

# Alvaro Perez-Diaz

## PERSONAL DETAILS

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<i>Nationality</i>	Spanish
<i>Address</i>	Agents, Interaction and Complexity, Electronics and Computer Science, University of Southampton
<i>Phone number</i>	<i>On request</i>
<i>Website</i>	<a href="http://www.alvarop.me">http://www.alvarop.me</a> <a href="https://github.com/alvaropp">https://github.com/alvaropp</a>
<i>Email</i>	cv@alvarop.me

## WORK EXPERIENCE

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**External consulting** 2018  
*S&P Platts, BlockLab.nl*

Academic consulting and participation in an industrial innovation project looking at smart-grid technology. Work involved advising design decisions and actively working with developers.

## EDUCATION

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**Ph.D. Program. Computer Science** 2015-2019  
*University of Southampton (UK)*

Supervisors: Dr Enrico Gerding and Professor Frank McGroarty

Currently starting my third and last year, my research focuses on the interaction between large fleets of electric vehicles and electricity markets and infrastructure. So far, this research applies techniques from mathematical optimisation, mechanism design, game theory, decentralised multi-agent systems, blockchain and machine learning. Moreover, we combine theoretical results with realistic simulations using real data to back-up the proposed models. We have published this research in top conferences and journals, as detailed in the publications section.

**Minor thesis:** three-month project looking at ways to improve the ways that programming can be taught to young learners by gamification using Python and Minecraft. I developed a Minecraft modification (*mod*) in Java, Python-Tool Mod, to allow interactive execution of Python scripts that alter the virtual world in real time. This software has been used for outreach purposes in science festivals in the UK. For more information, see Publications section.

Research Interests: Multi-Agent Systems, Decentralised Multi-Agent Systems, Mathematical Optimisation, Game Theory, Mechanism Design, Forecasting, Machine Learning, Smart-Grid.

**MSc Complex Adaptive Systems**

**2nd year Erasmus Mundus Master in Complex Systems Science** 2014-2015  
*Chalmers University of Technology (Sweden)*

First Class Honours.

**Modules included:** Game theory, Simulation of Complex Systems, Quantum Physics and Scientific Visualisation.

**Master Thesis:** The Minority Game: evolution of strategy scores. Supervisor: Dr Mats

Granath.

<http://publications.lib.chalmers.se/records/fulltext/220180/220180.pdf>

### **MSc Complexity Science**

**1st year Erasmus Mundus Master in Complex Systems Science** 2013-2014

*University of Warwick (UK)*

First Class Honours.

**Modules included:** Mathematical Networks, Dynamical Systems, Self-organisation and Chaos, Statistical Mechanics, Machine Learning, Statistics.

**Master Thesis:** Ultrasonic transducers: From analytical modelling to design optimisation and validation. Supervisor: Dr Nishal Ramadas.

[https://www2.warwick.ac.uk/fac/cross\\_fac/complexity/study/emmcs/outcomes/studentprojects/perez\\_diaz\\_m1.pdf](https://www2.warwick.ac.uk/fac/cross_fac/complexity/study/emmcs/outcomes/studentprojects/perez_diaz_m1.pdf)

### **MPhys. Fundamental Physics**

2009-2015

*Universidad Nacional de Educación a Distancia (Spain)*

Upper Second Class Honours.

**Modules included:** Classical Mechanics, General Relativity, Quantum Mechanics, Solid State Physics, Statistical Mechanics, Electromagnetism, Electronics.

### **Erasmus Exchange Program in Mathematics**

2011-2012

*University of Manchester (UK)*

First Class Honours.

**Modules included:** Partial Differential Equations, Differentiable Manifolds, Algebraic Topology, Functional Analysis, Fluid Dynamics, Set Theory.

**Thesis:** Categories, Functors and Natural Transformations. Supervisor: Professor Mike Prest.

### **MMath. Mathematics**

2008-2013

*Universidad Complutense de Madrid (Spain)*

First Class Honours.

**Modules included:** Linear Algebra, Real and Complex Calculus, Group Theory, Differential Equations, Numerical Methods, Algebraic Geometry.

## **PUBLICATIONS**

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Journal papers:

- Perez-Diaz, A., Gerding, E., McGroarty F. *Detecting Strategic Manipulation in Distributed Optimisation of Electric Vehicle Aggregators*. arXiv:1810.07063 (2018).
- Perez-Diaz, A., Gerding, E., McGroarty F. *Coordination and payment mechanisms for electric vehicle aggregators*. Applied Energy, 212:185-195 (2018).
- Granath, M. and Perez-Diaz, A. *Diffusion and localization of relative strategy scores in the Minority Game*. Journal of Statistical Physics, 165(1):94–114 (2016).

Conference papers:

- Perez-Diaz, A., Gerding, E., McGroarty F. *Coordination of Electric Vehicle Aggregators: A Coalitional Approach*. In Proc. of the 17th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2018).
- Perez-Diaz, A. *Coordination of Electric Vehicle Aggregator Participation in the Day-Ahead Market*. In Proc. of the 17th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2018). Doctoral Consortium.

Workshop papers:

- Perez-Diaz, A., Gerding, E., McGroarty F. *Decentralised Coordination of Electric Vehicle Aggregators*. In International Workshop on Optimization in Multiagent Systems (OptMAS-18).

Software:

- Perez-Diaz, A. and Fangohr, H. PythonTool-Mod for Minecraft: developing programming skills with Minecraft & Python (2016). DOI: 10.5281/zenodo.801627  
<https://github.com/ngcm/PythonTool-Mod>

## **ADDITIONAL EDUCATION**

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<b>Introduction to Pandas (Python)</b> <i>University of Southampton, NGCM Summer school</i>	June 2017
<b>Introduction to Scikit-learn (Python)</b> <i>University of Southampton, NGCM Summer school</i>	June 2017
<b>Introduction to C++ Programming</b> <i>University of Southampton, Jacek Generowiczl</i>	Oct 2016
<b>Programming the Intel Phi</b> <i>University of Southampton, NGCM Summer school</i>	June 2016
<b>GPU Programming Using CUDA</b> <i>University of Southampton, NGCM Summer school</i>	June 2016
<b>Project Planning and Management</b> <i>University of Southampton &amp; Boeing UK</i>	April 2016
<b>Parallel Programming with OpenMP</b> <i>University of Southampton &amp; ARCHER</i>	April 2016
<b>Parallel Programming with MPI</b> <i>University of Southampton &amp; ARCHER</i>	April 2016
<b>Control of Mobile Robots</b> <i>Coursera (Georgia Institute of Technology)</i>	March 2013
<b>Creative Programming for Digital Media &amp; Mobile Apps</b> <i>Coursera (University of London)</i>	Sept 2013

## **AWARDS, SCHOLARSHIPS, AND GRANTS**

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<b>AAMAS 2018 Student Scholarship</b>	2018
<b>19th European Agent Systems Summer School Scholarship</b>	2017
<b>Best New Outreach Activity Award</b> University of Southampton Science and Engineering Festival. Awarded to the three NGCM activities including PythonTool-Mod for Minecraft: developing programming skills with Minecraft & Python.	March 2017
<b>UK EPSRC International Doctoral Scholarship</b>	2015-2019
<b>EU EACEA Postgraduate Scholarship</b>	2015
<b>Fundación Mutua Madrileña Postgraduate Scholarship</b>	2013-2015
<b>EU Erasmus Exchange Scholarship</b>	2011-2012

## CONFERENCES, SUMMER SCHOOLS, PRESENTATIONS AND EVENTS ATTENDED

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- Center for Machine Intelligence Showcase** Oct 2018  
*University of Southampton (UK)*  
Presented **poster**: *Decentralised Coordination of Electric Vehicle Aggregators.*
- 17th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2018)** July 2018  
*Stockholm, Sweden*  
Gave **three presentations**: *Coordination of Electric Vehicle Aggregators: A Coalitional Approach, Coordination and Payment Mechanisms for Electric Vehicle Aggregators, Decentralised Coordination of Electric Vehicle Aggregators.*
- Machine Learning Summer School** June 2018  
*Universidad Torcuato di Tella (Argentina)*
- NATCOR course on Convex Optimisation** June 2018  
*University of Edinburgh (UK)*
- 19th European Agent Systems Summer School** August 2017  
*University of Gdańsk (Poland)*
- NGCM Strategic Advisory Board 2016** Nov 2016  
*University of Southampton (UK)*  
Gave **presentation**: *Developing Programming Skills with Minecraft & Python*  
Presented **poster**: *Agent-Based Modelling of High-Frequency Trading*
- Southampton Python User Group** Aug 2016  
*University of Southampton (UK)*  
Gave **presentation**: *Continuous Integration using CircleCI*, together with Ryan Pepper.
- EuroPython 2016** July 2016  
*Euskalduna Conference Center (Spain)*
- NGCM Summer School 2016** June 2016  
*University of Southampton (UK)*  
Presented **poster**: *Agent-Based Modelling of High-Frequency Trading*
- NGCM Strategic Advisory Board 2015** Nov 2015  
*University of Southampton (UK)*  
Gave **presentation**: *Agent-Based Modelling of High-Frequency Trading*
- Student Conference on Complexity Science SCCS 2014** Aug 2014  
*University of Sussex (UK)*
- Erasmus Mundus Summer School on Networks** June 2014  
*Chalmers University of Technology (Sweden)*  
Gave **presentation**: *Ultrasonic transducers: From analytical modelling to design optimisation and validation.*

## OTHER CONTRIBUTIONS

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- NGCM Summer Academy 2017** June 2017

*University of Southampton (UK)*

Part of the organising committee: general management.

### **Academic Paper Reviews**

I have sub-reviewed several papers in top journals and conferences, such as Applied Energy, AAMAS and AAAI.

## **TEACHING**

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**Outreach Activity: PythonTool-Mod for Minecraft: developing programming skills with Minecraft & Python** March 2017

*University of Southampton Science and Engineering Festival (UK)*

**Outreach Activity: PythonTool-Mod for Minecraft: developing programming skills with Minecraft & Python** Feb 2017

*Winchester Science Centre (UK)*

**Beginner Python Programming Workshop** May 2016

*University of Southampton (UK)*

Helped as a demonstrator.

**Beginner Python Programming** June 2016

*NGCM Summer Academy 2016, University of Southampton (UK)*

Helped as a demonstrator.

**Version Control** June 2016

*NGCM Summer Academy 2016, University of Southampton (UK)*

Helped as a demonstrator.

**Continuous Integration Workshop** Feb 2016

*University of Southampton (UK)*

Seminar leader together with Ryan Pepper.

**Postgraduate Demonstrator** 2016-

*University of Southampton (UK)*

Demonstrator for undergraduate problem sessions and tutorials, for various courses.

## **SKILLS**

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<i>Languages</i>	Spanish (mother tongue), English (fluent), French (basic)
<i>Programming</i>	PYTHON (proficient) C, JAVA, MATLAB, R, HTML, CSS (prior experience)
<i>Other</i>	Electronics, product prototyping, web development, writing.
<i>Teaching</i>	Postgraduate Demonstrator. Regularly supervise undergraduate problem sessions and tutorials, and mark assignments.
<i>Hobbies</i>	Outdoors, running, cycling, adventuring, travel.

## **REFERENCES**

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**Associate Professor Enrico Gerding**

Department of Electronics and Computer Science, University of Southampton, SO17 1BJ,  
United Kingdom.

**Professor Frank McGroarty**

Southampton Business School, University of Southampton, SO17 1BJ, United Kingdom.