Javier Bonilla Cruz

Curriculum Vitae

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ResearchGate: Javier-Bonilla
Google Scholar: Javier Bonilla

Personal Information

Name: Javier Bonilla Cruz
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Birthplace: Barcelona, Spain
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Education

2008 - 2013 **Ph.D. with International Mention**, *University of Almería*, Center for Postgraduate Studies, Computing Department, Ph.D. in Computer Science - R.D. 1393/2007.
Topic: Modeling of Two-Phase Flow Evaporators for Parabolic-Trough Solar Thermal Power Plants
Grade: *cum laude*.

2007 - 2008 **Master in Advanced Computer Science**, *University of Almería*, Official Postgraduate Program, Grade: *3.54/4*.
Project: Approaches to the chattering problem in dynamic mathematical two-phase flow models
Grade: honours.

2001 - 2004 **Master in Computer Engineering**, *University of Almería*, Grade: *2.54/4*.
Project: Decision making software for the climate conditions of tomato crops in greenhouses
Grade: honours.

1998 - 2001 **Bachelor in Computer Systems Engineering**, *University of Almería*, Grade: *2.56/4*.

Research Trajectory

I'm driven by applying automation (modeling, simulation, control and artificial intelligence) to optimize concentrating solar thermal processes with the aim of reducing costs, improving efficiency and minimizing the use of energy and water.

In my PhD, I worked on the dynamic modeling of two-phase flow evaporators for direct steam generation in parabolic trough solar thermal power plants. In the scope of several international projects, I worked on the modeling and control of a Heat Recovery System (HRS) in an innovative design for the coupling of a biogas turbine with a solar power plant. I've been also involved in the recovery of wasted thermal energy from a solar power plant to produce water in a distillation facility to reduce the fresh water consumption. I worked in several national projects, modeling parabolic trough collectors, heat exchangers, thermal energy storage systems, and coupling a solar tower power plant, a gas turbine and a solar distillation facility.

Currently, I'm motivated by applying artificial intelligence in solar thermal power plants, since they exhibit a low degree of intelligence and autonomy in general, with new ideas like a software tool for electricity mix optimization based on artificial intelligence, and a smart solar tracker based on machine learning and computer vision.

Index

Tutoría de becarios/as del Programa de Formación de Personal Investigador o de otros programas de formación similares

Experiencia en centros de investigación nacionales o extranjeros

Sección C

Participación en trabajos e informes de asesoramiento científico

Estudio y desarrollo de nuevos procesos, sistemas o métodos

Diseño, construcción y experimentación de prototipos y plantas piloto

Actividades de divulgación de la ciencia

Participación en actividades de gestión científica

Cualquier otro mérito que alegue el aspirante relacionado con la especialidad objeto de la convocatoria

International Research Projects

2018 - 2023 **Expansion, improvement, renovation and remodelling of Plataforma Solar de Almería (PSA) (SolarNOVA II)**, *European Regional Development Fund (ERDF) and Spanish funds, ICTS-2017-03-CIEMAT-04*, Team member, budget: 11,996,375 €.
SolarNOVA II website

2018 - 2022 **Solving water issues for CSP plants (SOLWARIS)**, *Horizon 2020, European Commission, grant agreement nº 792103*, Research team member, buget: 10,812,504 €.
SOLWARIS website

2013 - 2016 **Innovative configuration for a fully renewable hybrid CSP plant (HYSOL)**, *EU Seventh Framework Programme for Research (FP7-Energy), European Commission, grant agreement n° 308912*, Research team member, budget: 9,275,982 €.
HYSOL website

2009 - 2013 **Solar facilities for the european research area (SFERA)**, *EU Seventh Framework Programme for Research (FP7-Infrastructures), European Commission, grant agreement n° 228296*, Work team member, budget: 9,042,935 €.
SFERA website

National Research Projects

2022 - 2025 **More efficient heliostat fields for solar tower plants (HELIOSUN)**, *Generation Knowledge Projects, Ministry of Science and Innovation, PID2021-126805OB-100*, Work team member, budget: 145,200 €.

2022 - 2025 **Hybrid cooling solutions for water saving in solar thermal applications (SOLHYCOOL)**, *Generation Knowledge Projects, Ministry of Science and Innovation, PID2021-126452OA-I00*, Work team member, budget: 78,650 €.

2022 - 2023 **SOL-préndete: Didáctica y divulgación de la energía solar térmica de concentración con nuevas tecnologías de realidad aumentada y virtual**, *Convocatoria de ayudas para el Fomento de la Cultura Científica, Tecnológica y de la Innovación, Ministry of Science and Innovation*, FCT-21-16905, Work team member, budget: 15,000€.

2018 - 2022 **Solar thermal solutions for integration in industrial processes (SOLTERMIN)**, *Spanish National Programme for Research Aimed at the Challenges of Society, Ministry of Science and Innovation, ENE2017-83973-R*, Work team member, budget: 278,300 €.
SOLTERMIN website

2015 - 2018 **Control and energy management strategies in production environments with support of renewable energy (ENERPRO) – Subproject title: Efficient energy control and management of solar thermal desalination systems (EFFERDESAL)**, *Spanish National Programme for Research Aimed at the Challenges of Society, Ministry of Science and Innovation, DPI2014-56364-C2-2-R*, Work team member, budget: 131,200 €.
ENERPRO website

2011 - 2015 **Controlling the growth of crops under glass by optimizing sustainability, economic and energy efficiency criteria (CONTROLCROP)**, *Proyecto de investigación de Excelencia financiado por la Consejería de Innovación Ciencia y Empresa, Junta de Andalucía, P10-TEP-6174*, Work team member, budget: 145,005 €.
CONTROLCROP website

2011 - 2014 **Predictive control techniques for efficient management of renewable energy microgrids (POWER)**, *Programa nacional de proyectos de investigación fundamental, subprograma de proyectos de investigación fundamental no orientada, Ministry of Science and Innovation, DPI2010-21589-C05-04*, Work team member, budget: 105,270 €.
POWER website

2011 - 2013 **Hybridization of renewable technologies in a power generation plant (HIBIOSOLEO)**, *INNPACTO 2010, National Program for Public-Private Cooperation, Ministry of Science and Innovation, IPT-440000-2010-004*, Work team member, budget: 4,270,000 €.
HIBIOSOLEO website

Work Experience

2018 - 2023 **Postdoctoral researcher - SolarNOVA II project**, *CIEMAT-PSA*, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas - Plataforma Solar de Almería,.

2016 - 2017 **Postdoctoral researcher - EFFERDESAL project**, *CIEMAT-PSA*, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas - Plataforma Solar de Almería,.

2013 - 2016 **Postdoctoral researcher - HYSOL project**, *CIEMAT-PSA*, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas - Plataforma Solar de Almería,.

2011 - 2013 **University graduate researcher - HIBIOSOLEO project**, *CIEMAT-PSA*, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas - Plataforma Solar de Almería,.

2009 - 2011 **University graduate researcher - Economy and employment stimulation plan (Plan E)**, *CIEMAT-PSA*, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas - Plataforma Solar de Almería,.

2009 - 2009 **University graduate researcher - Work-experience contract**, *CIEMAT-PSA*, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas - Plataforma Solar de Almería,.

2007 - 2009 **University graduate researcher in training - Ph.D. Scholarship**, *CIEMAT-PSA*, Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas - Plataforma Solar de Almería,.

2004 - 2007 **Analyst - programmer**, *Grupo J. Carrión, Asetir S.L.* , Volvo Industrial vehicles dealer (Veinsur), Huercal de Almería, (Almería).

2004 **Company scholarship, UAL – PSA agreement 2004**, *Reorganization of the Direct Steam Generation (DISS) in parabolic troughs project database*, Plataforma Solar de Almería,.

Research Contracts

2021 **Simulación para la Optimización del Mix Eléctrico Portugués en 2030**, *Contrato de prestanción de servicios para la realización de trabajos de investigación*, La Asociación Española para la Promoción de la Industria Termosolar (PROTERMOSOLAR) y Cientro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT),.

Intellectual Property

2021 **Artificial intelligence software tool for the optimization of the electricity mix**, *J. Bonilla*, Unidad de Propiedad Industrial y Creación de Empresas de Base Tecnológica, Oficina de Transferencia de Tecnología del CIEMAT, nº M-000601/2021, July 20, 2021.

Books

2015 **Modelado y simulación dinámica de procesos termoquímicos en instalaciones termosolares**, *A. de la Calle, L. Roca,* ***J. Bonilla****, S. Dormido*,
Editorial CIEMAT, ISBN: 978-84-7834-743-8.
Depósito Legal: M-32433-2015, NIPO: 721-15-053-4

2013 **Modeling and simulation of two-phase flow evaporators for parabolic-trough solar thermal power plants**, ***J. Bonilla***, *L. J. Yebra, S. Dormido, E. Zarza*,
Editorial CIEMAT, ISBN: 978-84-7834-705-6.
Depósito Legal: M-28846-2013, NIPO: 721-13-044-9

Scientific Production Overview

2010 - 2022	h-index	Cites
Elsevier Scopus	13	439
Google Scholar	14	706

Scientific Publications

Q1	Q2	Q3	Q4	Total
16	8	1	2	27

First Scopus Topic: Solar Power Plants & Solar Thermal Energy

Conferences	Oral Presentation	Poster	Total
International	15	8	23
National	1	7	8

- Invited Presentations: 5
- Intellectual Property: 1
- Books: 2
- Doctoral Colloquiums: 2

Scientific Publications

2022 **Dynamic modeling of a multi-effect vertical falling-film evaporator for water reuse in CSP plants**,
B. Ortega-Delgado, P. Palenzuela, ***J. Bonilla*** */ CIEMAT, M. Berenguel / UAL, L. Roca, D.C. Alarcón-Padilla / CIEMAT*,
Desalination, Volume 529, 115623, ISSN: 0011-9164.
DOI: 10.1016/j.desal.2022.115623
JIF: 11.211 (2021), Q1 - Water resources (3/100, 98.33% percentile)

2021 **Feasibility and practical limits of full decarbonization of the electricity market with renewable energy: Application to the Spanish power sector**,
J. Bonilla, *J. Blanco, E. Zarza, D.C. Alarcón-Padilla / CIEMAT*,
Energy, Volume 239, Part E, 122437, ISSN: 0360-5442.
DOI: 10.1016/j.energy.2021.122437
JIF: 8.857 (2021), Q1 - Thermodynamics (3/63, 96.03% percentile)

2020 **Optimal operation of solar thermal desalination systems coupled to double-effect absorption heat pumps**,
J.A. Carballo, ***J. Bonilla****, L. Roca / CIEMAT, A. de la Calle / CSIRO, P. Palenzuela, D.C. Alarcón-Padilla / CIEMAT, M. Berenguel / UAL*,
Energy Conversion and Management, Volume 210, 112705, ISSN: 0960-1481.
DOI: 10.1016/j.enconman.2020.112705
JIF: 9.709 (2020), Q1 - Mechanics (2/135, 98.89% percentile)

2020 **Solar tower power mockup for the assessment of advanced control techniques**,
J.A. Carballo, ***J. Bonilla*** */ CIEMAT, M. Berenguel / UAL, J. Fernández-Reche, G. García / CIEMAT*,
Renewable Energy, Volume 149, pages 682-690, ISSN: 0960-1481.
DOI: 10.1016/j.renene.2019.12.075
JIF: 8.001 (2020), Q1 - Energy & fuels (16/144, 86.40% percentile)

2019 **New approach for solar tracking systems based on computer vision, low cost hardware and deep learning**,
J.A. Carballo, ***J. Bonilla*** */ CIEMAT, M. Berenguel / UAL, J. Fernández-Reche, G. García / CIEMAT*,
Renewable Energy, Volume 133, pages 1158-1166, ISSN: 0960-1481.
DOI: 10.1016/j.renene.2018.08.101
JIF: 6.274 (2019), Q1 - Energy & fuels (19/112, 83.48% percentile)

2019 **Parabolic trough collector field dynamic model: Validation, energetic and exergetic analyses**,
J.A. Carballo, ***J. Bonilla*** */ CIEMAT, M. Berenguel / UAL, P. Palenzuela / CIEMAT*,
Applied Thermal Engineering, Volume 148, pages 777-786, ISSN: 1359-4311.
DOI: 10.1016/j.applthermaleng.2018.11.093
JIF: 4.725 (2019), Q1 - Engineering, mechanical (13/130, 90.38% percentile)

2018 **Design and experimental validation of a computational effective dynamic thermal energy storage tank model**,
J. Bonilla*, M. M. Rodríguez-García, L. Roca / CIEMAT, A. de la Calle / CSIRO, L. Valenzuela / CIEMAT*,
Energy, Volume 152, pages 840-857, ISSN: 0360-5442.
DOI: 10.1016/j.energy.2017.11.017
JIF: 5.537 (2018), Q1 - Thermodynamics (3/60, 95.83% percentile)

2018 **A novel heat exchanger design method using a delayed rejection adaptive Metropolis Hasting algorithm**,
A. Mohammadi / UT, ***J. Bonilla*** */ CIEMAT, R. Zarghami, S. Golshan / UT*,
Applied Thermal Engineering, Volume 137, pages 808-821, ISSN: 1359-4311.
DOI: 10.1016/j.applthermaleng.2018.04.028
JIF: 4.026 (2018), Q1 - Engineering, mechanical (13/129, 90.31% percentile)

2018 **Model validation and control strategy of a heat recovery system integrated in a renewable hybrid power plant demonstrator**,
J. Bonilla*, L. Roca / CIEMAT*,
Solar Energy, Volume 176, pages 698-708, ISSN: 1099-1514.
DOI: 10.1016/j.solener.2018.10.076
JIF: 4.674 (2018), Q2 - Energy & fuels (39/131, 70.61% percentile)

2018 **Steady-state and dynamic validation of a parabolic trough collector model using the ThermoCycle Modelica library**,
A. Desideri, R. Dickes / ULG, ***J. Bonilla****, L. Valenzuela / CIEMAT, S. Quoilin, V. Lemort / ULG*,
Solar Energy, Volume 174, pages 866-877, ISSN: 1099-1514.
DOI: 10.1016/j.solener.2018.08.026
JIF: 4.674 (2018), Q2 - Energy & fuels (39/131, 70.61% percentile)

2018 **New low-cost solar tracking system based on open source hardware for educational purposes**,
J.A. Carballo, ***J. Bonilla****, L. Roca / CIEMAT, M. Berenguel / UAL*,
Solar Energy, Volume 164, pages 826-836, ISSN: 1099-1514.
DOI: 10.1016/j.solener.2018.09.064
JIF: 4.674 (2018), Q2 - Energy & fuels (39/131, 70.61% percentile)

2018 **Optimal operating conditions analysis for a multi-effect distillation plant according to energetic and exergetic criteria**,
J.A. Carballo / UAL, ***J. Bonilla****, L. Roca / CIEMAT, A. de la Calle / CSIRO, P. Palenzuela, D.C. Alarcón-Padilla / CIEMAT*,
Desalination, Volume 435, pages 70-76, ISSN: 0011-9164.
DOI: 10.1016/j.desal.2017.12.013
JIF: 6.035 (2018), Q1 - Water resources (2/91, 98.35% percentile)

2017 **Study on shell-and-tube heat exchanger models with different degree of complexity for process simulation and control design**,
J. Bonilla */ CIEMAT, A. de la Calle / CSIRO, L. Roca / CIEMAT, M. M. Rodríguez-García, L. Valenzuela / CIEMAT*,
Applied Thermal Engineering, Volume 124, pages 1425-1440, ISSN: 1359-4311.
DOI: 10.1016/j.applthermaleng.2017.06.129
JIF: 3.771 (2017), Q1 - Engineering, mechanical (12/128, 91.02% percentile)

2017 **Optimal operating conditions analysis of a multi-effect distillation plant**,
J.A. Carballo / UAL, ***J. Bonilla****, L. Roca / CIEMAT, A. de la Calle / CSIRO, P. Palenzuela / CIEMAT, M. Berenguel / UAL*,
Desalination and Water Treatment, 69, pages 229-235, ISSN: 1944-3986.
DOI: 10.5004/dwt.2017.0703
JIF: 1.383 (2017), Q3 - Engineering, chemical (79/137, 42.70% percentile)

2017 **Modelo dinámico de un recuperador de gases - sales fundidas para una planta termosolar híbrida de energías renovables**,
J. Bonilla*, L. Roca / CIEMAT, A. de la Calle / CSIRO, S. Dormido / UNED*,
RIAI - Revista Iberoamericana de Automatica e Informatica Industrial, Volume 14, Issue 1, pages 70-81, ISSN: 1697-7912.
DOI: 10.1016/j.riai.2016.11.003
JIF: 0.494 (2017), Q4 - Automation & control systems (60/61, 2.46% percentile)

2016 **Dynamic modeling and simulation of a double-effect absorption heat pump**,
A. de la Calle / CSIRO, L. Roca, ***J. Bonilla****, P. Palenzuela / CIEMAT*,
International Journal of Refrigeration, Volume 72, pages 171-191, ISSN: 1877-0509.
DOI: 10.1016/j.ijrefrig.2016.07.018
JIF: 2.779 (2016), Q1 - Thermodynamics (12/58, 80.70% percentile)

2016 **Predictive control applied to a solar desalination plant connected to a greenhouse with daily variation of irrigation water demand**,
L. Roca / CIEMAT, J. Sanchez, F. Rodríguez / UAL, ***J. Bonilla*** */ CIEMAT, A. de la Calle / CSIRO, M. Berenguel / UAL*,
Energies, Volume 194, Issue 9, pages 1-17, ISSN: 1007-5704.
DOI: 10.3390/en9030194
JIF: 2.264 (2016), Q2 - Energy & fuels (45/92, 51.63% percentile)

2015 **Switching moving boundary models for two-phase flow evaporators and condensers**,
J.Bonilla */ CIEMAT, S. Dormido / UNED, F.E. Cellier / ETH*,
Communications in Nonlinear Science and Numerical Simulation, Volume 20, Issue 3, pages 743-768, ISSN: 1007-5704.
DOI: 10.1016/j.cnsns.2014.06.035
JIF: 2.834 (2015), Q1 - Mathematics, applied (5/254, 98.23% percentile)

2015 **Dynamic modeling and simulation of a solar-assisted multi-effect distillation plant**,
A. de la Calle, ***J.Bonilla****, L. Roca, P. Palenzuela / CIEMAT*,
Desalination, Volume 357, pages 65-76, ISSN: 0011-9164.
DOI: 10.1016/j.desal.2014.11.008
JIF: 4.412 (2015), Q1 - Water resources (2/85, 98.24% percentile)

2014 **Dynamic modeling and performance of the first cell of a multi-effect distillation plant**,
A. de la Calle, ***J.Bonilla****, L. Roca / CIEMAT, P. Palenzuela / UTA*,
Applied Thermal Engineering, Volume 70, Issue 1, pages 410-420, ISSN: 1359-4311.
DOI: 10.1016/j.applthermaleng.2014.05.035
JIF: 2.739 (2014), Q1 - Engineering, mechanical (8/130, 94.23% percentile)

2014 **A control based on a Knapsack problem for solar hydrogen production**,
L. Roca, R. Díaz, A. de la Calle, ***J.Bonilla****, A. Vidal / CIEMAT*,
Optimal Control, Applications and Methods - Optimal Control of Solar Energy Systems (special issue), Volume 37, Issue 3, pages 496-507, ISSN: 1099-1514.
DOI: 10.1002/oca.2118
JIF: 0.903 (2014), Q2 - Mathematics, applied (110/257, 57.39% percentile)

2014 **A room simulation tool for thermal comfort control in a bioclimatic building. A real example of use with an optimal controller**,
M. Castilla / UAL, ***J.Bonilla*** */ CIEMAT, J.D. Álvarez / US, F. Rodríguez / UAL*,
Optimal Control, Applications and Methods - Optimal Control of Solar Energy Systems (special issue), Volume 37, Issue 3, pages 479-495,
ISSN: 1099-1514.
DOI: 10.1002/oca.2116
JIF: 0.903 (2014), Q2 - Mathematics, applied (110/257, 57.39% percentile)

2012 **Chattering in dynamic mathematical two-phase flow models**,
J.Bonilla*, L.J. Yebra / CIEMAT, S. Dormido / UNED*,
Applied Mathematical Modelling, Volume 36, Issue 5, pages 2067-2081, ISSN: 0307-904X.
DOI: 10.1016/j.apm.2011.08.013
JIF: 1.706 (2012), Q1 - Engineering, multidisciplinary (11/90, 88.33% percentile)

2012 **Parabolic-trough solar thermal power plant simulation scheme, multi-objective genetic algorithm calibration and validation**,
J.Bonilla*, L.J. Yebra / CIEMAT,S. Dormido / UNED, E. Zarza / CIEMAT*,
Solar Energy, Volume 86, Issue 1, pages 531-540,
ISSN: 0038-092X.
DOI: 10.1016/j.solener.2011.10.025
JIF: 2.952 (2012), Q2 - Energy & fuels (21/81, 74.69% percentile)

2011 **A heuristic method to minimise the chattering problem in dynamic mathematical two-phase flow models**,
J.Bonilla*, L.J. Yebra / CIEMAT, S. Dormido / UNED*,
Mathematical and Computer Modelling, Volume 54, Issue 5-6, pages 1549-1560,
ISSN: 0895-7177.
DOI: 10.1016/j.mcm.2011.04.026
JIF: 1.346 (2011), Q1 - Computer science, software engineering (24/104, 77.40% percentile)

2010 **Mean densities in dynamic mathematical two-phase flow models**,
J.Bonilla*, L.J. Yebra / CIEMAT, S. Dormido / UNED*,
Computer Modeling in Engineering & Science, Volume 66, Issue 1, pages 13-37,
ISSN: 1526-1506.
DOI: 10.3970/cmes.2010.067.013
JIF: 1.123 (2010), Q2 - Engineering, multidisciplinary (23/90, 75.00% percentile)

2010 **Object oriented modelling and simulation of ACUREX solar thermal power plant**,
L.J. Yebra / CIEMAT, M. Berenguel / UAL, ***J. Bonilla*** */ CIEMAT, L. Roca / CIEMAT, S. Dormido / UNED, E. Zarza / CIEMAT*,
Mathematical and Computer Modelling of Dynamical Systems, Volume 16, Issue 3, pages 211-224, ISSN: 1744-5051.
DOI: 10.1080/13873954.2010.507420
JIF: 0.452 (2010), Q4 - Mathematics, applied (191/236, 19.28% percentile)

International Conference Proceedings

2022 **Hel-IoT web server: a smart heliostat development platform**,
J.A. Carballo, ***J. Bonilla****, J. Fernández-Reche, D.C. Alarcón-Padilla / CIEMAT*,
28^{th} Concentrating Solar Power and Chemical Energy Systems (SolarPaces),
Abstract, Poster,
Albuquerque (USA), Sep 27 - 30, 2022.
Conference Paper

2022 **Assessment of the integration of a MED-TVC plant into a solar tower with Brayton cycle**,
J. Bonilla, *P. Palenzuela, B. Ortega-Delgado, J.M. Serrano, D.C. Alarcón-Padilla / CIEMAT*,
Desalination for the environment: clean water and energy,
Abstract, Poster,
Las Palmas (Spain), Jun 20 - 23, 2021.
Online Programme

2020 **Inductive projection planning: Putting CSP in the picture**,
J. Bonilla */ CIEMAT, L. Crespo / Protermosolar*,
26^{th} Concentrating Solar Power and Chemical Energy Systems (SolarPaces),
Regular paper in Proceedings, Oral presentation,
Albuquerque (USA), Online, Sep 28 - Oct 2, 2020.
DOI: 10.1063/5.0085735

2020 **Optimización del desarrollo de la energia termosolar en españa en el contexto de la transición energética**,
J. Blanco, ***J. Bonilla****, E. Zarza, D.C. Alarcón-Padilla / CIEMAT*,
XVII Congreso Ibérico e XIII Congreso Ibero-americano de Energia Solar (CIES),
Regular paper in Proceedings, Oral presentation,
Lisboa (Portugal), Online, November, 3 - 5, 2020.
DOI: 10400.9/3340

2019 **Machine learning perspectives in concentrating solar thermal technology**,
J. Bonilla*, J.A. Carballo / CIEMAT, M. Berenguel / UAL, J. Fernández-Reche, L. Valenzuela / CIEMAT*,
10^{th} Congress of the Federation of European Simulation Societies (EUROSIM). Special Session on Trends and Perspectives of Machine Learning in Automation,
Regular paper in Proceedings, Oral presentation,
La Rioja (Spain), Jul 1 - 5, 2019.
Abstract volume

2019 **A software for dimensioning of small microgrids with PV-battery systems**,
J.L. Torres-Moreno / UAL, J.A. Carballo, ***J. Bonilla*** */ CIEMAT, A. Gímenez / UAL*,
ISES Solar World Congress, IEA SHC International Conference on Solar Heating and Cooling for Buildings and Industry,
Regular paper in Proceedings, Oral presentation,
Santiago (Chile), Nov 4 - 7, 2019.
DOI: 10.18086/swc.2019.31.05

2018 **Machine learning for solar trackers**,
J.A. Carballo, ***J. Bonilla*** */ CIEMAT, M. Berenguel / UAL, J. Fernández-Reche, G. García / CIEMAT*,
24^{th} Concentrating Solar Power and Chemical Energy Systems (SolarPaces),
Regular paper in Proceedings, Poster,
Casablanca (Morocco), Oct 2 - 5, 2018.
DOI: 10.1063/1.5117524

2017 **Development of an open source multi-platform software tool for parameter estimation studies in FMI models**,
J. Bonilla*, J.A. Carballo, L. Roca / CIEMAT, M. Berenguel / UAL*,
12^{th} International Modelica conference,
Regular paper in Proceedings, Oral presentation,
Prague (Czech Republic), May 15 - 17, 2017.
DOI: 10.3384/ecp17132683

2017 **Optimal operating conditions analysis for a double-effect absorption heat pump coupled to a multi effect distillation plant**,
J.A. Carballo, ***J. Bonilla****, P. Palenzuela, L. Roca / CIEMAT, A. de la Calle / CSIRO*,
Euromed, Desalination for Clean Water and Energy: Cooperation around the World,
Regular paper in Proceedings, Poster,
Tel Aviv (Israel), May 9 - 12, 2017.
Online Program

2016 **Control strategies applied in HYSOL demonstrator: a simulation-based evaluation**,
L. Roca, ***J. Bonilla*** */ CIEMAT, M. Berenguel / UAL, L. González, A.R. Rocha / COBRA* ,
24^{th} Mediterranean Conference on Control and Automation,
Regular paper in Proceedings, Oral presentation,
Athens (Greece), June 21 - 24, 2016.
DOI: 10.1109/MED.2016.7535952

2016 **Operation & training tool for a gas - molten salt heat recovery demonstrator facility**,
J. Bonilla*, L. Roca / CIEMAT, E. Cerrajero, D. Lopez / IDIE, S. Miraval, S. Padilla / AITESA, L. Diez / SERLED, A.R. Rocha, L. González / COBRA*,
6^{th} International Conference on Sustainable Energy Information Technology (SEIT-2016),
Regular paper in Proceedings, Oral presentation,
Madrid (Spain), May 23 - 26, 2016.
DOI: 10.1016/j.procs.2016.04.232

2016 **Optimal operating conditions analysis of a multi-effect distillation plant**,
J.A. Carballo, ***J. Bonilla****, L. Roca / CIEMAT, A. de la Calle / CSIRO, P. Palenzuela / CIEMAT, Manuel Berenguel / UAL*,
Desalination for the environment: clean water and energy,
Abstract, Poster,
Rome (Italy), May 22 - 26, 2016.
Abstract

2015 **Object-oriented modeling of a multi-pass shell-and-tube heat exchanger and its application to performance evaluation**,
J. Bonilla*, M.M. Rodríguez, L. Roca, L. Valenzuela / CIEMAT*,
1^{st} Conference on Modelling, Identification and Control of Nonlinear Systems (MICNON),
Regular paper in Proceedings, Oral presentation,
Saint-Petersburg (Rusia), June 24 - 26, 2015.
DOI: 10.1016/j.ifacol.2015.09.166

2015 **Control strategies in a thermal oil - molten salt heat exchanger**,
L. Roca, ***J. Bonilla****, M.M. Rodríguez, P. Palenzuela, A. de la Calle, L. Valenzuela / CIEMAT*,
21^{th} Concentrating Solar Power and Chemical Energy Systems (SolarPaces),
Regular paper in Proceedings, Poster,
Cape Town (South Africa), October 13 - 16, 2015.
DOI: 10.1063/1.4949227

2015 **Experimental calibration of heat transfer and thermal losses in a shell-and-tube heat exchanger**,
J. Bonilla*, A. de la Calle, M.M. Rodríguez, L. Roca, L. Valenzuela / CIEMAT*,
11^{th} International Modelica Conference,
Regular paper in Proceedings, Poster,
Versailles (France), September 21 -23, 2015.
DOI: 10.3384/ecp15118873

2013 **A combinatorial optimization problem to control a solar reactor**,
L. Roca, R. Diaz-Franco, A. de la Calle, ***J. Bonilla****, L. J. Yebra, Alfonso Vidal / CIEMAT*,
19^{th} Concentrating Solar Power and Chemical Energy Systems (SolarPaces),
Regular paper in Proceedings, Oral presentation
Las Vegas (USA), September 17 - 20, 2013.
DOI: 10.1016/j.egypro.2014.03.216

2012 **Object-oriented library of switching moving boundary models for two-phase flow evaporators and condensers**,
***J. Bonilla**, L.J. Yebra / CIEMAT, S. Dormido / UNED, F.E. Cellier / ETH*,
9^{th} International Modelica Conference,
Regular paper in Proceedings, Oral presentation,
Munich (Germany), September 3 - 5, 2012.
DOI: 10.3384/ecp1207671

2012 **Object-oriented modeling of switching moving boundary models for two-phase flow evaporators**,
***J. Bonilla**, L. J. Yebra /CIEMAT, S. Dormido / UNED, F. E. Cellier / ETH*,
7^{th} Vienna International Conference on Mathematical Modelling (MATHMOD),
Regular paper in Proceedings, Oral presentation,
Vienna (Austria), February 5 - 7, 2012.
DOI: 10.3182/20120215-3-AT-3016.00189

2011 **Exploiting OpenMP in the initial section of modelica models**,
***J. Bonilla**, L.J. Yebra / CIEMAT, S. Dormido / UNED*,
4^{th} International Workshop on Equation-Based Object-Oriented Modeling Languages and Tools,
Regular paper in Proceedings, Oral presentation,
Zürich (Switzerland), September 5, 2011.
Conference Paper

2009 **Real-time simulation of CESA-I central receiver solar thermal power plant**,
***J. Bonilla**, L. Roca, L.J. Yebra / CIEMAT, S. Dormido / UNED*,
7^{th} International Modelica Conference,
Regular paper in Proceedings, Oral presentation,
Como (Italy), September 20 - 22, 2009.
DOI: 10.3384/ecp09430062

2009 **Chattering in dynamic mathematical two-phase flow models**,
***J. Bonilla**, L.J. Yebra , E. Zarza / CIEMAT, S. Dormido /UNED*,
European Control Conference 2009 (ECC),
Regular paper in Proceedings, Oral presentation,
Budapest (Hungary), August 23 - 26, 2009.
DOI: 10.23919/ECC.2009.7075015

2009 **Object oriented modelling and simulation of acurex solar thermal power plant**,
L.J. Yebra / CIEMAT, M. Berenguel / UAL, L. Roca / Aunergy Thermosolar S.L.,
***J. Bonilla** /CIEMAT, S. Dormido / UNED*,
6^{th} Vienna International Conference on Mathematical Modelling (MATHMOD),
Extended Abstract and Regular paper in Proceedings, Oral presentation,
Vienna (Austria), February 11 - 13, 2009.
Conference Paper

2009 **Modelling and real-time simulation of heliostat fields in Central Receiver Plants**,
***J. Bonilla** /CIEMAT, L. Roca, J. González / Aunergy Thermosolar S.L., L.J. Yebra / CIEMAT*,
6^{th} Vienna International Conference on Mathematical Modelling (MATHMOD),
Extended Abstract and Short paper in Proceedings, Poster,
Vienna (Austria), February 11 - 13, 2009.
Conference Paper

National Conference Proceedings

2019 **Control de un recuperador de sales en una planta termosolar híbrida**,
*P. Otalóra / UAL, L. Roca, **J. Bonilla** / CIEMAT, J.L Gúzman / UAL*,
XL Jornadas de Automática 2019.
Regular paper in Proceedings, Poster,
Ferrol (Spain), September 4 - 6, 2019.
DOI: 10.17979/spudc.9788497497169.421

2018 **Modelado y optimización para una gestión eficiente de recursos en desalación solar**,
J.A. Carballo, ***J. Bonilla*** */ CIEMAT, M. Berenguel / UAL*,
XVI Simposio CEA de Ingeniería de Control,
Regular paper in Proceedings, Poster,
Almería (Spain), March 7 - 9, 2018.
Conference Paper

2016 **Control predictivo para satisfacer la demanda de agua en un invernadero mediante un sistema de desalación solar**,
L. Roca / CIEMAT, J.A. Sanchez, F. Rodríguez / UAL, ***J. Bonilla*** */ CIEMAT, A. de la Calle / CSIRO, M. Berenguel / UAL*,
II Simposio Nacional de Ingeniería Hortícola - Automatización y TICs en Agricultura,
Regular paper in Proceedings, Poster,
Almería (Spain), February 10 - 12, 2016.
Conference Paper

2015 **Inversión de la causalidad computacional en el modelado dinámico. Caso práctico de una planta de generación de hidrógeno solar**,
A. de la Calle, L. Roca, ***J. Bonilla*** */ CIEMAT*,
XXXVI Jornadas de Automática 2015,
Regular paper in Proceedings, Poster,
Bilbao (Spain), September 2 - 4, 2015.
Conference Paper

2014 **Solar desalination management to fulfill greenhouse water demand using predictive control**,
L. Roca / CIEMAT, J.D. Álvarez, F. Rodríguez / UAL, ***J. Bonilla*** */ CIEMAT*,
XXXV Jornadas de Automática 2014,
Regular paper in Proceedings, Poster,
Valencia (Spain), September 3 - 5, 2014.
Conference Paper

2013 **Intercambio de modelos entre herramientas de simulación con functional mock-up interface (FMI)**,
J. Bonilla */ CIEMAT, J.D. Álvarez / US, A. de la Calle, L. Roca, L.J. Yebra / CIEMAT, F. Rodríguez / UAL*,
XXXIV Jornadas de Automática 2013,
Regular paper in Proceedings, Poster,
Terrassa (Spain), September 4 - 6, 2013.
Conference Paper

2011 **Modelado y simulación de un evaporador de tubos sumergidos**,
A. de la Calle, L. Roca, ***J. Bonilla****, L.J. Yebra / CIEMAT*,
XXXII Jornadas de Automática 2011,
Regular paper in Proceedings, Poster,
Seville (Spain), September 7 - 9, 2011.
Conference Paper

2007 **Sistema de ayuda a la toma de decisiones en la gestión del clima interior de un invernadero basado en modelos de crecimiento de cultivos de tomate**,
J. Bonilla*, L.J. Yebra / CIEMAT, F. Rodríguez / UAL, Armando Ramírez / UACH*,
II Congreso Español de Informática (CEDI),
I Simposio en Modelado y Simulación de Sístemas Dinámicos (SIMOSI),
Regular paper in Proceedings, Oral presentation,
Zaragoza (Spain), September 11 - 14, 2007.
Conference Proceedings

Invited Presentations

2022 **The potential of concentrating solar power in portugal using inductive projection planning**,
J. Blanco, ***J. Bonilla*** */ CIEMAT, G. Martín / Protermosolar*,
How CSP can improve Frequency Stability of the Power Grid, ATA insights,
Oral presentation, online, January 27, 2022.
Online Video

2020 **Optimization of CSP development in spain using inductive projection planning tool based on artificial intelligence**,
J. Blanco, ***J. Bonilla****, E. Zarza, D.C. Alarcón-Padilla / CIEMAT*,
CSP4Climate, The Cyprus Institute,
Oral presentation, online, December 15 - 17, 2020.
Online Video.

2020 **Herramienta para optimizar el mix eléctrico aplicando técnicas de inteligencia artificial**,
J. Bonilla */ CIEMAT*,
Feria Internacional de Energía y Medioambiente (GENERA),
Oral presentation, Madrid (Spain), Feb 5 - 7, 2020.
Presentation Slides.

2014 **Modelado y simulación de plantas termosolares**,
J. Bonilla */ CIEMAT*,
Jornadas de Informática 2014, University of Almería,
Oral presentation, Almería (Spain), March 3, 2014.
Certificate.

2010 **Modelado y simulación de plantas termosolares**,
J. Bonilla */ CIEMAT*,
XXXI Jornadas de Automática 2010, Modeling and Simulation Group,
Oral presentation, Jaén (Spain), September 8, 2010.
Certificate.

International Doctoral Colloquiums

2009 **Chattering problem in dynamic mathematical two-phase flow models**,
J. Bonilla */ CIEMAT*,
5^{th} Sollab Doctoral Colloquium on Solar Concentrating Technologies,
Abstract, Oral presentation and Poster.
Cologne, Germany, June 22 - 24, 2009.

2008 **Chattering problem in dynamic mathematical two-phase flow models**,
J. Bonilla */ CIEMAT*,
4^{th} Sollab Doctoral Colloquium on Solar Concentrating Technologies,
Abstract and Oral presentation.
Tabernas, Almería (Spain), September 10 - 12, 2008.

Entrepreneurship

2022 **CIEMAT Emprende**, *Fomento de la Innovación a través de Programa de Aceleración de Proyectos Innovadores desarrollados por Entidades Públicas*, Madrid City Council.

- *Idea:* Smart Heliostat.
- *Participants:* **J. Bonilla**, J.A. Carballo / CIEMAT.

Direction of Ph.D. Students

2018 **Modelado y optimización para una gestión eficiente de recursos en tecnlogía termosolar**,
Jose Antonio Carballo, University of Almería (UAL),
Directors: **J. Bonilla** / CIEMAT and M. Berenguel / UAL.

2015 **Contribuciones al modelado dinámico de procesos termoquímicos en instalaciones termosolares**,
Alberto de la Calle Alonso, National Distance Learning University (UNED),
Directors: L. Roca, **J. Bonilla** / CIEMAT and S. Dormido / UNED.

Direction of Final Degree Projects

2016 **Desarrollo de una herramienta software para simulación y control del demostrador de una planta termosolar híbrida de energías renovables**,
Gustavo José Martín de Dios, University of Almería (UAL),
Directors: J.D. Álvarez / UAL and **J. Bonilla** / CIEMAT.

Staff Supervision

2022 - Now **Company tutor**,
Álvaro Martínez Fernández,
Curricular Practices, code 356971, University of Almería (UAL).

2015 - 2018 **Director of research plan**,
Jose Antonio Carballo,
Ph.D. in Computer Science, code 8909, Real Decreto 99/2011 de 28 de enero (BOE nº 35, de 10 de febrero de 2011), University of Almería (UAL).

Membership to Research Groups

2007 - Now **Solar Thermal Applications**,
Plataforma Solar de Almería (PSA), Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Science and Innovation, Government of Spain.
PSA website

2007 - Now **Automatic control, Robotics and Mechatronic (ARM) Research Group**,
Department of Computer Sciences, University of Almería.
ARM website

2007 - Now **Modeling and Control Unit**,
Centro de Investigación en Energía Solar (CIESOL), Joint Institute UAL – PSA.CIEMAT.
CIESOL website

Research Stays

2011 **Object-oriented modeling and simulation of complex physical systems**, *ETH Zurich, Department of Computer Science*, Supervisor: Prof Dr. François E. Cellier, 3 months, Zurich (Switzerland), Sep 3 - Dec 3, 2011.

2010 **Modeling of two-phase flow evaporators for parabolic-trough solar thermal power plants**, *National Distance Learning University (UNED), Department of Computer Science and Automation*, Supervisor: Prof Dr. Sebastián Dormido, 1 month, Madrid (Spain), Mar 1 - 31, 2010.

Research Studies

2022 **Research study - The potential until 2030 of concentrating solar power in Portugal using inductive projection planning**.

- *Authors:* **J. Bonilla** / CIEMAT, G. Martín / Protermosolar.
- *Client:* European Solar Thermal Electricity Association (ESTELA).
- *Description:* Portugal electricity mix optimization for 2030 using the developed software tool based on artificial intelligence. Collaboration with Associação Portuguesa de Energias Renováveis (APREN) to establish the assumptions and goals considered in this study.

Scientific Software

Website Open Data **CSP Data**, *Spanish mix optimizations for 2030, 2040 and 2050 applying Artificial Intelligence*,

- *Authors:* **J. Bonilla**.

CSP Data website

Software Website Open Data **Electricity mix optimization**, *Spanish mix optimizations for 2030, 2040 and 2050 applying Artificial Intelligence*,

- *Authors:* **J. Bonilla**, J. Blanco, E. Zarza, D.C. Alarcón-Padilla.

Electricity Mix Optimization website

Web App **Hel-IoT web server: a smart heliostat development platform**,
*J.A. Carballo, **J. Bonilla**, J. Fernández-Reche, D.C. Alarcón-Padilla / CIEMAT*,
28^{th} Concentrating Solar Power and Chemical Energy Systems (SolarPaces),
Abstract, Poster,
Albuquerque (USA), Sep 27 - 30, 2022.
Conference Paper

Web App **Parabolic trough collector (PTC) power plant performance**, *Web app to estimate the performance of a 50 MW PTC power plant with 8 hours of thermal storage in different locations around the world*,

- *Authors:* **J. Bonilla**, E. Zarza.

PTC performance web app

Web App **Solar tower, gas turbine and MED-TVC simulator**, *Web app for the integration of a thermal seawater desalination system, based on Multi-Effect Distillation technology with Thermal Vapor Compression (MED-TVC), into a high-temperature power cycle (air Brayton cycle) and high-temperature Concentrating Solar Power (CSP) technology, Central Receiver Solar (CRS) tower system*,

- *Authors:* **J. Bonilla**, , P. Palenzuela, B. Ortega-Delgado, J.M. Serrano, J. Fernández-Reche, D.C. Alarcón-Padilla Zarza.

Simulator poster

Software Website **Surf - Simulator builder**, *A toolchain for building powerful multi-platform simulators of FMI-compliant models in an easy and convenient way*,

- *Author:* **J. Bonilla**.

Surf website

Developed simulators:

- Small Parabolic Trough Field
- Thermal Energy Storage Tank
- Thermodynamic Properties of Solar Fluids
- Big Parabolic Trough Collector
- Heat Transfer Basics

Software Repository Open Source

Optifmus - Optimization of functional mock-up units (FMUs), *Open source multi-platform software tool for optimization studies in FMI-compliant models applying genetic algorithms*,
- *Author:* **J. Bonilla**.

Optifmus repository

Contributions to Scientific Open Source Software

2022 **SolarPILOT and CoPylot**, *Solar Power tower Integrated Layout and Optimization Tool (SolarPILOT) and library to access all capabilities seamlessly through Python (CoPylot)*, National Renewable Energy Laboratory (NREL) (USA),
- *Contribution:* code to read SolarPILOT (spt) files and import them in CoPylot.

SolarPILOT / CoPylot repository

2020 **Fluter web ChartJS**, *Charting components for Flutter Web*, Victor Ramos / Fliper (Brazil),
- *Contribution:* linear, logarithm and time axes for charts.

Fluter Web ChartJS repository

2018 **ThermoCycle library**, *A Modelica library for the simulation of thermodynamic systems*, University of Liège (Belgium) and DTU Mechanical Engineering (Denmark),
- *Contribution:* improvements to the solar collector models.

ThermoCycle website

Host of International Facility Access Activities

2016 **SFERA-II: Transnational access activities**, *Access to Plataforma Solar de Almería (PSA) facilities. Collaboration for the experimental validation of a Modelica-based dynamic parabolic trough collector model*, A. Desideri, R. Dickes, S. Quoilin / University of Liege (Belgium), 3 weeks, Jun 27 - Jul 8, 2016.
SFERA-II periodic report

Prototypes and Pilot Plants

2022 - 2025 **More efficient heliostat fields for solar tower plants (HELIOSUN)**, *Generation Knowledge Projects, Ministry of Science and Innovation, PID2021-126805OB-100*, Work team member, budget: 145,200 €.

2020 **Solar tower power mockup for the assessment of advanced control techniques**,
*J.A. Carballo, **J. Bonilla** / CIEMAT, M. Berenguel / UAL, J. Fernández-Reche, G. García / CIEMAT*,
Renewable Energy, Volume 149, pages 682-690, ISSN: 0960-1481.
DOI: 10.1016/j.renene.2019.12.075
JIF: 8.001 (2020), Q1 - Energy & fuels (16/144, 86.40% percentile)

Experimental Campaigns

2018 - Now **CESA-1 solar tower power plant**, Singular scientific and technical infrastructure, Plataforma Solar de Almería (ICTS - PSA), Experimental campaign to develop a new tracking strategy based on artificial intelligence and computer vision.

2019 **NEP PolyTrough 1200 solar field**, Singular scientific and technical infrastructure, Plataforma Solar de Almería (ICTS - PSA), Experimental campaign for the validation of small parabolic trough collector models.

2018 - 2019 **AQUASOL Plant**, Singular scientific and technical infrastructure, Plataforma Solar de Almería (ICTS - PSA), Experimental campaign to validate a steam generator model and the coupling of the elements of the AQUSOL plant.

2016 **Heat Transfer Fluid (HTF) test loop**, SFERA-II: Transnational access activities, Experimental campaign for the validation of big parabolic trough collector models.

2016 **Molten Salt Test Loop for Thermal Energy Systems (MOSA)**, HYSOL project, Experimental campaign for the validation of heat exchanger and molten salt thermal storage system models.

New Methods

2021 **Feasibility and practical limits of full decarbonization of the electricity market with renewable energy: Application to the Spanish power sector**,
J. Bonilla, *J. Blanco, E. Zarza, D.C. Alarcón-Padilla / CIEMAT*,
Energy, Volume 239, Part E, 122437, ISSN: 0360-5442.
DOI: 10.1016/j.energy.2021.122437
JIF: 8.857 (2021), Q1 - Thermodynamics (3/63, 96.03% percentile)

2019 **New approach for solar tracking systems based on computer vision, low cost hardware and deep learning**,
J.A. Carballo, ***J. Bonilla*** */ CIEMAT, M. Berenguel / UAL, J. Fernández-Reche, G. García / CIEMAT*,
Renewable Energy, Volume 133, pages 1158-1166, ISSN: 0960-1481.
DOI: 10.1016/j.renene.2018.08.101
JIF: 6.274 (2019), Q1 - Energy & fuels (19/112, 83.48% percentile)

2018 **A novel heat exchanger design method using a delayed rejection adaptive Metropolis Hasting algorithm**,
A. Mohammadi / UT, ***J. Bonilla*** */ CIEMAT, R. Zarghami, S. Golshan / UT*,
Applied Thermal Engineering, Volume 137, pages 808-821, ISSN: 1359-4311.
DOI: 10.1016/j.applthermaleng.2018.04.028
JIF: 4.026 (2018), Q1 - Engineering, mechanical (13/129, 90.31% percentile)

Outreach Activities

2022 **SOL-préndete: Didáctica y divulgación de la energía solar térmica de concentración con nuevas tecnologías de realidad aumentada y virtual**, European Researchers' Night, open researchers, Marie Skłodowska-Curie actions, European Commission, Almería (Spain), September 30, 2022.

2019 **Inteligencia artificial y energía solar**, *Foco Sur - Actualidad, Economía y Cultura de Almería*, nº 262, December 2019,.

2019 - Now **Blog Posts about Programming, Machine Learning, Embedded Devices & Solar Energy**.

- Weather data: Solar, Temperature & Wind in Python
- Machine Learning: Image Classification with Qt & TensorFlow
- Machine Learning on Desktop, iOS and Android with Tensorflow, Qt and Felgo
- Tensorflow Lite integration with Qt and Felgo for machine learning apps on iOS and Android
- An Introductory Guide to ESP8266, ESP-XX modules and NodeMCU pinout
- ESP8266 NodeMCU programming: First Steps
- Basic ESP8266 NodeMCU tutorial: Breadboard, Pinout and Dimmable LED with PWM
- Getting started with ESP8266 NodeMCU remote control from Desktop, iOS and Android
- ESP8266 NodeMCU RGB LED Remote Control
- Raspberry Pi, TensorFlow Lite and Qt/QML: object detection example
- Coral USB Accelerator, TensorFlow Lite C++ API & Raspberry Pi for TPU object detection
- Raspberry Pi, TensorFlow Lite and Qt/QML: image segmentation example

- Cross-compile and deploy Qt 5.12 for Raspberry Pi
- ESP8266 NodeMCU pinout for Arduino IDE

2019 **Heliostato inteligente**, European Researchers' Night, open researchers, Marie Skłodowska-Curie actions, European Commission, Almería (Spain), September 27, 2019.

2018 **Modelado y control de sistemas de concentración solar**, European Researchers' Night, open researchers, Marie Skłodowska-Curie actions, European Commission, Almería (Spain), September 28, 2018.

2017 **Modelado, simulación y control de sistemas solares**, European Researchers' Night, open researchers, Marie Skłodowska-Curie actions, European Commission, Almería (Spain), September 29, 2017.

2016 **Modelado, simulación y control de sistemas solares**, European Researchers' Night, open researchers, Marie Skłodowska-Curie actions, European Commission, Almería (Spain), September 30, 2016.

2016 - Now **Noticias, sala de prensa, CIEMAT**.

- Participación de la PSA-CIEMAT en el CIES 2020 celebrado en Lisboa
- Software para optimización del mix eléctrico aplicando técnicas de inteligencia artificial
- Tesis doctoral del proyecto ENERPRO de un investigador de CIESOL, Centro mixto PSA-UAL
- Seis Premios Extraordinarios de Doctorado en la Plataforma Solar de Almería
- Finaliza con éxito el proyecto HYSOL

2009 **Control y operación automático de plantas termosolares**,
J. González / Aunergy, M. Berenguel / UAL, M. Romero, L.J. Yebra, D. Martínez, A. Valverde, L. Roca, ***J. Bonilla****, E. Zarza / CIEMAT*,
Montajes e Instalaciones, Year nº 39, Nº 437, March 2009, pages 90-95, ISSN: 0210-184X,.

Membership to Scientific Committees

2021 - Now **Joint Programme (tJP) on Digitalisation for Energy (DfE)**, *The European Energy Research Alliance (EERA)*, Subprogram 2: Data Science & Artificial Intelligence.
tJP Digitalisation for Energy website

2016 **II Simposion Nacional de Ingeniería Hortícola (SNIH)**, Automatización y tecnologias de la información y comunicaciones (TICs) en la agricultura, University of Almería, February 10 - 12, 2016 Certificate.

2015 - Now **International Renewable Energy Congress (IREC)**, *IEEE Power & Energy Society*, International program committee member IREC Committee website.

Membership to Strategic Research Lines

2021 - 2025 **Analysis of sustainable energy systems**, *Strategic Research Line, CIEMAT*, April 2021,.

2021 - 2025 **Plataforma Solar de Almería (PSA)**, *Strategic Research Line, CIEMAT*, April 2021,.

Peer-review activities

2012 - Now **Regular reviews for scientific journals**, *Solar Energy, Renewable Energy, Energy, Energies, Applied Thermal Engineering, International Journal of Heat and Mass Transfer, etc*,.

2012 - Now **Regular reviews for scientific conferences**, *International Renewable Energy Congress (IREC), International Conference on Sustainable Energy Information Technology, European Control Conference (ECC), Annual Conference of the IEEE Industrial Electronics Society (IECON), Vienna International Conference on Mathematical Modelling (MATHMOD), etc*,.

Prizes, Acknowledgments and Fellowships

2016 **Ph.D. dissertation extraordinary prize in Engineerring**, *Modeling of Two-Phase Flow Evaporators for Parabolic-Trough Solar Thermal Power Plants*, University of Almería (UAL), **J. Bonilla**, Directors: L.J. Yebra and S. Dormido.

2016 **Director of Ph.D. dissertation with an extraordinary prize**, *Contribuciones al modelado dinámico de procesos termoquímicos en instalaciones termosolares*, National Distance Learning University (UNED), A. de la Calle, Directors: L. Roca, **J. Bonilla** and S. Dormido.

2016 **Best paper award given by sociedad española de agroingeniería**, *Control predictivo para satisfacer la demanda de agua en un invernadero mediante un sistema de desalación solar*, II Simposio Nacional de Ingeniería Hortícola - Automatización y TICs en Agricultura.

2013 **Best paper in modeling and simulation**, *Intercambio de Modelos entre Herramientas de Simulación con Functional Mock-up Interface (FMI)*, XXXIV Jornadas de Automática 2013, Comité Español de Automática (CEA).

2007 - 2009 **Ph.D. scholarship**, *Plataforma Solar de Almería*, Energy Deparment, CIEMAT, Spain.

2004 **Undergraduated scholarship**, *University of Almería - Plataforma Solar de Almería agreement, Spain*.

Continuing Education

2022 **La transición energética - La energía solar en el sistema eléctrico español**, *IEEE Power & Energy Society (PES), Webinar 11, Spain Section Chapter, PE31, 3 hours*, May 19, 2022.

2021 **Neural networks applied to scientific and technical problems**, *Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Science and Innovation, Government of Spain*, CIEMAT in-company training, Online, course, 50 hours.
Almería, October 4 - November 5, 2021.

2020 **Introduction to applied supervised machine learning**, *Dr. Antonio Jesús Fernández (Universidad de Extremadura)*, Universidad of Almería, Online, course, 10 hours.
Almería, May 26 - 28, 2020.

2019 **Jornada sobre Transición del sector eléctrico español hacia un mercado mayoritariamente renovable en 2030**, *Máster Unversitario en Energía Solar, Universidad of Almería*, Almería, Presential, course, 5 hours, May 16, 2019.

2019 **Practical introduction to quantum computing**, *Dr. Elías Fernández-Combarro Álvarez (Universidad de Oviedo)*, Universidad of Almería, Presential, course, 10 hours.
Almería, October 1 - 2, 2019.

2018 **Industry 4.0**, *Dr. Ramón Vilanova (Universidad Autónoma de Barcelona)*, Universidad of Almería, Presential, course, 10 hours.
Almería, November 14 - 15, 2018.

2018 **Advanced control techniques for process control**, *Dr. Antonio Visioli (University of Brescia)*, Universidad of Almería, Presential, course, 10 hours.
Almería, November 25 - 26, 2018.

2017 **Programming of GPU cards with CUDA**, *Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Economy, Industry and Competitiveness, Government of Spain*, CIEMAT in-company training, Online, course, 15 hours.
Almería, October 16 - 20, 2017.

2017 **Introduction to acceleration and parallelization of scientific code**, *Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Economy, Industry and Competitiveness, Government of Spain*, CIEMAT in-company training, Online, course, 12 hours.
Almería, October 9 - 12, 2017.

2016 **Confort y Edificación Sostenible, una respuesta desde la Automática y las Micro-Redes Energéticas**, *Parque Científico-Tecnológico de Almería (PITA)*, Presential, course, 5 hours.
Almería, Oct 20, 2016.

2016 **Mathematica and SystemModeler**, *Wolfram Research*, Universidad of Almería, Presential, course, 8 hours.
Almería, May 16 - 17, 2016.

2012 **Optimization techniques applied to multi-objetive problems: Evolutionary Algorithms**, *Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Economy and Competitiveness, Government of Spain*, CIEMAT in-company training, Online, course, 12 hours.
Almería, October 2 - 10, 2012.

2012 **Introduction to Python programming**, *Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Economy and Competitiveness, Government of Spain*, CIEMAT in-company training, Online, course, 12 hours.
Almería, June 25 - July 6, 2012.

2011 **Introduction to the MPI and OpenMP programming models in the Euler supercomputer**, *Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Science and Innovation, Government of Spain*, CIEMAT in-company training, Online, course, course, 10 hours.
Almería, June 13 - 17, 2011.

2009 **Engineering equation solver**, *CIESOL, Centro Mixto UAL-PSA.CIEMAT*, conducted by Plataforma Solar de Almería (PSA), Presential, seminar, 16 hours.
Almería, December 1 - 2, 2009.

2009 **Efficient presentations**, *Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Science and Innovation, Government of Spain*, CIEMAT in-company training, Online, course, 20 hours.
Almería, November 23 - December 18, 2009.

2009 **Educational technology: Remote virtual laboratories, interactive tools and Microsoft collaborative technologies**, *University of Almería*, coducted by Prof. Dr. Manuel Berenguel Soria, Vicar (Almería), Presential, course, 25 hours.
Vicar (Almería), July 13 - 16, 2009.

2008 **Occupational health & safety management systems at the Plataforma Solar de Almería**, *Centro de Investigaciónes Energéticas, Medioambientales y Tecnológicas (CIEMAT), Ministry of Science and Innovation, Government of Spain*, Almería, Online, course, 9.5 hours.
Almería, October 27 - 31, 2008.

2008 **Identification of dynamic systems**, *University of Almería*, conducted by Prof. Dr. Daniel E. Rivera, Arizona State University (EEUU), Almeria, Presential, course, 15 hours.
Almeria, September 8 - 10, 2008.

2008 **The influence of IT in the learning process: a practical point of view**, *University of Almería*, coducted by Prof. Dr. Manuel Berenguel Soria, Vicar (Almería), Pressential, course, 25 hours.
Vicar (Almería), July 16 - 18, 2008.

2007 **Process control: application in the Matlab-Simulink environment**, *National Distance Learning University (UNED)*, coducted by Prof. Dr. Sebastián Dormido Bencomo, El Barco de Ávila (Ávila), Presential, course, 35 hours.
El Barco de Ávila (Ávila), July 16 - 20, 2007.

2007 **Modelica and OpenModelica**, *National Distance Learning University (UNED)*, Departamento de Informática y Automática, conducted by Prof. Dr. Peter Fritzson, Linköping University (Sweden), Madrid, Presential, course, 25 hours.
Madrid, March 26 - 28, 2007.

2007 **LaTeX: a scientific editing platform**, *University of Almería*, Enseñanzas propias, Almería, Presential, course, 40 hours.
Almería, March 8 - 30, 2007.

2004 **Programming languages: Java and Visual Basic**, *the Andalusian Government, Employment and technological development regional Ministry*, Info-Studio Academy, Almería, occupational formation course, 400 hours.
Almería, January 8 - May 3, 2004.

2000 **Legal and technical issues of security on the Internet. An approach to safe e-commerce**, *International university of Andalusia*, University of Almería, Almería, Presential, course, 30 hours.
Almería, July 24 - 28, 2000.

Main International Collaborations

2018 - Now **Machine learning for solar thermal systems**. Pete Warden & Aakanksha Chowdhery. TensorFlow Mobile/Embedded Team, Google Brain, USA.

2018 **New design methods for heat exchangers**. Reza Zarghami, Ahad Mohammadi & Shahab Golshan. Process Design and Simulation Research Centre, School of Chemical Engineering, College of Engineering, University of Tehran, Iran.

Related publications:

- A novel heat exchanger design method using a delayed rejection adaptive Metropolis Hasting algorithm

2016 - 2018 **Dynamic modeling, validation and optimization of solar thermal systems**. Sylvain Quoilin, Adriano Desideri & Rémi Dickes. Aerospace and Mechanical Engineering Department, University of Liege, Belgium.

Related publications:

- Steady-state and dynamic validation of a parabolic trough collector model using the ThermoCycle Modelica library

2106 - Now **Modeling, optimization and control of solar thermal systems**. Alberto de la Calle. Solar Energy System Group, Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia.

Related publications:

- Optimal operation of solar thermal desalination systems coupled to double-effect absorption heat pumps
- Design and experimental validation of a computational effective dynamic thermal energy storage tank model
- Optimal operating conditions analysis for a multi-effect distillation plant according to energetic and exergetic criteria
- Optimal operating conditions analysis of a multi-effect distillation plant
- Study on shell-and-tube heat exchanger models with different degree of complexity for process simulation and control design
- Modelo dinámico de un recuperador de gases - sales fundidas para una planta termosolar híbrida de energías renovables
- Dynamic modeling and simulation of a double-effect absorption heat pump
- Predictive control applied to a solar desalination plant connected to a greenhouse with daily variation of irrigation water demand

2011 - 2015 **Object-oriented modeling and simulation of complex physical systems**. François E. Cellier. Department of Computer Science, ETH Zurich, Switzerland.

Related publications:

- Switching moving boundary models for two-phase flow evaporators and condensers
- Object-oriented library of switching moving boundary models for two-phase flow evaporators and condensers
- Object-oriented modeling of switching moving boundary models for two-phase flow evaporators

Languages

English **Advanced C1 level**.

Spanish **Native**.

Diploma **Certificado de nivel avanzado en el idioma inglés**, *Escuela Oficial de Idiomas, Consejería de Educación de la Junta de Andalucía*, July 2015, .

Diploma **Certificate in Advanced English (CAE)**, *University of Cambridge*, ESOL Examinations, Effective Operational Proficiency Level, General English, Level C1 of CEFR
Grade: C, **Score:** 69/100, June 2010 .

Diploma **First Certificate in English (FCE)**, *University of Cambridge*, ESOL Examinations, Vantage Level, General English, Level B2 of CEFR (The Common European Framework of Reference),
Grade: B, **Score:** 75/100, June 2009 .

Course **Advanced English I**, *Andalusian Entrepreneur Network Foundation (CEA)*, financed by the Andalusian Government and the European Social Fund, online course, 50 hours.
Almería, July 2 - 17, 2010 .

Course **Advanced English - Fifth level**, *Escuela Oficial de Idiomas*, Almería, 2014.

Course **Advanced English - Fourth level**, *Escuela Oficial de Idiomas*, Almería, 2013.

Curriculum Vitae Verification

The undersigned **Javier Bonilla Cruz** is responsible for the truthfulness of all the information in this CV, undertaking to provide any requested documentation.

Almería, January 2023.
Signed: Javier Bonilla Cruz