

PERSONAL INFORMATION **Javier GARCÍA-HERAS CARRETERO**

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 javier.garcia-heras@uc3m.es <http://es.linkedin.com/in/javiegarciagheras> https://www.researchgate.net/profile/Javier_Garcia-Heras_Carretero <https://orcid.org/0000-0003-3975-446X> [Skype javieryarcia_h66](skype:javiergarcia_h66)  [Researcher ID M-9293-2013](https://orcid.org/0000-0003-3975-446X)**WORK EXPERIENCE** **Gender Male | Date of birth 2 August 1984 | Nationality Spanish****Feb 2017 – Present Assistant Professor**

Universidad Carlos III de Madrid (UC3M)
Av. de la Universidad 30. 28911 Leganés, Madrid (Spain) <https://aero.uc3m.es>

- Technical activities for TBOMet (Meteorological Uncertainty Management for Trajectory Based Operations) a SESAR H2020 project. Validation scenarios were developed based on a robust optimal flight planning methodology.
- Validation for OptMet (Analysis and optimization of aircraft trajectories under the effects of meteorological uncertainties) a Retos projects.
- Master's Degree: Elements of Critical Software (coordinator); Aerospace Autonomous Systems (coordinator); Air Navigation Systems; Air Transport.
- Bachelor Degree: On-board System Design (coordinator); Aerial navigation, air transport and airports.

May 2016 – Jan 2017 ATM R&D Engineer

CRIDA (Centro de Referencia de Investigación, Desarrollo e Innovación ATM, A.I.E.)
Avda. de Aragón 402 Edificio Allende 4ª Planta 28022 Madrid (Spain), <http://www.crida.es>

- Technical and management activities for COPTRA (COmbining Probable TRAjectories) a SESAR exploratory research project.
- Probability of an aircraft collision in Madrid-Barajas airport in collaboration with the URJM (Universidad Rey Juan Carlos de Madrid) and UC3M (Universidad Carlos III de Madrid).
- Identify performance and information indicators in an aircraft trajectory based on radar data.
- PERSEO (Platform for Analysis of the Network Effects of Sectorization in Operation) algorithms accuracy study.

Sept 2014 – April 2016 Software Engineer

Lockheed Martin Commercial Flight Training
Warmonderweg, 11, 2171AH, Sassenheim (The Netherlands)
<http://www.lockheedmartin.com/cft>

- August 2015-April 2016: ACARS Project (cross-platform) in Qt Creator, C++.
 - * Automatic Dependent Surveillance (ADS) design, development and integration according to ARINC 745 (ADS-C) and DO-260B (ADS-B) protocols in C++.
 - * Datalink interface design between Aircraft and Instructor Operating Station in C++.
 - * Design, development and integration of Flight Information Regions/ Upper Information Region (FIR/UIR) simulation according to ARINC 424 protocol in C++.
 - * Design, development and integration of Digital Automatic Terminal Information Service (D-ATIS) simulation according to ARINC 620, 623 protocols in C++.
- January 2015-August 2015: working on the B777 Full-Flight Simulator software development. Main functional areas: Avionics, Navigation, Aircraft and Simulation Systems.
 - * ARINC 629 and 429 Implementation into Environmental Control System in C++.
 - * Designing mainly EGPWS program pin setting and the Customer Configuration Profile systems.
 - * Customer Configuration Profiles module design, and integration to allow customers initialise the simulation with certain configuration, initial setup.
- October 2014-January 2015: B767 Full-Flight Simulator software development. Main functional areas: Avionics, Simulation and Aircraft Systems.
 - * Aircraft Systems Simulation HW-SW Integration (ARINC 429, C++).
 - * Functional Schematics and Wiring Diagrams implementation for the Instructor Operating Station in C++.
- September 2014-October 2014: B737 Full-Flight Simulator software development. Main functional areas Avionics and Aircraft Systems.
 - * Inertial Reference System software development in C++.
 - * Multifunctional displays configuration simulation in C++.

Sept 2011 – Aug 2014 Teaching Assistant

Universidad Politécnica de Madrid (UPM)
E.T.S.I. Aeronáuticos, Pza. Cardenal Cisneros, 3. 28040 Madrid (Spain)
<http://www.aero.upm.es>

- Master's Degree: Air Navigation; and Air Navigation Systems.
- Bachelor Degree: Positioning, guidance and control; Air traffic control and management; Embedded and terrestrial control systems; and Computer systems management.
- Others: Air Navigation Systems; and Automatic Dependent Surveillance (ADS).

Oct 2009 – Aug 2014 PhD Researcher

Air Navigation Research Group (GINA)
E.T.S.I. Aeronáuticos, Pza. Cardenal Cisneros, 3. 28040 Madrid (Spain)
<http://gina.sataa.upm.es/>

- Aircraft trajectory based on radar data segmentation. SW implementation in Matlab. Project sponsored by CRIDA.
- Administrative support to Universidad Politécnica de Madrid (UPM) and CRIDA in HALA SESAR research network.
- Conducted research on the analysis of the geometric altimetry to support aircraft optimal trajectories within future 4D trajectory management to accomplish the new goals proposed by SESAR and NextGen for the future ATM system.
- Leading ADAM Project sponsored by Boeing: UAV model based on a 3DoF PMM. SW implementation in Matlab/Simulink.
- ADS-B to enhance atmospheric behaviour where real ADS-B messages were recorded and decoded to use them in a Galerkin method. SW implementation in Matlab.
- Optimal fuel and noise Continuous Climb Operations using Chebyshev Pseudospectral Method through AMPL modelling languages.

EDUCATION AND TRAINING

2011–2014 PhD in Aerospace Engineering

Level 8

Universidad Politécnica de Madrid, Spain

- PhD Thesis: *Analysis of the geometric altimetry to support aircraft optimal trajectory within the future 4D trajectory management*, awarded with Cum-Laude. Coding, modelling of Atmospheric, Aircraft 3 degrees of Freedom in Matlab and Simulink and Trajectory Optimization in AMPL.
- Researcher stay at Ecôle National de l'Aviation Civile (ENAC) Toulouse. I joined the *Groupe de Recherche en Automatique du Laboratoire MAIAA* under the supervision of Dr. Félix Mora-Camino, doing research on the different optimal control methods applicable optimal aircraft trajectories. That research led to the publication of a paper awarded as *Excellent Paper at the 3rd International Symposium on Aircraft Airworthiness*, Toulouse, 2013.
- Five articles/posters published in the scope of the PhD research.

2009–2010 **Master in Aerospace Engineer**

Level 7

Universidad Politécnica de Madrid, Spain

- Master thesis: *Design of a winds field model using real ADS-B data*. Wind field model developed using a Galerkin method in Matlab.
- Subjects: *Filtering techniques applied to air navigation and air traffic, Stability and control of Dynamical and Physical Systems*, among others.

2006–2009 **Master's degree in Aeronautical Engineering**

Level 7

Universidad Politécnica de Madrid, Spain

- Graduating project: *Criteria for Positioning Active Multilateration Stations Located Close to Distance Measuring Equipment*. Multilateration station and Distance Measuring Equipment modelled with Matlab and Simulink to establish the criteria for positioning active multilateration station located close to distance measuring equipment.
- Subjects: *Air Navigation System, Avionics Systems, Air Transport, filtering and control techniques, fluid mechanics, flight mechanic and aerodynamics, Control Theory*, among others.

2002–2006 **Bachelor in Aeronautical Engineer**

Level 6

Universidad Politécnica de Madrid, Spain

- Graduating project: *Madrid-Barajas TMA design in case of north configuration*. Madrid-Barajas TMA design in case of north configuration where the RNAV Standard Terminal Arrival Route and Instrumental Approach Chart have been designed using Microstation software.
- Subjects: *Air Navigation Systems, Geotechnics and Cartography, Electromagnetic Waves and Communications*, among others.

PERSONAL SKILLS

Mother tongue Spanish

Other languages

| | UNDERSTANDING | | SPEAKING | | WRITING |
|---------|---------------|---------|--------------------|-------------------|---------|
| | Listening | Reading | Spoken interaction | Spoken production | |
| English | C1 | C1 | C1 | C1 | C1 |
| French | A2 | A2 | A2 | A2 | A2 |

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user
[Common European Framework of Reference \(CEF\) level](https://www.cedefop.europa.eu/en/etools/cefr)

Communication skills – Good team player, good communication skills acquired during the activities developed within my career experience.
– Experienced at giving presentations gained through conferences, presentations and university lessons.

Organisational / managerial skills Managerial skills gained through the supervision of GINA research group project, teaching activities and PhD, master and final bachelor thesis.

Computer skills – Python used to elaborate the PERSEO algorithms accuracy study, and the validation task for TBOMet and OptMet projects.
– TAAM (Total Airspace and Airport Modeler) used in the Air Navigation teaching labs and OptMet Validation Tasks.
– Java in Eclipse to perform PERSEO applications.
– BlueSly (The open source Air Traffic Simulator) for the Air Navigation teaching labs and OptMet Validation Tasks.
– R used to elaborate the PERSEO algorithms accuracy study.
– Sql to collect flight information in order to perform ATM studies.
– C ++ in Visual Studio and Qt Creator to develop Commercial Trainer Flight Simulator.
– Matlab and Simulink to develop GINA projects such as wind field models and an Aircraft 3DoF PMM model.
– AMPL modelling language to determine the optimal aircraft trajectory solutions.
– CATIA to design an aircraft model, Microstation to design RNAV aircraft procedures at Madrid-Barajas Airport.
– Html for webpage design of the GINA Research Group (<http://gina.infra.upm.es>).
– LaTeX to produce the research publications.
– Adobe Illustrator to design the figures publications.
– Good command of Windows, Linux and Mac OS, Microsoft Office, Computer programming, installation and configuration of computer based software.

Other skills Proactive way of acting, hard-worker and responsible. Good at multitasking and at working under pressure.

Driving licence B

PUBLICATIONS

Books – *Robust Optimal Trajectory Planning Under Uncertain Winds and Convective Risk..* **Daniel González-Arribas, Javier García-Heras, Manuel Soler, Manuel Sanjurjo-Rivo, Ulrike Gelhardt, Juergen Lang, Thomas Hauf, and Juan Simarro.** In: Electronic Navigation Research Institute (eds) Air Traffic Management and Systems III. EIWAC 2017. Lecture Notes in Electrical Engineering, vol 555. Springer, Singapore, 2019. ISBN: 978-981-13-7085-4.

- Journals**
- *Environmental benefits in terms of fuel efficiency and noise when introducing continuous climb operations as part of terminal airspace operation.* **Manuel Villegas Díaz, Victor Fernando Gómez Comendador, Javier García-Heras Carretero, Rosa María Arnaldo Valdés.** International Journal of Sustainable Transportation, 2019. DOI: 10.1080/15568318.2019.1651924
 - *Characterization and Enhancement of Flight Planning Predictability under Wind Uncertainty.* **Javier García-Heras, Manuel Soler, and Daniel González-Arribas.** International Journal of Aerospace Engineering, vol. 2019, Article ID 6141452, 29 pages, 2019. <https://doi.org/10.1155/2019/6141452>.
 - *Analyzing the Departure Runway Capacity Effects of Integrating Optimized Continuous Climb Operations.* **Manuel Villegas Díaz, Fernando Gómez Comendador, Javier García-Heras Carretero, and Rosa María Arnaldo Valdés.** International Journal of Aerospace Engineering, vol. 2019, Article ID 3729480, 10 pages, 2019. <https://doi.org/10.1155/2019/3729480>.
 - *Collocation Methods to Minimum-Fuel Trajectory Problems with Required Time of Arrival in ATM.* **J. García-Heras, M. Soler, F.J. Sáez.** Journal of Aerospace Information Systems. Volume 13 (7), 2016, Pages 243-265. ISSN: 1940-3151. doi: 10.2514/1.1010401.
 - *A comparison of optimal control methods for minimum fuel cruise at constant altitude and course with fixed arrival time.* **J. García-Heras, M. Soler, F. J. Sáez.** The Procedia: Procedia Engineering/ELSEVIER Ltd. Volume 80, 2014, Pages 231-244. ISSN: 1877-7058. <https://doi.org/10.1016/j.proeng.2014.09.083>.
 - *Aircraft used as a sensor for atmospheric behaviour determination. Practical case: pressure estimation using automatic dependent surveillance-broadcast.* **J. F. Alonso, F. J. Sáez, J. García-Heras.** Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering, 227(5), 778-797. April 2012. ISSN: 0954-4100. <https://doi.org/10.1177/0954410012442044>.

- Conferences**
- *Data Driven Occupancy Prediction in Adverse Weather Conditions using Thunderstorm and Traffic Observations.* **A. Jardines, M. Soler, J. García-Heras.** 2019 Ninth SESAR Innovation Days, 2nd – 5th December 2019, Athens (Greece). ISSN 0770-1268.
 - *Effects Of Weather Uncertainty In Sector Demand At Tactical Level.* **A. Valenzuela, A. Franco, D. Sacher, J. García-Heras, and M. Soler.** International Symposium on Sustainable Aviation 9 – 11 July 2018, Rome (Italy).
 - *Effects of Reducing Wind-Induced Trajectory Uncertainty on Sector Demand.* **A. Valenzuela, A. Franco, D. Rivas, J. García-Heras, M. Soler.** 2017 Seventh SESAR Innovation Days, 28th – 30th November 2017, Belgrade (Serbia Republic).
 - *ATM Performance Analysis considering Minimum Climatology Impact Trajectories.* **Javier García-Heras, Manuel Soler, Guillermo Puelles, Marcos Sanz and Daniel González-Arribas.** 5th ENRI International Workshop on ATM/CNS (EIWAC 2017). 14th-16th November 2017, Tokyo (Japan).
 - *Robust Optimal Trajectory Planning under Uncertain Winds and Convective Risk.* **Daniel González-Arribas, Javier García-Heras, Manuel Soler, Manuel Sanjurjo-Rivo, Ulrike Gelhardt, Juergen Lang, Thomas Hauf, and Juan Simarro .** 5th ENRI International Workshop on ATM/CNS (EIWAC 2017). 14th-16th November 2017, Tokyo (Japan).
 - *Aircraft Trajectory Simulator Using a Three Degrees of Freedom Aircraft Point Mass Model.* **J. García-Heras, F. J. Sáez, R. Román.** 3rd International Conference on Application and Theory of Automation in Command and Control Systems (ATACCS'2013). ISBN: 978-2-917490-24-2.
 - *A comparison of optimal control methods for minimum fuel cruise at constant altitude and course with fixed arrival time.* **J. García-Heras, M. Soler, F. J. Sáez.** 3rd International Symposium on Aircraft Airworthiness, Toulouse, November 2013.
 - *Analysis of the Geometric Altimetry to Support Aircraft Optimal Vertical Profiles within Future 4D Trajectory Management.* **J. García-Heras, F. J. Sáez.** 2nd International Conference on Application and Theory of Automation in Command and Control Systems (ATACCS'2012). ISBN: 978-2-917490-20-4.
 - *Criteria for Positioning Active Multilateration Stations Located Close to Distance Measuring Equipment.* **J. García-Heras, F. J. Sáez, J. F. Alonso.** International Symposium Enhanced Solutions for Aircraft and Vehicle Surveillance (ESAVS 2010). ISSN-2194-0304.

PROJECTS

Research projects and grants

- **MetATS- Managing Meteorological Uncertainty for a More Efficient Air Traffic System.** <https://metatsretos2018.wordpress.com>. Funding FEDER/Ministerio de Ciencia, Innovación y Universidades/Agencia Estatal de Investigación. Project numbers: RTI2018-098471-B-C31|RTI2018-098471-B-C32|RTI2018-098471-B-C33. Grant: €. Period: 01/01/2019 - 31/12/2021. Principal Investigator (PI): Manuel Soler Arnedo and Juan Simarro Grande.
- **TBO-MET - Meteorological Uncertainty Management for Trajectory Based Operations.** <https://tbomet-h2020.com/>. Funding EC | H2020. Contract (GA) number 699294. Financing entity: European Commission. Grant: 107500€. Period: 01/06/2016 - 31/05/2018. Principal Investigator (PI): Manuel Soler Arnedo.
- **OptMet: Analysis and optimization of aircraft trajectories under the effects of meteorological uncertainties.** <https://optmet.wordpress.com/> TRA2014-58413-C2-2-R. Funded by the Spanish Ministry of Economy and Competitiveness, General Direction of Science and Innovation. Period: 01/01/2015 – 31/12/2018. Grant: 55000€. Plan Estatal de Investigación Científica y Técnica y de Innovación 2013-2016. Principal Investigator (PI): Manuel Soler Arnedo.
- **COPTRA: Combining Probable Trajectories in a Trajectory Based Operations Environment.** <https://www.sesarju.eu/projects/coptra> Contract (GA) number 699274. Financing entity: European Commission. Period: 01/03/2016 - 28/02/2018. Grant: 1.280.818€. Principal Investigator (PI): Nicolás Suarez.

Contracts as PI

- **DONUT- Dynamic Operation Under Uncertainty.** Financing entity: Airbus. Period: 01/02/2019 – 31/12/2019. Grant: 67000€. Principal Investigator (PI): Manuel Soler Arnedo & Javier García-Heras Carretero.

Contracts as researcher

- **Convenio Especifico Uc3m-Crida Para El Analisis De Viabilidad De Operaciones Independientes Entre Las Arribadas A La Pista 18I Y Los Despegues Por La 14r En Configuración Sur Del Aeropuerto Adolfo Suarez-Madrid Barajas.** Financing entity: CRIDA. Grant: 8000€. Period: 01/07/2015 – 30/06/2020. Principal Investigator (PI): Manuel Soler Arnedo.
- **Service Contract For Supporting Br&T-E In The Development Of Advanced.** Financing entity: Boeing Research and technology Europe, S.L.U. Grant: 7000€. Period: 06/10/2017 - 15/12/2017. Principal Investigator (PI): Manuel Soler Arnedo.
- **Ines-Innovacion En El Desarrollo De Sistemas Electronicos Para Aeronautica.** Financing entity: Boeing Research and technology Europe, S.L.U. Grant: 30000€. Period: 03/05/2017 – 31/12/2017. Principal Investigator (PI): Manuel Soler Arnedo.
- **Ines-2-Innovacion En El Desarrollo De Sistemas Electronicos Para Aeronautica.** Financing entity: Boeing Research and technology Europe, S.L.U. Grant: 60000€. Period: 09/02/2018 – 08/02/2019. Principal Investigator (PI): Manuel Soler Arnedo.
- **Servicios en el área de la gestión del tráfico aéreo para SENASA.** Financing entity: SENASA. Grant: 1.320€. Period: 01/04/2016 - 31/03/2017. Principal Investigator (PI): Manuel Soler Arnedo.

ADDITIONAL INFORMATION

Honours and awards

- Prize for the Excellent Papers at the 3rd International Symposium on Aircraft Airworthiness for A comparison of optimal control methods for minimum fuel cruise at constant altitude and course with fixed arrival time, Toulouse, November 2013.
- José Ramón López Villares prize for best graduating project in the field of Air Navigation (XV edition) by AENA for *Criteria for Positioning Active Multilateration Stations Located Close to Distance Measuring Equipment*, 2010.
- UPM scholarship from February 2010 to August 2011, Personal Investigación en Formación (PIF).

Research stays

- **ENAC - Ecole Nationale de l'Aviation Civile.** host by: Prof Félix Mora-Camino. Department: Groupe de Recherche en Automatique du Laboratoire MAIAA. Duration: 3 months. Contributions: paper conference ISAA 2013.