Rogerio Rodrigues Lima

Ph.D. Candidate in Robotics – WVU

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- Google Scholar https://scholar.google.com/citations?user=KRpOMZUAAAAJ&hl=en
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RESEARCH INTERESTS

Aerial Robotics, State Estimation, Embedded Systems, Artificial Intelligence.

EDUCATION

2020-present **Ph.D. in Aerospace Engineering**
Exploiting the Advantages and Overcoming the Challenges of the Cable in a Tethered Drone System
Advisor: Guilherme Augusto Silva Pereira.
West Virginia University (WVU), USA.

2010-2013 **M.Sc. in Electrical Engineering**
Development of an Embedded Electronic Instrumentation System for UAVs.
Advisor: Leonardo Antônio Borges Tôrres.
University of Minas Gerais (UFMG). Brazil.

2005-2009 **B.Sc. in Electrical Engineering**
Senior Project: Development of an Inclinometer System for Power Line Insulators.
Advisor: Leonardo Antônio Borges Tôrres.
University of Minas Gerais (UFMG). Brazil.

1997-1998 **Electrical Technician**
Industrial Apprenticeship National Service (SENAI).

PROFESSIONAL EXPERIENCE

2020-present **Graduate Research Assistant**
Field and Aerial Robotics (**FARO**) Laboratory. Department of Mechanical and Aerospace Engineering, West Virginia University (**WVU**), USA. https://farolab.wvu.edu/.

Summer/2023 **Intern –** Engineering Development Group (EDG) at **MathWorks**, USA.
https://www.mathworks.com/

2013-2019 **Lecturer –** Engineering Dept., University Center of Belo Horizonte (**UniBH**), Brazil.
Electrical Engineering course. https://www.unibh.br/

2014-2017 **Consultant and Instructor –**
Embedded Systems Consultant at **Konatus**, Brazil. https://www.konatus.com.br/en.

2013-2014 **System Engineer –** Foundation for Technological Innovations (**FITec**), Brazil.
Development and testing of mini-UAVs (10 kg). https://www.fitec.org.br/.

2011-2012 **Lecturer –** Education Institute for the Labor of Minas Gerais (**UTRAMIG**), Brazil.
Mechatronics technical course. https://utramig.mg.gov.br/.

PROJECTS

Current Project

2020-present **Autonomous Robotic Early Warning System for Underground Stone Mining Safety**
Sponsor: The Alpha Foundation for the Improvement of Mine Safety and Health, Inc.
Contributions: Design of a tethering system that connects a drone (UAV) to an unmanned ground vehicle (UGV) through a cable to deliver power to the UAV to achieve long endurance missions. The tethering system comprises a sophisticated instrumentation system that controls the tension of the tether whilst reading tether variables (angles, length, tension) required to perform the drone localization (secondary task of the tethering system and landing).

Past Projects

2010-2013 **Mini-UAVs for Coverage of Areas with Minimization of Time**
Contributions: Design and prototype an electronic instrumentation system for fixed-wing UAVs. This include: sensors specification, microcontroller and DSP programming, sensor fusion modeling, simulation and implementation on embedded systems.
Funding: Financiadora de Estudos e Projetos (FINEP/Brazil).

2008-2009 **Regional Study of Wind Action on the Insulator Chain Balance for the Design of Insulation Coordination of Overhead Transmission Lines**
Constribuitions: Development of an embedded system based on MEMS accelerometers and gyrometers to implement an electronic inclinometer to measure the inclination angle of insulators of aerial power transmission lines.

Funding: CEMIG/ANEEL.

PUBLICATIONS

Total number of publications: 8

Peer-reviewed journal papers (3)

1. **R. R. Lima**, B. Martinez Rocamora and G. A. S. Pereira, "Continuous Vector Fields for Precise Cable-Guided Landing of Tethered UAVs," in *IEEE Robotics and Automation Letters*, vol. 8, no. 7, pp. 4370-4377, July 2023, DOI: 10.1109/LRA.2023.3281940.
2. **R. R. Lima**, and Guilherme A. S. Pereira. "A Multi-model Framework for Tether-based Drone Localization," in *Journal of Intelligent & Robotic Systems*, vol. 108, no. 2, p. 20, June 2023, DOI: 10.1007/s10846-023-01851-0.
3. Martinez Rocamora Jr, B., **Lima, R. R.**, Samarakoon, K., Rathjen, J., Gross, J. N., & Pereira, G. A. S. "Oxpecker: A Tethered UAV for Inspection of Stone-mine Pillars," Drones, 7(2), 73, 2023, DOI: https://doi.org/10.3390/drones7020073.

Peer-reviewed papers in conferences (6)

1. **R. R. Lima** and G. A. S. Pereira, "Drone Collision Detection and Classification using Proprioceptive Data," 2022 International Conference on Unmanned Aircraft Systems (ICUAS), 2022, pp. 562-569, DOI: 10.1109/ICUAS54217.2022.9836207.
2. **R. R. Lima** and G. A. S. Pereira, "On the Development of a Tether-based Drone Localization System," 2021 International Conference on Unmanned Aircraft Systems (ICUAS), 2021, pp. 195-201, DOI: 10.1109/ICUAS51884.2021.9476778.
3. G. S. C. Avellar, G. D. Thums, **R. R. Lima**, P. Iscold, L. A. B. Tôrres and G. A. S. Pereira, "On the Development of a Small Hand-held Multi-UAV Platform for Surveillance and Monitoring," 2013 International Conference on Unmanned Aircraft Systems (ICUAS), 2013, pp. 405-412, DOI: 10.1109/ICUAS.2013.6564715.
4. **R. R. Lima** and L. A. B. Tôrres, "Performance Evaluation of Attitude Estimation Algorithms in the Design of an AHRS for Fixed Wing UAVs," 2012 Brazilian Robotics Symposium and Latin American Robotics Symposium, 2012, pp. 255-260. DOI: 10.1109/SBR-LARS.2012.61.
5. G. S. Ribeiro, **R. R. Lima**, G. A. S. Pereira, L. A. B. Tôrres, L. C. de Araújo Pimenta, "Simulacao Hardware-in-the-loop Aplicada a Avaliacao de Algoritmos de Estimacao de Atitude para VANTS", Simpósio Brasileiro de Automação Inteligente (SBAI), 2013, Link.
6. M. F. Guimarães, C. A. M. Nascimento, R. M. Valle, G. A. C. França, **R. R. Lima**, and G. A. A. Moreira, "Estudo Regionalizado do Balanço de Cadeias de Isoladores devido à Ação do Vento," Centro de Gestão de Tecnologia e Inovação (CGTI), 2008, Link.

Thesis

1. **Rogério Rodrigues Lima.** "Desenvolvimento de uma Cabeça Sensora para Veículos Aéreos Não-Tripulados" (Development of a Sensor Head for Unmanned Aerial Vehicles). M.Sc. thesis, Federal University of Minas Gerais (**UFMG**), 2013. Link to the thesis (In Portuguese).

Patent

1. Tethering System for Localization and Landing of Drones. U.S. Provisional Patent. June 2023.

HONORS/AWARDS

2020-present	Graduate Research Assistantship. Funding: Alpha Foundation.
2019/06	Honored Lecturer (UniBH)
2018/12	Honored Lecturer (UniBH)
2011-2013	Master's Studies Scholarship. Funding: National Council for Scientific and Technological Development (CNPq/Brazil).
2007	Undergraduate Research Scholarship. Funding: National Council for Scientific and Technological Development (CNPq/Brazil).

DEVELOPMENT EXPERIENCE

Design of Autonomous Vehicles and Robots (in collaboration with others):

- Tether-powered drone.
- Tethering System that integrates a heterogeneous (ground and aerial) robotic system.
- Fixed-wing UAV systems.
- System acquisition and Instrumentation systems.
- Design and integration of electronic circuits for robots.

Software Experience:

- Languages: C/C++, MATLAB, Python.
- Libraries: Open-source Computer Vision Library (OpenCV), TensorFlow.
- Tools: Robot Operating System (ROS).
- Simulation: Gazebo, Simulink, Spice (OrCAD, LTspice).
- CAD: Solidworks, AutoCAD, Visio, Eagle, Altium.
- Operating Systems: Linux, MS Windows.

UNDERGRADUATE ADVISING

Capstone Projects at UniBH

- Cristiano Lopes Barbosa and Emerson Junio Costa Thomas, "Development of a Lightning and Electrical Transients Protection System," 2019.
- Lucas de Sousa Oliveira, "Analysis of the Energy Consumption of an Air Conditioning System in a Commercial Facility under Various Environmental Configurations," 2019.

- André Carlos Souza Valadão and Thiago Felipe Andrade Oliveira, "Development of an Embedded System for Monitoring the Thermal Treatment and Incubation Process of Dairy Beverages in a Dairy Company," 2019.
- Glauber Stallone Siqueira and Paulo Henrique Mendes Granja, "Development of a Embedded System for Hydraulic Leakage Detection through Electrical Current Flow in Pumps Used in Aircraft," 2018.
- Gleison de Almeida Libério, "Development of a Low-Cost CNC Machine," 2018.
- Gabriel da Silva Pinto and Nataniel Nascentes Pereira, "Angular Control of a Pendulum Actuated with a Propeller Motor using a Digital PID Controller Implemented on a Microcontroller," 2018.
- Rubens Tadeu Gomes dos Reis, "Smart Irrigation using Embedded Systems and Internet of Things (IoT)," 2018.
- Alcyberg da Silva and Caio Otaviano do Carmo, "Automated Optical Inspection with Webcams for Quality Control," 2018.
- David José da Silva and Jacqueline Celestina Porto, "Low-cost automation of a Winding Cable Machine using Arduino," 2017.
- Kleydson Braga Guimarães and Renner Gustavo Ferreira de Oliveira, "Development of a Thermal Chamber with PID Temperature Control," 2017.
- Nathanael Camba Nicholls Sathler, "Development of a 3D Printer: Analysis of Printing Quality," 2017.

COMMITTEES

- Capstone Project Committee: 22 students

ROBOTICS COMPETITIONS

- International Conference on Unmanned Aircraft Systems (ICUAS) **Unmanned Aerial Vehicle (UAV) Competition** (2022). Team Mountaineers' mentor. Virtual/simulated competition motivated by the challenges faced by fire-fighting UAVs. Results: 10th place (no prize).
- **NASA Space Robotics Challenge 2** (2020-2021). Team Mountaineers' Testing Lead. Virtual/simulated competition on multi-robot coordination for Lunar exploration and excavation. Results: 6th place (total prize U$45,000.00).

EVENT ORGANIZATION

- **Line Following Robot Competition** (CompRo) at UniBH, Belo Horizonte, Brazil, November 2017
  - ➢ Behind the scenes and the competition: https://youtu.be/7ijQw3XkiO8
- **Introduction to Embedded Systems.** University Center of Belo Horizonte (UniBH), Belo Horizonte, Brazil, 2016.
- **Arduino Workshop**. University Center of Belo Horizonte (UniBH), Belo Horizonte, Brazil, 2017.
- **Arduino Workshop.** University Center of Belo Horizonte (UniBH), Belo Horizonte, Brazil, 2018.
- **Arduino Workshop.** University Center of Belo Horizonte (UniBH), Belo Horizonte, Brazil, 2019.

VOLUNTEER

- **AVEC Liga da Robótica –** Free introductory robotic classes for students from 10 to 14 years old of public schools, Belo Horizonte, Brazil, May to November/2019.
  - https://avecmg.org.br/portfolio-items/liga-da-robotica/
- **Girls in Aviation Day –** Event organized to encourage and inspire young women to pursue careers in aviation and aerospace, Bridgeport/WV, USA, September/2022.

PRESS COVERAGE

- WVU Press: WVU Robotics Team Places 6th in Final Round of NASA Centennial Challenge.
- NASA Press: Teams Develop Code to Coordinate Robots, Win $535,000 in Space Robotics Challenge.
- NASA Press: 22 Teams Crack Code, Qualify for Final Stage of NASA Space Robotics.
- WVU Press: Shooting for the moon: WVU qualifies for final round of NASA Centennial Challenge.

LANGUAGE SKILLS

Portuguese	Native Speaker.
English	Advanced level.
Spanish	Comprehends and reads well.

REFERENCES

Prof. Guilherme A. S. Pereira (Ph.D. Advisor @ WVU)	guilherme.pereira@mail.wvu.edu
Kunal Kadakia (Internship Manager @ MathWorks)	kkadakia@mathworks.com

October 10, 2023