

# Aitor R Gomez

Guidance, Navigation & Control Engineer

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## ABOUT

As a GNC Engineer, and a space exploration enthusiast, I am devoted to the development of algorithms and technology for the sustainable progress of the space industry. I value collaborative learning to the highest degree, recognizing it as the most effective means of acquiring knowledge and fostering innovation, and I believe in sustainability as the driving force for progress. My diverse experiences and abilities make me a highly motivated and rigorous researcher, ready to contribute to advanced space exploration and technology. Learn more about my career in my web [portfolio](#).

## EDUCATION

Title	<b>Ph.D. Candidate in Control</b>	@Aalborg University, AAU
Advisor(s)	<b>Prof. Rafal Wisniewski</b> – <a href="mailto:raf@es.aau.dk">raf@es.aau.dk</a>	2020 - 2023
Covered	<ul style="list-style-type: none"><li>• <i>Main focus on spacecraft safety: collision probability assessment and avoidance strategies.</i></li><li>• <i>Developed a decentralized attitude guidance strategy for the LISA mission and presented it at IFAC World Congress.</i></li><li>• <i>Collaborated with former NASA engineer Prof. John Crassidis at his home university in relation to maneuver determination strategies.</i></li><li>• <i>Supervised multiple Master's thesis related to spacecraft guidance, navigation and control.</i></li><li>• <i>Became member of the <a href="#">AAU Space Group</a></i></li></ul>	
Title	<b>M.S. in Control and Automation</b>	@Aalborg University, AAU
Covered	<ul style="list-style-type: none"><li>• <i>Nonlinear attitude control and quaternion-based navigation and filtering.</i></li><li>• <i>NRHO and Lissajous orbit design and station-keeping control for lunar observation missions.</i></li><li>• <i>Optimization, Robustness, Fault-detection and recovery algorithms.</i></li><li>• <i>Education based on Project-Based Learning enhancing critical assessment, literature retrieval and teamwork.</i></li><li>• <i>Thesis on autonomous rendezvous and docking for CubeSats, obtaining the highest grade.</i></li></ul>	2017 - 2019
Title	<b>B.S. in Industrial Engineering</b>	@Barcelona School of Industrial Engineering, ETSEIB/UPC.
Covered	<ul style="list-style-type: none"><li>• <i>Comprehensive curriculum on various engineering disciplines.</i></li><li>• <i>Strong mathematical background.</i></li><li>• <i>Combined with tutoring and teaching large groups of Industrial engineers from the Polytechnic University of Catalonia.</i></li><li>• <i>Thesis on the design, construction and control of a Gough-Stewart parallel platform, obtaining the highest grade.</i></li></ul>	2011 - 2016

## PUBLICATIONS

Journals	<ul style="list-style-type: none"><li>• (P1) <b>Gomez, A. R.</b>, Bujorianu, M., Wisniewski R., "Safety of Weakly Perturbed Hamiltonian Systems with Probabilistic Initial Conditions", TBS in <i>Automatica</i>, 2023.</li><li>• (P2) <b>Gomez, A. R.</b>, Nebelecky, C., Crassidis, J., "Maneuver Determination in Near-Earth and Cislunar Space", TBS in <i>AIAA Journal of Guidance, Control and Dynamics</i>, 2023.</li></ul>
Conferences	<ul style="list-style-type: none"><li>• (P3) <b>Gomez, A. R.</b>, Al Ahdab, M., "Momentum-Based Learning of Nash Equilibria for LISA Pointing Acquisition", <i>IFAC World Congress</i>, 2023.</li><li>• (P4) <b>Gomez, A. R.</b>, Wisniewski, R., "Stochastic Safety in Short-term Space Conjunctions", <i>IEEE Conference on Decision and Control</i>, 2022.</li></ul>

## PROJECTS

Name	<b>Space Rover</b>	2023 - present
Collab.	AAU Space Robotics: Software team.	
Description	<i>Phd and Master's student-driven project aiming to build a space rover to participate on the European Rover Challenge 2024.</i>	
Tasks	<ul style="list-style-type: none"><li>• <i>Implementing steering inverse kinematics and path-planning algorithms.</i></li><li>• <i>Designing safety control for collision avoidance.</i></li></ul>	
Name	<b>Maritime Internet of Things (MARIOT)</b>	2020 - 2023
Collab.	Sternula, AAU, Gatehouse, Satlab, Space Inventor and Danmark Meteorologiske Institut.	
Description	Global satellite constellation to provide better and safer maritime navigational services.	
Tasks	<ul style="list-style-type: none"><li>• <i>Scripted simulations of comm. protocols, launch and early operations and antenna budget in Python for system verification.</i></li><li>• <i>Advised on collision avoidance operations and safety.</i></li></ul>	
Name	<b>Orbital Mechanics Simulator in C++</b>	2023 - present
Collab.	Personal Project.	
Description	<i>Developing an end-to-end simulation and 3D visualization environment for orbital mechanics written in C++ and OpenGL.</i>	

## PROFESSIONAL EXPERIENCE

Occupation	<b>Invited Researcher</b>	@ State University of New York at Buffalo, NY, USA.
Advisor(s)	<b>Prof. John Crassidis</b>	2022 - 2023
Description	<i>Research on Maneuver Determination and Data Association techniques.</i>	
Tasks	<ul style="list-style-type: none"><li>• <i>Designed novel algorithm to determine unknown impulsive maneuvers in near-Earth and cislunar space.</i></li><li>• <i>Findings to be submitted in AIAA academic journal of Guidance, Control and Dynamics.</i></li></ul>	
Occupation	<b>Researcher</b>	@ Drone Research Lab, AAU.
Advisor(s)	<b>Dr. Anders la Cour-Harbo</b>	2019 - 2020
Description	<i>Research on UAV safety (SafeEYE Project): Automated emergency landing system for risk mitigation of big drones (&gt;7kg).</i>	
Tasks	<ul style="list-style-type: none"><li>• <i>Designed and assisted lab and air-borne tests.</i></li><li>• <i>Acquired and analyzed vibration data from IMU sensors and VICON motion capture.</i></li><li>• <i>Developed an emergency landing decision method.</i></li><li>• <i>Contributed and authored conference papers: P5 and P6 (external links)</i></li></ul>	
Occupation	<b>Research Assistant</b>	@ Institute of Robotics and industrial Informatics, IRI (CSIC - UPC).
Advisor(s)	<b>Dr. Francesc Moreno-Noguer</b> and <b>Dr. Antonio Agudo</b> .	2016 - 2017
Description	<i>Research performed in Perception and Manipulation department on human image synthesis and 3d human modeling.</i>	
Tasks	<ul style="list-style-type: none"><li>• <i>Tested deep convolutional neural network models trained for 3D-pose estimation from still images.</i></li><li>• <i>Incorporated mesh representation models that encode human shape and pose in 3D.</i></li></ul>	
Occupation	<b>Teacher in Mathematics</b>	@ Centre d'Estudis Universitaris Superiors, CEUS Academy.
Description	<i>Tutoring and teaching large groups of students coursing Industrial Engineering at UPC, ETSEIB.</i>	
Tasks	<ul style="list-style-type: none"><li>• <i>Organized and performed lectures and exercise sessions on Linear Algebra and Differential Equations</i></li></ul>	

## SKILLS

Program.	C / C++ — OpenGL — Python — Bash — L <sup>A</sup> T <sub>E</sub> X <sup>®</sup> — html/css
Simulation	MATLAB <sup>®</sup> — Simulink <sup>®</sup> — ANSYS <sup>®</sup> — SolidWorks <sup>®</sup> — AutoCAD <sup>®</sup>
Courses	Stochastic Safety — Optimal Control — LMIs for Optimization and Control — Reinforcement Learning — Advanced Mathematics.

## LANGUAGES

Spanish	<i>Native</i>
Catalan	<i>Native</i>
English	<i>High competence</i> - Cambridge Certificate in Advanced English (CAE) C1 - 2017
French	<i>Basic competence</i> - Diplôme d'Études en Langue Française (DELF) A1 - 2007
Portuguese	<i>High spoken competence</i>

## AWARDS / MEMBERSHIPS

- **AAU Space Group** member. Learn more about it [here](#).
- Young Researcher, Awards *XXIV Certamen de Joves Investigadores*, 2011.
- Award *Fundació Salas*, 2011
- Award *Argó*, Autonomous University of Barcelona, 2011