

Jamal Toutouh, Ph.D.

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Education

PhD in Computer Science (Doctor Europeus)

E.T.S. Ingeniería Informática (University of Malaga)

Malaga, Spain

January 2016

Dissertation: “Natural Computing for Vehicular Networks”. **With Cum Laude honors.**

Best Spanish PhD Thesis in Smart Cities and **Best PhD Thesis Award of University of Malaga.**

Key features of research:

- In-depth analysis of the emerging field of vehicular networks and its main challenges.
- Formulation of optimization problems to address vehicular networks and smart mobility.
- Devising new Machine Learning methods based on Natural Computing.
- Modeling and simulating vehicular environments by using real world maps and mobility models.
- Real world pilots (hardware and software) for vehicular communications testbeds.

Original research published in five ISI JCR indexed journals and in thirteen prestigious conferences and workshops.

M.Sc. in Software Engineering and Artificial Intelligence

E.T.S. Ingeniería Informática (University of Malaga)

Malaga, Spain

January 2011

- This Master’s degree is part of the doctoral programme of the University of Malaga, and is considered as a requirement to enter the PhD research level.

- Main Areas: Artificial Intelligence, Machine Learning, and Software Engineering.

- Dissertation: “Metaheuristics for the Optimal Configuration of the OLSR Routing Protocol in Vehicular Networks”.
With honors.

M.Sc.in Information and Computer Sciences - Intelligent and Adaptive Systems

Faculty of Science, Technology and Communication (University of Luxembourg)

Luxembourg, Luxembourg

July 2010

- Main Areas: Intelligent Agents, Multi-agent Systems, Neural Networks, Logic/Semantic-based Reasoning, and Multi-criteria Decision Making and Optimization.

- Dissertation: “Metaheuristics for Optimal Transfer of P2P Information in VANETs”.

Awards

Best Oral Presentation (ECUSA Congress 2019)

Awarded by Spanish Scientists in the USA.

Boston, USA

2019

2018 Best Spanish PhD Thesis in Smart Cities

Sponsored by the Spanish network on research for Smart Cities CI-RTI and the Sensors Journal.

Granada, Spain

2018

Best PhD Thesis Award “University Chair Aytos-Berger Levrault on the Development of Smart Governance”

Funded and awarded by the University of Malaga, University of Sevilla, and Aytos-Berger Levrault group.

Malaga, Spain

2018

Best PhD Thesis Award of University of Malaga (2016/2017)

Funded and awarded by the University of Malaga.

Malaga, Spain

2018

Spin-Off 2014

Funded and awarded by the University of Malaga and Malaga City council.

Malaga, Spain

2014

Doctoral Consortium AEPIA 2013

Sponsored by Spanish Association for Artificial Intelligence.

Madrid, Spain

2013

Grants

EU Marie Skłodowska-Curie Actions Individual Fellowship – Global Fellowship

(8.06.UE/47.8041)

Funded by the European Commission within the framework of Horizon 2020.

Brussels, Belgium

2018

Postdoctoral fellowship - I Plan Propio de Investigación y Transferencia de la Universidad de Málaga Funded by the University of Malaga.	Malaga, Spain 2017
Short stay grant for FPU holders (Est13/00988) Funded by the Spanish Ministry of Education.	Madrid, Spain 2014
Grants of Education's University Faculty Training (FPU) programme (AP2010-3108) Funded by the Spanish Ministry of Education.	Madrid, Spain 2012

Research Projects

TAILOR: Foundations of Trustworthy AI - Integrating Reasoning, Learning and Optimization Research collaborator. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the European EU H2020-ICT-2019-3	Malaga, Spain Oct. 2020 - Exp. Oct. 2023
ECO-IoT: Development of an intelligent waste management system based on IoT and machine learning Research collaborator. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the Spanish Ministry of Economy and Competitiveness and FEDER (RTC-2017-6714-5).	Malaga, Spain Apr. 2018 - Exp. Dic. 2021
FIQARE – Generic Enablers in FIWARE Research collaborator. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the European EUREKA-CELTIC PLUS initiative (C2017/2-2).	Malaga, Spain Jan. 2017 - Exp. Dic. 2020
6CITY: Building intelligent applications in a smart city Research collaborator. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the Spanish Ministry of Economy and Competitiveness and FEDER (TIN2017-88213-R).	Malaga, Spain Jan. 2017 - Exp. Dic. 2021
moveON: Metaheuristics, Holistic Intelligence, and Smart Mobility Research associate. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the Spanish Ministry of Economy and Competitiveness and FEDER (TIN2014-57341-R).	Malaga, Spain Jan. 2015 - Exp. Jun. 2018
CellCar: Advanced Cellular Technologies for Connected Cars Research collaborator. Qatar Mobility Innovations Center (QMIC) Funded by the Qatar National Research Fund.	Doha, Qatar Sep. 2015 - Dec. 2015
maxCT –Movilidad Inteligente: Wifi, Rutas y Contaminación Research collaborator. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the regional AOP GGI3003IDII (Andalusian).	Malaga, Spain Jan. 2015 - Dec. 2015
TABS: Teoría, Algoritmos Bioinspirados y Software Scientific collaborator. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the Spanish initiative FEDER.	Malaga, Spain Jan. 2015 - Jun. 2015
roadME: Fundamentals for Real World Applications of Metaheuristics Research collaborator. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the Spanish Ministry of Economy and Competitiveness (TIN2011-28194).	Malaga, Spain Jan. 2012 - Dec. 2015
DIRICOM: Intelligent Design of Wireless Communication Networks Research associate. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the regional ministry for Innovation, Science, and Business (P07-TIC-03044).	Malaga, Spain Dec. 2009 - Jan. 2012
CARLINK. Wireless Traffic Service Platform for Linking Cars Research associate. <i>E.T.S. Ingeniería Informática</i> (University of Malaga) Funded by the European EUREKA-CELTIC initiative (FIT-330225-2007-1).	Malaga, Spain Oct. 2007 - Oct. 2008

Journals

[J20] A. Camero, J. Toutouh, E. Alba. Random error sampling-based recurrent neural network architecture optimization. *Engineering Applications of Artificial Intelligence*, 2020 (In Press).

- [J19] Z. Hameed Mir, Zeeshan, [J. Toutouh](#), F. Filali, Y. Ko. Enabling DSRC and C-V2X Integrated Hybrid Vehicular Networks: Architecture and Protocol. *IEEE Access*, 2020 (In Press).
- [J18] I. Lebrusán, [J. Toutouh](#). Car restriction policies for better urban health: a low emission zone in Madrid, Spain. *Air Quality, Atmosphere and Health*, 2020 (In Press).
- [J17] U. O'Reilly, [J. Toutouh](#), M. Pertierra, D. Prado-Sanchez, D. Garcia, A. Erb-Luogo, J. Kelly, E. Hemberg. Adversarial Genetic Programming for Cyber Security: A Rising Application Domain Where GP Matters. *Genetic Programming and Evolvable Machine*, Vol. 21, pp. 219–250, 2020.
- [J16] I. Lebrusán, [J. Toutouh](#). Using smart city tools to evaluate the effectiveness of a low emissions zone in Spain: Madrid Central. *Smart Cities. Special Issue: Mobility and IoT for the Smart Cities*, 3(2), 456-478, 2020.
- [J15] S. Nesmachnow, G. Colacurcio, D. Rossit, [J. Toutouh](#), F. Luna. Optimizing household energy planning in Smart cities: a multiobjective approach. *Revista de Ingeniería, Universidad de Antioquia*, 2020 (In Press).
- [J14] D. G. Rossit, [J. Toutouh](#), S. Nesmachnow. Exact and heuristic approaches for multi-objective garbage accumulation points location in real scenarios. *Waste Management*, Volume 105, pp. 467-481, 15 March 2020.
- [J13] E. Fabbiani, S. Nesmachnow, [J. Toutouh](#), A. Tchernykh, A. Avetisyan, G. Radchenko. Analysis of Mobility Patterns for Public Transportation and Bus Stops Relocation. *Programming and Computer Software*, Vol. 44, Issue 6, pp. 508–525, 2018.
- [J12] A. Camero, [J. Toutouh](#), J. Ferrer, E. Alba. Waste generation prediction under uncertainty in smart cities through deep neuroevolution. *Revista de Ingeniería, Universidad de Antioquia*, No.93, pp. 128-138, 2019.
- [J11] [J. Toutouh](#), D. G. Rossit, S. Nesmachnow. Soft computing methods for multiobjective location of garbage accumulation points in smart cities. *Annals of Mathematics and Artificial Intelligence*. pp. 1-27. 2019.
- [J10] D. G. Rossit, S. Nesmachnow, [J. Toutouh](#). A bi-objective integer programming model for locating garbage accumulation points: a case study. *Revista de Ingeniería, Universidad de Antioquia*, No.93, pp. 70-81, 2019.
- [J09] [J. Toutouh](#), E. Alba. A swarm algorithm for collaborative traffic in vehicular networks. *Vehicular Communications*, Vol. 12, pp. 127-137, 2018.
- [J08] [J. Toutouh](#), J. Arellano, E. Alba. BiPred: A Bilevel Evolutionary Algorithm for Prediction in Smart Mobility. *Sensors*, 18(12), 2018.
- [J07] R. Massobrio, [J. Toutouh](#), S. Nesmachnow, E. Alba, Infrastructure Deployment in Vehicular Communication Networks Using a Parallel Multiobjective Evolutionary Algorithm, *International Journal of Intelligent Systems*, Vol. 32, Issue 8, pp 801-829, Wiley Periodicals, 2017.
- [J06] [J. Toutouh](#), E. Alba, Parallel multi-objective metaheuristics for smart communications in vehicular networks, Vol. 21, Issue 8, *Soft Computing*, Vol. 21, Issue 8, pp. 1949-1961, Springer, 2017.
- [J05] [J. Toutouh](#), E. Alba, Light commodity devices for building vehicular ad hoc networks: An experimental study, *Ad Hoc Networks*, Vol. 37, pp. 499-511, Elsevier, 2016.
- [J04] [J. Toutouh](#), E. Alba, Metaheuristics for energy-efficient data routing in vehicular networks, *International Journal of Metaheuristics*, Vol. 4, Issue 1, pp. 27-56, Inderscience Publishers (IEL), 2015.
- [J03] [J. Toutouh](#), S. Nesmachnow, E. Alba, Fast energy-aware OLSR routing in VANETs by means of a parallel evolutionary algorithm, *Cluster Computing*, Vol. 16, Issue 3, pp. 435-450, Springer US, 2013.
- [J02] [J. Toutouh](#), J. García-Nieto, E. Alba, Intelligent OLSR Routing Protocol Optimization for VANETs, *Vehicular Technology, IEEE Transactions on.*, Vol. 61, Issue 4, pp. 1884-1894, IEEE, 2012.
- [J01] J. García-Nieto, [J. Toutouh](#), E. Alba, Automatic Tuning of Communication Protocols for Vehicular Ad-Hoc Networks Using Metaheuristics, *Engineering Applications of Artificial Intelligence. Special Issue: Advances in metaheuristics for hard optimization: new trends and case studies*, 23(5), pp. 795-805, Springer, 2010.

Book Chapters

- [B03] [J. Toutouh](#), E. Hemberg, U. O'Reilly. Data Dieting in GAN Training. H. Iba, N. Noman (Eds.), *Deep Neural Evolution - Deep Learning with Evolutionary Computation*, pages 19, Springer, 2020, Springer (In Press).

- [B02] A. Muñoz, J. Toutouh, F. Jaime. A Review of Dynamic Verification of Security and Dependability Properties. Ryma Abassi (Eds.), *Artificial Intelligence and Security Challenges in Emerging Networks*, pp. 162-187, 2019, IGI Global. ISBN: 1522573534.
- [B01] R. Massobrio, J. Toutouh, S. Neschachnow, Multiobjective evolutionary algorithms for smart placement of road side units in vehicular networks, N. Nedjah, L. M. Mourelle, H. S. Lopes (Eds.), *Evolutionary Multi-Objective System Design: Theory and Applications*, pp. 86-114, 2017, Chapman and Hall/CRC. ISBN: 9781498780285

Conferences

- [C33] J. Toutouh, M. Esteban, S. Neschachnow. Parallel/distributed generative adversarial neural networks for data augmentation of COVID-19 training images. In the Latin America High Performance Computing Conference (CARLA 2020). pages 10, 2020.
- [C34] J. Toutouh, E. Hemberg, U. O'Reilly. Analyzing the Components of Distributed Coevolutionary GAN Training. In *The Sixteenth International Conference on Parallel Problem Solving from Nature (PPSN XVI)*. pages. 10, 2020.
- [C33] J. Toutouh, E. Hemberg, U. O'Reilly. Re-purposing Heterogeneous Generative Ensembles with Evolutionary Computation. In *Genetic and Evolutionary Computation Conference (GECCO'20)*, pp. 472-480, ACM, 2020.
- [C32] E. Perez, S. Neschachnow, J. Toutouh, E. Hemberg, U. O'Reilly. Parallel/distributed implementation of cellular training for generative adversarial neural networks. In *10th IEEE Workshop Parallel/Distributed Combinatorics and Optimization (PDCO 2020)*, pages 7, 2020.
- [C31] J. Toutouh, I. Lebrusan, S. Neschachnow. Computational intelligence for evaluating the air quality in the center of Madrid, Spain. In *International Conference in Optimization and Learning (OLA2020)*, pages. 12, 2020.
- [C30] G. Colacurcio, S. Neschachnow, J. Toutouh, F. Luna, D. Rossit. Multiobjective household energy planning using evolutionary algorithms. In *II Ibero-American Congress of Smart Cities (ICSC-CITIES 2019)*, pages 15, 2019.
- [C29] I. Lebrusan, J. Toutouh. Assessing the environmental impact of car restrictions policies: Madrid Central case. In *II Ibero-American Congress of Smart Cities (ICSC-CITIES 2019)*, pages 15, 2019.
- [C28] J. Toutouh, E. Hemberg, U. O'Reilly. Spatial Evolutionary Generative Adversarial Networks. In *Genetic and Evolutionary Computation Conference (GECCO '19)*, pp. 472-480, ACM, NY, USA, 2019.
- [C27] A. Camero, J. Toutouh, E. Alba. Comparing deep recurrent networks based on the MAE random sampling, a first approach, *Conference of the Spanish Association for Artificial Intelligence*, pp. 24-33, 2018.
- [C26] J. Luque, J. Toutouh, E. Alba. Reduction of the size of datasets by using evolutionary feature selection: the case of noise in a modern city, *Conference of the Spanish Association for Artificial Intelligence*, pp. 230-239, 2018.
- [C25] D.G. Rossit, S. Neschachnow, J. Toutouh. Municipal solid waste management in smart cities: facility location of community bins, *Ibero-American Congress on Information Management and Big Data. ICSC-CITIES 2018: Smart Cities*, pp. 102-115, 2018.
- [C24] A. Camero, J. Toutouh, J. Ferrer, E. Alba. Waste generation prediction in smart cities through deep neuroevolution, *Ibero-American Congress on Information Management and Big Data. ICSC-CITIES 2018: Smart Cities*, pp. 192-204, 2018.
- [C23] J. Toutouh, J. Luque, E. Alba. Smart Campus Human Tracking: The Case of University of Málaga, *Ibero-American Congress on Information Management and Big Data. ICSC-CITIES 2018: Smart Cities*, pp. 18-28, 2018.
- [C22] J. Toutouh, A. Muñoz, S. Neschachnow. Evolution Oriented Monitoring oriented to Security Properties for Cloud Applications. Proceedings of the 13th International Conference on Availability, Reliability and Security, Article No. 32, 2018.
- [C21] J. Toutouh Conducción Social Cooperativa en Ciudades Inteligentes, *International Greencities Congress 2018*, pp. 60-75, 2018.
- [C20] J. Toutouh, D. Rossit, S. Neschachnow. Computational intelligence for locating garbage accumulation points in urban scenarios. *Learning and Intelligent Optimization (LION) 12*, pp. 411-426, 2018.

- [C19] A. Camero, J. Toutouh, D.H. Stolfi, E. Alba. Evolutionary deep learning for car park occupancy prediction in smart cities. *Learning and Intelligent Optimization (LION) 12*, pp. 1-15, 2018.
- [C18] J. Toutouh, E. Alba, Distributed Fair Rate Congestion Control for Vehicular Networks, *13th International Conference Distributed Computing and Artificial Intelligence*, pp. 433-442, June 2016.
- [C17] C. Cintrano, D. H. Stolfi, J. Toutouh, F. Chicano, E. Alba, CTPATH: A Real World System to Enable Green Transportation by Optimizing Environmentally Friendly Routing Paths, *International Conference on Smart Cities*, 63-75, 2016.
- [C16] R Massobrio, J. Toutouh, S. Nesmachnow, E. Alba, Smart placement of RSU for vehicular networks using multiobjective evolutionary algorithms, *2nd Latin American Congress on Computational Intelligence* 1-6, 2015.
- [C14] R Massobrio, J. Toutouh, S Nesmachnow, A multiobjective evolutionary algorithm for infrastructure location in vehicular networks, *7th European Symposium on Computational Intelligence and Mathematics* 1-6, 2015.
- [C13] Z. Hameed Mir, J. Toutouh, F. Filali, E. Alba, QoS-Aware Radio Access Technology (RAT) Selection in Hybrid Vehicular Networks, *Communication Technologies for Vehicles. LNCS 9066*. 117-128, 8th International Workshop, Nets4Cars/Nets4Trains/Nets4Aircraft 2015, Sousse, Tunisia, 6-8 May, 2015.
- [C15] J. Toutouh, E. Alba, Comunicación eficiente entre vehículos aplicando un algoritmo multi-objetivo paralelo, *In X Congreso Español de Metaheurísticos, Algoritmos Evolutivos y Bioinspirados 2015 (MAEB 2015)*, 503-510, 2015, Mérida-Almendralejo, Spain.
- [C12] J. Toutouh, E. Alba, Optimizing Telecommunications in Vehicular Networks with a Parallel Multiobjective PSO, *In 22nd International Conference on Multiple Criteria Decision Making (MCDM2013)*, pp. 295, 17-21 June 2013.
- [C11] J. Toutouh, E. Alba, Computación Natural en Redes Vehiculares, In Congreso de la Asociación Española para la Inteligencia Artificial (CAEPIA'13), pages 1740-1745. Madrid, Spain, 20013.
- [C10] J. Toutouh, E. Alba, Parallel Swarm Intelligence for VANETs Optimization, *In Proceedings of the Seventh International Conference on P2P, Parallel, Grid, Cloud and Internet Computing (3PGCIC-2012)*, 285 -290, November 2012.
- [C09] J. Toutouh, E. Alba, Multi-objective OLSR optimization for VANETs, *In Proceedings of the 2012 IEEE 8th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob)*, 571-578, 8-10 October 2012.
- [C08] J. Toutouh, E. Alba, Green OLSR in VANETs with Differential Evolution, *In Proceedings of the fourteenth international conference on Genetic and evolutionary computation conference companion (GECCO Companion '12)*, Terence Soule (Ed.). ACM, 2012, NY, USA, 11-18.
- [C07] J. Toutouh, S. Nesmachnow, E. Alba, Evolutionary Power-Aware Routing in VANETs using Monte-Carlo Simulation, *in Proceedings of The 10th International Conference on High Performance Computing and Simulation (HPCS 2012)*, IEEE Computer Society Press, July, 2012, Madrid, Spain, 119-125.
- [C06] J. Toutouh, E. Alba, Optimizing OLSR in VANETS with Differential Evolution: A Comprehensive Study, *In First ACM International Symposium on Design and Analysis of Intelligent Vehicular Networks and Applications (DIVANet'11)*, November, 2011, Miami, Florida, USA.
- [C05] J. Toutouh, E. Alba, An Efficient Routing Protocol for Green Communications in Vehicular Ad-hoc Networks, *In Proceedings of the 13th annual conference companion on Genetic and evolutionary computation (GECCO '11)*, Natalio Krasnogor (Ed.), 2011, ACM, New York, USA, 719-726.
- [C04] J. Toutouh, E. Alba, Performance Analysis of Optimized VANET Protocols in Real World Tests, *in Wireless Communications and Mobile Computing 2011 (IWCMC2011)*, 2011, Istanbul (Turkey).
- [C03] J. Toutouh, J. García-Nieto, E. Alba, Optimal Configuration of OLSR Routing Protocol for VANETs by Means of Differential Evolution, *In 3rd International Conference on Metaheuristics and Nature Inspired Computing (META'2010)*, October, 2010, D'Jerba (Tunissia).
- [C02] J. Toutouh, J. García-Nieto, E. Alba, Configuración Óptima del Protocolo de Encaminamiento OLSR para VANETs Mediante Evolución Diferencial, *In Congreso Español de Metaheurísticos, Algoritmos Evolutivos y Bioinspirados 2010 (MAEB'10)*, pp. 463-471, Septiembre 2010, Valencia, Spain.
- [C01] E. Alba, S. Luna, and J. Toutouh, Accuracy and Efficiency in Simulating VANETs, *In Modelling, Computation and Optimization in Information Systems and Management Sciences*, pages 568–578, London, UK, 2008.

Selected Invited Talks

Applying Generative Adversarial Networks to address Real World Problems: Smart Energy Forecasting

Universidad de la Republica, Uruguay, April 2020.

Lipizzaner: Distributed Coevolution for Resilient Generative Adversarial Networks Training

Universidad de la Republica, Uruguay, April 2020.

Deep Neuroevolution applied to Generative Adversarial Networks

Spain AI, April 2020.

Navigating to Generative Adversarial Networks, a friendly introduction

Spain AI, April 2020.

Lipizzaner: Spatially distributed coevolution for robust and resilient GAN training

Schlumberger, December 2019.

Spatial Coevolutionary Deep Neural Networks Training

Universidad de la Republica, Montevideo Uruguay, May 2019.

An Artificial Coevolutionary Framework for Adversarial AI

Universidad de la Republica, Montevideo Uruguay, May 2019.

Research Visits

Qatar Mobility Innovations Center (QMIC)

Supervisor: Dr. Fethi Filali

Doha, Qatar

Sep. 2014 - Dec. 2014

Centria University of Applied Sciences

Supervisor: Joni Jämsä

Ylivieska, Finland

Nov. 2012 - Dec. 2012

Memberships of Scientific and Professional Societies

Ibero-American Research Thematic Network of Fully Integrated, Efficient and Sustainable Smart Cities

Red Temática Ciudades Inteligentes Totalmente Integrales, Eficientes y Sostenibles (CITIES)

(Ref.: Red 518RT0558)

Association of Spanish Scientists in the United States. **Board Member**

ECUSA: Asociación de Científicos Españoles en Estados Unidos

Research Thematic Network on Smart Cities

Red Temática de Investigación en Ciudades Inteligentes

(Ref.: TIN2016-81766-REDT)

European Innovation Partnership on Smart Cities and Communities (Ref.: 6904)

COST Action - Improving Applicability of Nature-Inspired Optimisation by Joining Theory and Practice

(Ref.: CA15140)

Working Group on Heuristics of the Statistics and Operations Research Spanish Society

Grupo de Trabajo en Heurísticas de la Sociedad Española de Estadística e Investigación Operativa

(Refs.: TIC2002-10886E and TIN2004-20061E)

Selected Program Committees

GECCO: The Genetic and Evolutionary Computation Conference

LION: The Learning and Intelligent Optimization Conference

LOD: The International Conference on Machine Learning, Optimization, and Data Science

SEA: The Special Event on Analysis of Experimental Algorithms

DARWiN: Distributed, Autonomic and Robust Wireless Networks

Innovative Teaching Research

- [T04] C. Alcaraz, R. Roman, E. Abdo-Sánchez, R. Halir, A. Hernández-Escobar, J. Toutouh. Gamification Models and Tools According to Profiles: An Experience in Engineering Degrees, *12th annual International Conference of Education, Research and Innovation (ICERI2019)*, 2019.
- [T03] J. Toutouh, D.H. Stolfi, C. Alcaraz, E. Abdo, R. Halir, M. Ruiz, Let's Play Gamification to Mitigate Demotivation and Unevenness in Engineering Courses, *International Conference in Innovative Teaching: Improving the University for Future Generations 2018*, 2018.
- [T02] C. Alcaraz, E. Abdo, J. Toutouh, R. Halir, M. Ruiz, D.H. Stolfi, Some Ingredients to Improve Gamification in Engineering, *EDULEARN18*, pp. 7040-7044, 2018.
- [T01] C. Alcaraz, E. Abdo, R. Halir, J. Toutouh, M. Ruiz, D.H. Stolfi, Gamification to Fight Lack of Motivation and Heterogeneity in Engineering, *EDULEARN17*, pp. 3662-3668, 2017.

Teaching

6.431x Probability – The Science of Uncertainty and Data 1st Semester (Core subject)	<i>Program in Statistics and Data Science. MIT Open Learning</i> 2019 - 2020
Programming I 1st Semester (Core subject)	<i>In Computing Engineering. University of Malaga</i> 2017 - 2018
Programming II 2nd Semester (Core subject)	<i>In Telematics Engineering. University of Malaga</i> 2014 - 2015
Programming II 2nd Semester (Core subject)	<i>In Sound and Image Engineering. University of Malaga</i> 2014 - 2015
Information Systems on Internet 6th Semester (Core Subject)	<i>In Computing Engineering. University of Malaga</i> 2013 - 2014
Programming II 2nd Semester (Core subject)	<i>In Sound and Image Engineering. University of Malaga</i> 2013 - 2014