Roberto José Aguilar-Martínez

Contact information

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Education

2022 – 2027 (expected) Lunar and Planetary Lab, University of Arizona **Tucson, AZ**

- PhD Degree: Planetary Sciences
  - Research group: TAPIR (Terrestrial And Planetary Investigations and Reconnaissance)
  - Academic Advisor: John Holt

2018 – 2020 Skolkovo Institute of Science and Technology (Skoltech) **Moscow, Russia**

- Masters Degree: Space and Engineering Systems. GPA: 4.89 / 5
- Thesis project in collaboration with Photogrammetry and Remote Sensing group, **ETH Zurich**
  - Topic: Deep-learning-based Lake Ice Detection using ESA Sentinel-1 SAR data
  - Pixel-wise classification of lake ice using DeepLab v3 based on TensorFlow, with Sentinel-1 data obtained from Google Earth Engine. Results include generalization across winters and lakes, using VV and VH polarizations. As a multivariable analysis, SAR data was complemented with meteorological and multispectral data (Sentinel-2 and Landsat).
- Short research projects:
  - Developed a pipeline in Python for individual tree-based detection and classification in boreal forests. This required processing point clouds from an airborne LiDAR sensor in order to detect tree crowns (CHM generation and crown delineation), and classification of hyperspectral features using different machine learning algorithms (RF, k-NN, SVM)

2011 – 2015 University of Costa Rica **San Jose, Costa Rica**

- Bachelor's Degree: Computer Science. GPA: 8.8 / 10.0
- Founder member of the Aerospace Engineering Group (GIA-UCR)
  - Developed a telemetry system based on Arduino for high power rockets.
- Internship at the Central American Association for Aeronautics and Space (ACAE)
  - Organized weather balloons launches with the aim to capture images and atmospheric data from different regions in Costa Rica https://youtu.be/rpXspqvmQy8

Professional experience

July 2020 – May 2022 Aerialytics www.aerialytics.ai **Cartago, Costa Rica**
Co-founder / CTO

- Established a strategic alliance with Agrohawk, a provider of precision crop spraying drones services and sales partner of Hylio https://www.hyl.io/ in Central America.
- Managed mapping and monitoring projects in extensive pineapple fields using UAVs PPK, RTK devices, and AI platforms for automated planting inventory and crops health change detection.
- Analyzed aerial and satellite multispectral imagery, as well, as chlorophyll and soil sensors for agrochemical evaluations in demonstration plots of sugarcane, pineapple, and vegetables.
- Introduced an internship program for high school students in Agriculture 4.0, thus collaborating with the new national study plan for agricultural technical schools in Costa Rica.

January 2022 – March 2022 GPR Louvain **Louvain-la-Neuve, Belgium**
Remote sensing research assistant

- Participated in the early research phases of proposal *Improving GNSS-R products for soil moisture using high resolution GPR* https://sites.uclouvain.be/gprlouvain/

January 2018 - August 2019. Wise Technique **Moscow, Russia**
Software Developer

- Developed a computer vision based runway detection system for landing of small aircrafts.
    - Stereo-calibration of a RGB+Thermal dual camera system using OpenCV
    - Real-time object detection using YOLO, running on a Nvidia TX2 board
    - Exact delineation of shapes based on Structured Forests for Fast Edge Detection

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

- Developed a low-level feature for the Aruba Networking Operating System and Open vSwitch
    - Technical leader of a project team with management responsibilities
    - C/C++ and Python programming languages

August 2015 – June 2016. University of Costa Rica **San José, Costa Rica**
Lecturer

- Course: Information Systems Design, Industrial Engineering School.
    - Theory of Requirements Engineering
    - Development of Java applications and integration with relational databases

October 2010 – December 2010. Ad Astra Rocket Company **Liberia, Costa Rica**
Electronics technician

- Development of an electronic probe for evaluation of plasma on the VASIRM VX-CR.

Awards

June 2020 Technological Innovation Program - University of Costa Rica **San Jose, Costa Rica**

- 1st place in a national innovation competition.
- Raised non-refundable funding to prototype a geospatial data management system for sustainable agriculture, using UAV and satellite imagery https://youtu.be/VtpSslv9Fnk

December 2018 Skoltech President scholarship **Moscow, Russia**

- Outstanding scientific achievements on Level 1 WoS/Scopus publications

March 2018 International Space Exploration Forum 2 **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 - May 2022	**INCAE Business School** Executive Program for Agroindustrial acceleration	**Alajuela, Costa Rica**
July 2018	**Bauman State Technical University** Space Development Theory & Practice Workshop http://ysc.sm.bmstu.ru/eng/sdtp/	**Moscow, Russia**
September 2016	**TRIPOLI Rocketry Association** Level 1 and 2 certification for High Power Rockets	**Black Rock Desert, NV**
May 2016	**Korea Aerospace Research Institute** KARI International Space Training (Approach: Earth Observation satellite systems)	**Daejeon, South Korea**

Relevant Scientific Publications

- 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
- **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
- 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

Languages

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