Roberto José Aguilar-Martínez

Contact information

Address: Lunar and Planetary Laboratory, University of Arizona, Kuiper Space Sciences Building, University Blvd., Tucson, AZ.
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Education

2022 – 2027 (expected) Ph.D. Planetary Sciences - Lunar and Planetary Lab, University of Arizona

- Research direction: retrieving subsurface geometry of debris-covered glaciers on Earth and Mars
- Fieldwork experience:
    - Surveyed rock glaciers (Sourdough, Alaska and Galena Creek, Wyoming) with drone-based GPR and photogrammetry. In charge of data collection, processing, and interpretation (Software: Metashape, Emlid Studio, EkkoProject, QGIS)
- Responsible for updating the SHARAD Surface Clutter Simulations in the NASA PDS Geosciences node
- Academic Advisor: John W. Holt

2020 M.Sc Space Systems and Engineering (Honors) - Skolkovo Inst. of Science and Technology

- Academic mobility in the Photogrammetry and Remote Sensing group, **ETH Zurich**
- Thesis topic: Deep-learning-based Lake Ice Detection using ESA Sentinel-1 SAR data
- Other research: forest classification using LiDAR and hyperspectral data with machine learning

2020 M.Sc Traffic control systems and navigation - Moscow Inst. of Physics and Technology

- Research: Computer vision-based runway detection in aerial and satellite images

2015 University of Costa Rica

- B.Sc: Computer Science
    - T.A.: Operating systems and Compilers & Automata
    - Founding member of the Aerospace Engineering Group of the university (rocketry group)

Professional experience

July 2019 – May 2022 Aerialytics SRL www.aerialytics.ai
Co-founder / CTO

- Managed mapping and monitoring projects in extensive agricultural fields using UAVs PPK, RTK devices, and AI platforms for automated planting inventory and crop health change detection.
- Established a strategic alliance with a sales partner of Hylio spraying drones in Central America, to provide integrated services of mapping, monitoring, and fumigation with drones.
- Raised non-refundable funding to prototype a geospatial data management system for sustainable agriculture, using UAV and satellite imagery https://youtu.be/VtpSslv9Fnk
- Mentored internships in precision agriculture for students from technical high schools.

January 2022 – March 2022 UCLouvain
Assistant Researcher

- Collaborated in writing the project proposal: *Improving GNSS-R products for soil moisture using high-resolution GPR,* adding inputs with ESA Sentinel 1&2 products for a multiscale calibration.

June 2015 – September 2017. Hewlett Packard Enterprise (R&D Center)
Embedded Software Engineer II / Scrum Master

- Developed a low-level feature for the Aruba Networking Operating System in C/C++
- Received an *excellent* score in the annual evaluation for 2 years consecutively

August 2015 – December 2015. University of Costa Rica
Lecturer (course: Information Systems Design)

- Theory of Requirements Engineering
- Project-driven class with a coding component in Java and integration with MySQL

October 2010 – December 2010. Ad Astra Rocket Company
Electronics Technician (internship for the high school technical degree in Industrial Electronics)

Awards

March 2018 International Space Exploration Forum 2 organized by JAXA (Tokyo, Japan)

- 1st place in the workshop for Young Professionals. Real Tech Fund Award
- Team idea: Sustainable production of proteins in space based on fungi.

Training & Certifications

April 2022	**INCAE Business School**
	Executive Program for SME acceleration
September 2016	**TRIPOLI Rocketry Association**
	Level 1 and 2 certifications for High Power Rockets in the Black Rock Desert, NV
May 2016	**Korea Aerospace Research Institute**
	KARI International Space Training (Approach: Earth Observation satellite systems)

Relevant Scientific Publications [Google Scholar]

- M. Tom, **R. Aguilar**, P. Imhof, S. Leinss, E. Baltsavias, K. Schindler, *Lake Ice Detection from Sentinel-1 SAR with Deep Learning, ISPRS Annals*: https://arxiv.org/abs/2002.07040 **GitHub**
- **R. Aguilar,** V. Mosin, A. Platonov, A. Vasiliev, A. Kedrov, A. Ivanov*, Robust Forest Classification using Hyperspectral Imaging, Laser Scanning and Satellite Imagery, IAC-19,B5,2,10,x51019,* 70th International Astronautical Congress, Washington, USA, October 2019
- **R. Aguilar,** V. Mosin, A. Platonov, A. Vasiliev, A. Kedrov, A. Ivanov, *Remote Sensing and Machine Learning for Tree Detection and Classification in Forestry Applications,* ERS19 SPIE Remote Sensing, Strasbourg, France, September 2019 **GitHub**
- F. Spina, **R. Aguilar**, M. Sugaya, C Guo, R. Yokoya, C Mandigma, K. Wada, *Towards a self-sustainable production of proteins in space: a proposed solution and roadmap,* IAC-18,D4,2,13,x48287, 69th International Astronautical Congress, Bremen, Germany, Oct 2018
- **R. Aguilar**, A. Mora*, Real-time data acquisition platform using the OpenRocket simulator, IAC-16,D2,IP,3,x31914,* 67th International Astronautical Congress, Guadalajara, México, Sept 2016
- A. Mora, M. Rojas, J. Solis, **R. Aguilar**, M. Jimenez, M Hernandez*, Design of a nanolab to monitor the elytra of a Chrysina beetle at the International Space Station, IAC-15,A2, 6,3,x28203,* 66th International Astronautical Congress, Jerusalem, Israel, October 2015

Public Outreach

- Interview with Roberto Aguilar thecostaricanews.com
- The story of Roberto Aguilar crhoy.com
- GIA-UCR students obtained Level II rocket certification ucr.ac.cr/noticias
- Costa Rica takes a leap toward the 'major leagues' of the space sector nacion.com
- Virtual presentation for elementary and high school students in Costa Rica on solar system topics

Voluntary work

2016 – 2018 National Point of Contact, Space Generation Advisory Council
2014- 2015 Mentor of robotics at Intel Club House (Cedes Don Bosco High School)
2010 – 2017 Member of the Central American Association of Aeronautics and Space

- Ditsö: prototyped an embedded system of a nanolab for an experiment in the ISS
- Daedalus: organized atmospheric balloon launches for promoting space projects in Costa Rica

Languages

English (Professional Proficiency), Spanish (Native language), Russian (Basic), French (Basic)

Hobbies

Playing and watching soccer, hiking, reading history and geography books