Internal LabMAG project.
- Funding: FCT integration into research grant.
- Supervisor: João Pedro Neto, LabMAG - FC/UL
- Objective: Design and implementation of a translator and simulator for the parallel execution of algorithms with recurrent neural networks.

*Lisbon, Portugal*

*Sep. 2009 - Aug. 2010*

## Funding

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### Heterogeneous Ad-hoc Network for the Coordination of Aquatic Drones (HANCAD)

SIGNIFICANT CONTRIBUTION TO FUNDED PROPOSAL

*Lisbon, Portugal*

*Apr. 2014 - Mar. 2016*

### Control of Aquatic Drones for Maritime Tasks (CORATAM)

SIGNIFICANT CONTRIBUTION TO FUNDED PROPOSAL

*Lisbon, Portugal*

*Apr. 2014 - Jul. 2015*

### FCT PhD Grant SFRH/BD/89573/2012

AUTHOR OF FUNDED PROPOSAL

*Instituto de Telecomunicações*

*Apr. 2013 - Mar. 2017*

### Grant PEst-OE/EEI/LA0008/2011 - B

RESEARCHER

*Instituto de Telecomunicações*

*Oct. 2012 - Feb. 2013*

### Research Grant, QREN project no 13776

RESEARCHER

*LabMAG - FC/UL*

*Sep. 2011 - Aug. 2012*

### FCT Integration into Research Grant

JUNIOR RESEARCHER

*LabMAG - FC/UL*

*Sep. 2009 - Aug. 2010*

## Student Supervision

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### Introduction to Robotics

ROLE: PROJECT CO-SUPERVISOR

- Advised four BSc students on the fundamentals of mobile robotics

*FC/UL*

*Sep. 2014 - Dec. 2014*

### Artificial Life

ROLE: PROJECT CO-SUPERVISOR

- Advised three MSc students on neural networks and bio-inspired computation

*FC/UL*

*Oct. 2013 - Nov. 2013*

### Mobile Robots

ROLE: PROJECT CO-SUPERVISOR

- Advised one MSc student on unsupervised behaviour learning in robotics

*FC/UL*

*Apr. 2013 - Jul. 2013*

## Courses

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### Practical Predictive Analytics: Models and Methods

UNIVERSITY OF WASHINGTON

- Grade achieved: 100%. Verified certificate.

*Coursera (online)*

*Dec. 2016*

### Communicating Data Science Results

UNIVERSITY OF WASHINGTON

- Grade achieved: 90%. Verified certificate.

*Coursera (online)*

*Nov. 2016*

### Data Manipulation at Scale: Systems and Algorithms

UNIVERSITY OF WASHINGTON

- Grade achieved: 100%. Verified certificate.

*Coursera (online)*

*Oct. 2016*

## Open Source Software Development

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### Simulation platform “JBotEvolver”

ROLE: DEVELOPER

- Neuroevolution platform and robotics simulator for education and research-driven experiments. Used in 50+ scientific publications.
- Software released as open-source: <https://github.com/BioMachinesLab/jbotevolver>

*Lisbon, Portugal*

*Sep. 2011 - Aug. 2017*

### Raspberry Pi-based control system for groups of Thymio II robots

ROLE: DEVELOPER

- Development of the onboard control system and the operator’s command and control system.
- Development of the control synthesis techniques that allow robots to learn new behaviour and adapt their behaviour during task execution.
- Development of a Common Interface that allows the same codebase to be executed on real robots and in simulation (JBotEvolver).
- Software released as open-source: <https://github.com/fgsilva/thymios>

*Lisbon, Portugal*

*May 2015 - Aug. 2016*

### Robotics platform “Ocean Swarm Zero”

ROLE: RESEARCHER

- Contributions to software development (onboard control system and the operator’s command and control system).
- Contributions to hardware development and maintenance.
- Software released as open-source: <http://goo.gl/pjtgh9>.

*Lisbon, Portugal*

*Sep. 2014 - Jul. 2016*

### Simulation platform “CAS”

ROLE: RESEARCHER

- Cellular automata modelling and simulation platform.
- Used in master-level courses and doctoral-level courses at FC/UL.

*Lisbon, Portugal*

*Sep. 2009 - Aug. 2011*

## Outreach and Community Engagement

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### Member

INTERNATIONAL SOCIETY FOR ARTIFICIAL LIFE

*ISAL*

*Apr. 2012 - now*

### Participant

ROBOTICS EXERCISE 2015 – REX15

- Field tests and demonstration of the robotics platform “Ocean Swarm Zero” to the Portuguese Navy.

*Lisbon Naval Base, Portugal*

*Jun. 2015*

### Exhibitor

BLUE BUSINESS FORUM (TRADE FAIR, HELD AS PART OF THE BLUE WEEK INITIATIVE)

- Showcased the technology behind the robotics platform “Ocean Swarm Zero”.

*FIL, Lisbon, Portugal*

*Jun. 2015*

### Organiser and host

LABMAG SEMINARS AND SCIENTIFIC MEETINGS

- Initiated, organised, and hosted seminars and scientific meetings.

*Lisbon, Portugal*

*Jan. 2012 - Jul. 2012, Jun. 2013 - Jun. 2014*

### Co-webmaster

16TH PORTUGUESE CONFERENCE ON ARTIFICIAL INTELLIGENCE (EPIA)

*Ilha Terceira, Azores, Portugal*

*Oct. 2012 - Sep. 2013*

### Volunteer

15TH PORTUGUESE CONFERENCE ON ARTIFICIAL INTELLIGENCE (EPIA)

*Lisbon, Portugal*

*Oct. 2011*

## Volunteer in educational and public outreach activities

INFORMATICS DEPARTMENT, FACULTY OF SCIENCES, UNIVERSITY OF LISBON

- Examples include Futurália, Dia Aberto, and visits from prospective high-school students.

Lisbon, Portugal

Sep. 2009 - Aug. 2014

## Participation in inter-university programming tournaments (TIUPs)

FACULTY OF SCIENCES, UNIVERSITY OF LISBON

Lisbon, Portugal

Sep. 2009 - Aug. 2010

## Member of the student mentoring program

FACULTY OF SCIENCES, UNIVERSITY OF LISBON

Lisbon, Portugal

Sep. 2008 - Aug. 2009

## Press Coverage (selected)

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### Aprendizagem evolucionária de grupos de robôs em contexto real

ONLINE ARTICLE: [HTTPS://GOO.GL/ZLULQG](https://goo.gl/zLULQG)

Info Ciências

Aug. 11, 2017

### Online evolution lets robots learn, adapt and cooperate

ONLINE ARTICLE: [HTTPS://GOO.GL/AMKQAT](https://goo.gl/AMKQAT)

Axios

Jul. 26, 2017

### AAAI Video Highlights: Drones Navigating Forests and Robot Boat Swarms

ONLINE ARTICLE: [HTTP://GOO.GL/0A19QC](http://goo.gl/0A19QC)

IEEE Spectrum

Feb. 11, 2016

### Drones of the sea learn to swarm

ONLINE ARTICLE: [HTTP://GOO.GL/BSPG4W](http://goo.gl/BSPG4W)

ZDNET

Feb. 5, 2016

### Will SWARMS of smart surveillance ships soon spy from the sea? Researchers reveal self learning ships that can 'think for themselves'

ONLINE ARTICLE: [HTTP://GOO.GL/T1h9BM](http://goo.gl/T1h9BM)

Daily Mail

Feb. 3, 2016

### Swarming robot boats demonstrate self-learning

ONLINE ARTICLE: [HTTPS://GOO.GL/SoO0EE](https://goo.gl/SoO0EE)

Gizmag

Feb. 2, 2016

### Sucesso.pt

NATIONAL TV SEGMENT: [HTTP://GOO.GL/SHQD8R](http://goo.gl/SHQD8R)

- Business feature on Ocean Swarm, including interviews and footage of aquatic drones.

SIC Notícias

Sep. 19, 2015

### Exame Informática TV, no 467

NATIONAL TV SEGMENT: [HTTP://GOO.GL/MODSYI](http://goo.gl/MODSYI)

- Technology feature on Ocean Swarm, including interviews and footage of aquatic drones.

SIC Notícias

Sep. 12, 2015

### Heróis do Mar e do Enxame

NATIONAL PRINT ARTICLE: [HTTP://GOO.GL/CHQXAY](http://goo.gl/CHQXAY)

- Technology feature on Ocean Swarm.

Exame Informática

Aug. 28, 2015

### Cohitec: detetar um enfarte numa hora e o HIV em três dias

ONLINE ARTICLE: [HTTP://GOO.GL/Cg3c48](http://goo.gl/Cg3c48)

Exame Informática

Jul. 15, 2015

### Inovações que detetam o HIV em três dias e drones que procuram peixe sozinhos

ONLINE ARTICLE: [HTTP://GOO.GL/E95PRH](http://goo.gl/E95PRH)

Observador

Jul. 14, 2015

### Investigadores desenvolvem drone para realizar tarefas no mar

REGIONAL PRINT ARTICLE: [HTTP://GOO.GL/RCAL5K](http://goo.gl/RCAL5K)

Observador

Jun. 22, 2015

### Utilização de Drones

REGIONAL TV SEGMENT: [HTTP://GOO.GL/QMJ1P7](http://goo.gl/QMJ1P7)

- Technology feature on Ocean Swarm (03:30 - 05:00).

RTP Açores

Jun. 20, 2015

### Mini-Fórum CYTED

REGIONAL TV SEGMENT: [HTTP://GOO.GL/QMJ1P7](http://goo.gl/QMJ1P7)

- Technology feature on Ocean Swarm (13:00 - 16:00).

RTP Açores

Jun. 16, 2015

### Portugueses em projeto para perceber linguagem animal

ONLINE ARTICLE: [HTTP://GOO.GL/SRHQFF](http://goo.gl/SRHQFF)

Lusa/DN Ciência

Apr. 04, 2014

## Talks

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### MAS-BioISI research seminar

PRESENTER FOR *Evolutionary Online Behaviour Learning and Adaptation in Robotic Systems*

Lisbon, Portugal

Jun. 2017

### 10th IEEE International Conference on Self-Adaptive and Self-Organizing Systems

PRESENTER FOR *Online Hyper-Evolution of Controllers for Multirobot Systems*

Augsburg, Germany

Sep. 2016

### 19th European Conference on the Applications of Evolutionary Computation

PRESENTER FOR *Leveraging Online Racing and Population Cloning in Evolutionary Multirobot Systems*

Porto, Portugal

Apr. 2016

### 17th Portuguese Conference on Artificial Intelligence

PRESENTER FOR *A Case Study on the Scalability of Online Evolution of Robotic Controllers*

Coimbra, Portugal

Sep. 2015

### International Conference on Autonomous Agents and Multiagent Systems

PRESENTER FOR *R-Hybrid: Evolution of Agent Controllers with a Hybridisation of Indirect and Direct Encodings* AND FOR *Engineering Online Evolution of Robot Behaviour*

Istanbul, Turkey

May 2015

### 3rd International Workshop on the Evolution of Physical Systems

PRESENTER FOR *Towards Online Evolution of Control for Real Robots with odNEAT*

New York City, NY, US

Jul. 2014

### 17th European Conference on the Applications of Evolutionary Computation

PRESENTER FOR *Speeding Up Online Evolution of Robotic Controllers with Macro-neurons*

Granada, Spain

Apr. 2014

### 16th Portuguese Conference on Artificial Intelligence

PRESENTER FOR *Dynamics of Neuronal Models in Online Neuroevolution of Robotic Controllers*

Terceira island, Portugal

Sep. 2013

### 10th International Conference on Cellular Automata for Research and Industry

PRESENTER FOR *A Study of Stochastic Noise and Asynchronism in Elementary Cellular Automata*

Santorini, Greece

Sep. 2012

### 5th International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems

PRESENTER FOR *Continuous Adaptation of Robot Behaviour through Online Evolution and Neuromodulated Learning*

Montpellier, France

Aug. 2012

### 13th International Conference on the Simulation & Synthesis of Living Systems

PRESENTER FOR *odNEAT: An Algorithm for Distributed Online, Onboard Evolution of Robot Behaviours*

East Lansing, Michigan, US

Jul. 2012

### LabMAG seminars

PRESENTER FOR *odNEAT: An Algorithm for Distributed Online, Onboard Evolution of Robot Behaviours*

Lisbon, Portugal

Feb. 2012

### 15th Portuguese Conference on Artificial Intelligence

PRESENTER FOR *Noise and Intermediate Asynchronism in Cellular Automata with Sampling Compensation*

Lisbon, Portugal

Oct. 2011

### 10th International Conference on Adaptive and Natural Computing Algorithms

PRESENTER FOR *Parallelization of Algorithms with Recurrent Neural Networks*

Ljubljana, Slovenia

Apr. 2011

## Publications and Reviewing Activity

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### Book Chapters

**BC1** F. Silva, L. Correia, and A. L. Christensen (2015). *Modelling Synchronisation in Multirobot Systems with Cellular Automata*. In: "Robots and Lattice Automata", eds. G. Sirakoulis and A. Adamatzky. Emergence, Complexity and Computation 13, 267–293. Springer International Publishing, Switzerland.

### Journal Publications

**IJ9** F. Silva, L. Correia, and A. L. Christensen (2017). *Evolutionary Online Behaviour Learning and Adaptation in Real Robots*. Royal Society Open Science 4, 160938.

- IJ8** F. Silva, L. Correia, and A. L. Christensen (2017). *Hyper-Learning Algorithms for Online Evolution of Robot Controllers*. ACM Transactions on Autonomous and Adaptive Systems 12(3), 1–26. **Invited article.**
- IJ7** F. Silva, L. Correia, and A. L. Christensen (2017). *Evolutionary Online Learning in Multirobot Systems*. AI Matters 3(1), 23–24.
- IJ6** F. Silva, P. Urbano, L. Correia, and A. L. Christensen (2016). *Open Issues in Evolutionary Robotics*. Evolutionary Computation 24(2), 205–236.  
**“Notable Article” distinction - 21st Annual Best of Computing by ACM Computing Reviews.**  
<http://www.computingreviews.com/recommend/bestof/notableitems.cfm?bestYear=2016>
- IJ5** F. Silva, L. Correia, and A. L. Christensen (2016). *Evolutionary Robotics*. Scholarpedia 11(7), 33333.
- IJ4** M. Duarte, V. Costa, J. Gomes, T. Rodrigues, F. Silva, S. M. Oliveira, and A.L. Christensen (2016). *Evolution of Collective Behaviors for a Real Swarm of Aquatic Surface Robots*. PLoS ONE 11(3), e0151834.
- IJ3** F. Silva, P. Urbano, L. Correia, and A. L. Christensen (2015). *odNEAT: An Algorithm for Decentralised Online Evolution of Robotic Controllers*. Evolutionary Computation 23(3), 421–449.
- IJ2** F. Silva, P. Urbano, and A. L. Christensen (2014). *Online Evolution of Adaptive Robot Behaviour*. International Journal of Natural Computing Research 4(2). 59–77. **Invited article.**
- IJ1** F. Silva and L. Correia (2013). *An Experimental Study of Noise and Asynchrony in Elementary Cellular Automata with Sampling Compensation*. Natural Computing 12(4), 573–588.

## Conference Publications

- IC22** F. Silva, L. Correia, and A. L. Christensen (2016). *Online Hyper-Evolution of Controllers in Multirobot Systems*. In 10th IEEE International Conf. on Self-Adaptive and Self-Organizing Syst. (SASO). IEEE Press, Piscataway, NJ.  
**Best Student Paper Award.**
- IC21** F. Silva, L. Correia, and A. L. Christensen (2016). *Leveraging online racing and population cloning in evolutionary multirobot systems*. In: 19th European Conf. on the Applications of Evolutionary Computation (EvoApplications), pp. 165–180. Springer International Publishing, Switzerland.  
**Best Paper Award (Evolutionary Robotics track).**
- IC20** M. Duarte, J. Gomes, V. Costa, T. Rodrigues, F. Silva, V. Lobo, M. Marques, S. M. Oliveira, and A. L. Christensen (2016). *Application of Swarm Robotic Systems to Marine Environmental Monitoring*. In: IEEE/MTS OCEANS 2016, pp. 1–8. IEEE Press, Piscataway, NJ.
- IC19** M. Duarte, V. Costa, J. Gomes, T. Rodrigues, F. Silva, S. M. Oliveira, and A. L. Christensen (2016). *Unleashing the Potential of Evolutionary Swarm Robotics in the Real World*. In: Genetic and Evolutionary Computation Conf. (GECCO), pp. 159–160. ACM Press, New York, NY.
- IC18** F. Silva, L. Correia, and A. L. Christensen (2015). *A Case Study on the Scalability of Online Evolution of Robotic Controllers*. In: 17th Portuguese Conf. on Artificial Intelligence (EPIA), pp. 189–200. Springer International Publishing, Switzerland.
- IC17** R. Mills, P. Zahadat, F. Silva, D. Miklic, P. Mariano, T. Schmickl, and L. Correia (2015). *Coordination of Collective Behaviours in Spatially Separated Agents*. In: 13th European Conf. on Artificial Life (ECAL), pp. 579–586. MIT Press, Cambridge, MA.
- IC16** F. Silva, L. Correia, and A. L. Christensen (2015). *R-Hybrid: Evolution of Agent Controllers with a Hybridisation of Indirect and Direct Encodings*. In: International Conf. on Auton. Agents and Multiagent Systems (AAMAS), pp. 735–744. IFAAMAS, Richland, SC.
- IC15** F. Silva, A. L. Christensen, and L. Correia (2015). *Engineering Online Evolution of Robot Behaviour*. In: International Conf. on Auton. Agents and Multiagent Systems (AAMAS), pp. 2017–2018. IFAAMAS, Richland, SC.
- IC14** A. L. Christensen, S. M. Oliveira, O. Postolache, M. J. de Oliveira, S. Sargento, P. Santana, L. Nunes, F. Velez, P. Sebastião, V. Costa, M. Duarte, J. Gomes, T. Rodrigues, and F. Silva (2015). *Design of Communication and Control for Swarms of Aquatic Surface Drones*. In: 7th International Conf. on Agents and Artificial Intelligence (ICAART), pp. 548–555. SCITEPRESS, Lisbon, Portugal.

- IC13** F. J. Velez, A. Nadziejko, A. L. Christensen, S. M. Oliveira, T. Rodrigues, V. Costa, M. Duarte, F. Silva, and J. Gomes (2015). *Wireless Sensor and Networking Technologies for Swarms of Aquatic Surface Drones*. In: IEEE 82nd Vehicular Technology Conf., pp. 1–2. IEEE Press, Piscataway, NJ.
- IC12** F. J. Velez, A. Nadziejko, A. L. Christensen, S. M. Oliveira, T. Rodrigues, V. Costa, M. Duarte, F. Silva, and J. Gomes (2015). *Experimental Characterization of WSNs Applied to Swarms of Aquatic Surface Drones*. In: 10th Conf. on Telecommunications. Unpublished.
- IC11** A. L. Christensen, S. M. Oliveira, O. Postolache, M. J. de Oliveira, S. Sargento, P. Santana, L. Nunes, F. Velez, P. Sebastião, V. Costa, M. Duarte, J. Gomes, T. Rodrigues, and F. Silva (2014). *Communication and Control for Swarms of Aquatic Surface Drones: the HANCAD and CORATAM projects*. In: 8° Congresso do Comité da URSI. ANACOM, Lisbon, Portugal.
- IC10** F. Silva, M. Duarte, S. M. Oliveira, L. Correia, and A. L. Christensen (2014). *The Case for Engineering the Evolution of Robot Controllers*. In: 14th International Conf. on the Synthesis & Simulation of Living Systems (ALIFE), pp. 703–710. MIT Press, Cambridge, MA.
- IC9** M. Duarte, F. Silva, T. Rodrigues, S. M. Oliveira, and A. L. Christensen (2014). *JBotEvolver: A Versatile Simulation Platform for Evolutionary Robotics*. In: 14th International Conf. on the Synthesis & Simulation of Living Systems (ALIFE), pp. 210–211. MIT Press, Cambridge, MA.
- IC8** F. Silva, L. Correia, and A. L. Christensen (2014). *Speeding up Online Evolution of Robotic Controllers with Macro-neurons*. In: 17th European Conf. on Applications of Evolutionary Computation (EvoApplications), pp. 765–776. Springer, Berlin, Germany.
- IC7** F. Silva, L. Correia, and A. L. Christensen (2013). *Dynamics of Neuronal Models in Online Neuroevolution of Robotic Controllers*. In: 16th Portuguese Conf. on Artificial Intelligence (EPIA), pp. 90–101. Springer, Berlin, Germany.  
**Top paper of the Artificial Life and Evolutionary Algorithms track. Nominated for the Best Paper Award. Nominated for the Best Student Paper Award.**
- IC6** J. Gomes, F. Silva, and T. Chambel (2012). *Genetic Soundtracks: Creative Matching of Audio to Video*. In: 6th International Conf. on Digital Arts (ARTECH), pp. 349–352. Online Proceedings.
- IC5** F. Silva, P. Urbano, and A. L. Christensen (2012). *Adaptation of Robot Behaviour through Online Evolution and Neuromodulated Learning*. In: 13th Ibero-American Conf. on Artificial Intelligence (IBERAMIA), pp. 300–309. Springer, Berlin, Germany.
- IC4** F. Silva and L. Correia (2012). *A Study of Stochastic Noise and Asynchronism in Elementary Cellular Automata*. In: 10th International Conf. on Cellular Automata for Research and Industry (ACRI), pp. 679–688. Springer, Berlin, Germany.
- IC3** F. Silva, P. Urbano, S. M. Oliveira and A. L. Christensen (2012). *odNEAT: An Algorithm for Distributed Online, On-board Evolution of Robot Behaviours*. In: 13th International Conf. on the Simulation & Synthesis of Living Systems (ALIFE), pp. 251–258. MIT Press, Cambridge, MA.  
**Tied for the Best Paper Award in the Collective Dynamics track.**
- IC2** F. Silva and L. Correia (2011). *Noise and Intermediate Asynchronism in Cellular Automata with Sampling Compensation*. In: 15th Portuguese Conf. on Artificial Intelligence (EPIA), pp. 209–222. Online Proceedings.
- IC1** J.P. Neto and F. Silva (2011). *Parallelization of Algorithms with Recurrent Neural Networks*. In: 10th International Conf. on Adaptive and Natural Computing Algorithms (ICANNGA), pp. 61–69. Springer, Berlin, Germany.

## Peer-reviewed Videos

- IV1** A. L. Christensen, M. Duarte, V. Costa, T. Rodrigues, J. Gomes, F. Silva, and S. M. Oliveira (2016). *A Sea of Robots*. In: AAAI Video Competition 2016.  
**Won Best Robot Video Award and a “Shakey” trophy.** <https://goo.gl/Qxgi12>.

## Workshop Publications

- WS2** F. Silva, L. Correia, and A. L. Christensen (2014). *Towards Online Evolution of Control for Real Robots with odNEAT*. In: 3rd International Workshop on the Evolution of Physical Systems, held as part of ALIFE 14. Unpublished.

**WS1** F. Silva, P. Urbano, and A.L. Christensen (2012). *Continuous Adaptation of Robot Behaviour through Online Evolution and Neuromodulated Learning*. In: 5th International Workshop on Evolutionary and Reinforcement Learning for Autonomous Robot Systems (ERLARS 2012), held as part of ECAI 2012. N. Siebel, Berlin, Germany, pp. 9–18, ISSN 2190-5576 (print), ISSN 2190-5746 (online).

## Thesis and Technical Reports

**TR3** F. Silva (2017). *Evolutionary Online Behaviour Learning and Adaptation in Robotic Systems*. PhD dissertation, Faculty of Sciences, Univ. of Lisbon, Portugal.

**TR2** F. Silva (2013). *Engineering Online Evolution of Robot Behaviour*. PhD Qualifying Exam, Faculty of Sciences, Univ. of Lisbon, Portugal.

**TR1** F. Silva (2012). *Online Evolution of Robot Behaviour*. MSc thesis, Faculty of Sciences, Univ. of Lisbon, Portugal.

## Reviewing Activity

### Program Committee

**PC6** GECCO 2018: Genetic and Evolutionary Computation Conference. July 15-19, 2018, Kyoto, Japan.

**PC5** GECCO 2017: Genetic and Evolutionary Computation Conference. July 15-19, 2017, Berlin, Germany.

**PC4** GECCO 2016: Genetic and Evolutionary Computation Conference. July 20-24, 2016, Denver, Colorado, USA.

**PC3** GECCO 2015: Genetic and Evolutionary Computation Conference. July 11-15, 2015, Madrid, Spain.

**PC2** GECCO 2014: Genetic and Evolutionary Computation Conference. July 12-16, 2014, Vancouver, BC, Canada.

**PC1** FEIM 2014: 1st Forum on Engineering of Informatics and Multimedia. June 5-6, 2014, Lisbon, Portugal.

**Journals (occasional reviews since 2013)** Applied Intelligence, IEEE Transactions on Cognitive and Developmental Systems, IEEE Transactions on Evolutionary Computation, Integrated Computer-Aided Design, International Journal of Advanced Robotics Systems, International Journal of Electrical Power & Energy System, Paladyn – Journal of Behavioral Robotics, Computers & Electrical Engineering.

**Conferences (occasional reviews since 2013)** Towards Autonomous Robotic Systems (TAROS), Autonomous Agents and Multi-agent Systems (AAMAS), Evolutionary Robotics (EvoRobot, held as part of Evostar), Biomimetic and Biohybrid Systems (Living Machines).