



Manuel Castillo Cagigal

Curriculum Vitae

Personal information

Date and place of birth September 25th, 1984
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Summary

I am currently postdoctoral researcher in the Universidad Politécnica de Madrid. I obtained my PhD degree in 2014 in the areas of Computer Science and Energy Management from Universidad Politécnica de Madrid (UPM). My PhD Thesis is entitled “A swarm intelligence approach based on coupled oscillators: an application in demand side management with photovoltaic distributed generation”. My PhD advisors were Álvaro Gutiérrez of the Escuela Técnica Superior de Ingenieros de Telecomunicación (ETSIT) and Estefanía Caamaño Martín of the Solar Energy Institute (IES). During my PhD period I spent 4 months at the Institute de Recherches Interdisciplinaires et de Développements en Intelligence Artificielle (IRIDIA) in Belgium under the supervision of Mauro Birattari.

I am member of the Robotics and Control System Group (ROBOLABO), the Renewable Distributed Generation and Intelligent Control Group (GEDIRCI) and the Educational Innovation in Electricity Generation and Control Group (GIEGEC). I’m especially involved in distributed, local and situated communications and control, where there is not need for any central brain or system. My research interests include: nonlinear dynamical systems, swarm intelligence, distributed energy management and smart grids.

Academic background

- 09/2010–12/2014 **Ph.D. in Computer Science and Energy Management**, *Escuela Técnica Superior de Ingenieros de Telecomunicación (ETSIT)*, Universidad Politécnica de Madrid, Spain.
- Ph.D. Thesis: A swarm intelligence approach based on coupled oscillators: an application in demand side management with photovoltaic distributed generation.
 - 02/2013–05/2013: Visiting researcher in IRIDIA at ULB, Brussels, Belgium.
- 09/2009–09/2010 **M.Sc. in Photovoltaic Solar Energy**, *Escuela Técnica Superior de Ingenieros de Telecomunicación (ETSIT)*, Universidad Politécnica de Madrid, Spain.
- M.Sc. Thesis: Optimizing the use of photovoltaic technology in residential environments.
- 09/2002–09/2009 **M.Sc. in Telecommunication Engineering**, *Escuela Técnica Superior de Ingenieros de Telecomunicación (ETSIT)*, Universidad de Málaga, Spain.
- M.Sc. Thesis: Design and implementation of a demand management system in smart houses.
 - 09/2006–09/2007: ERASMUS Programme at the University of Ulm, Germany

Teaching experience

- 2012–Present **Introduction to intelligent robotics**, *ETSIT*, Universidad Politécnica de Madrid..
- 2012–Present **Electronic control systems**, *ETSIT*, Universidad Politécnica de Madrid..
- 2012–2014 **Laboratory of intelligent robotic architectures**, *ETSIT*, Universidad Politécnica de Madrid..

Main collaborations in Research Projects

- 2016–present **DEMS: Distributed Power Management Systems in Smart Grids**, *member*.
- 2015–present **Smart Grids for efficiency in electrical grids: a case study in ETSIT-UPM**, *member*.
- 2012–2014 **VE2 project: Smart Energy Management System in Building using Electric Vehicles**, *member*.
- 2012–2014 **Solar Decathlon Europe 2014**, *monitoring team member*.
- 2011–2014 **SIGMAPLANTAS: Innovation in plant and Concentrated Photovoltaic system models in Spain**, *member*.
- 2011–2014 **DATA science for SIMulating the era of electric Vehicles-DATASIM**, *member*.
- 2011–2012 **Solar Decathlon Europe 2012**, *monitoring team member*.
- 2010–2011 **Study of Collective Algorithms for Intelligent Sensor Networks**, *member*.
- 2009–2011 **Development of Kalman Filters for Robotic Systems**, *member*.
- 2009–2011 **Study of Wireless Sensing Systems in Distributed Environments**, *member*.
- 2007–2010 **GEDELOS-FV: Management of Domestic Electricity Demand with Solar Photovoltaic Technology**, *member*.

Main publications

- [1] **Manuel Castillo-Cagigal**, E. Matallanas, F. Monasterio-Huelin, E. Caamano-Martin, and A. Gutierrez, "Multi-frequency coupled oscillators for distributed multi-agent coordination," *IEEE Transactions on Industrial Informatics*, vol. 12, no. 3, pp. 941–951, 2016.
- [2] **Manuel Castillo-Cagigal**, E. Matallanas, I. Navarro, E. Caamaño-Martín, F. Monasterio-Huelin, and A. Gutiérrez, "Variable threshold algorithm for division of labor analyzed as a dynamical system," *IEEE Transactions on Cybernetics*, vol. 44, no. 12, pp. 2242–2252, 2014.
- [3] **Manuel Castillo-Cagigal**, A. Brutschy, A. Gutiérrez, and M. Birattari, "Temporal task allocation in periodic environments: An approach based on synchronization," in *Proceedings of the 9th International Conference on Swarm Intelligence*, (Brussels, Belgium), pp. 182–193, Springer International Publishing, 2014.
- [4] E. Matallanas, J. Solórzano, **Manuel Castillo-Cagigal**, I. Navarro, E. Caamaño-Martín, M. A. Egido, and A. Gutiérrez, "Electrical energy balance contest in Solar Decathlon Europe 2012," *Energy and Buildings*, vol. 83, pp. 36–43, 2014.
- [5] D. Masa-Bote, **Manuel Castillo-Cagigal**, E. Matallanas, E. Caamaño-Martín, A. Gutiérrez, F. Monasterio-Huelin, and J. Jiménez-Leube, "Improving photovoltaics grid integration through short time forecasting and self-consumption," *Applied Energy*, vol. 125, pp. 103–113, 2014.
- [6] E. Matallanas, **Manuel Castillo-Cagigal**, A. Gutiérrez, F. Monasterio-Huelin, E. Caamaño-Martín, D. Masa, and J. Jiménez-Leube, "Neural network controller for active demand-side management with PV energy in the residential sector," *Applied Energy*, vol. 91, no. 1, pp. 90 – 97, 2012.
- [7] **Manuel Castillo-Cagigal**, E. Caamaño-Martín, E. Matallanas, D. Masa-Bote, A. Gutiérrez, F. Monasterio-Huelin, and J. Jiménez-Leube, "PV self-consumption optimization with storage and active DSM for the residential sector," *Solar Energy*, vol. 85, no. 9, pp. 2338–2348, 2011.
- [8] **Manuel Castillo-Cagigal**, A. Gutiérrez, F. Monasterio-Huelin, E. Caamaño-Martín, D. Masa-Bote, and J. Jiménez-Leube, "A semi-distributed electric demand-side management system with PV generation for self-consumption enhancement," *Energy Conversion and Management*, vol. 52, no. 7, pp. 2659–2666, 2011.