Frederico Fernandes Afonso Silva

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Biosketch

Frederico Fernandes Afonso Silva is a Marie Curie Fellow at the University of Manchester. His current research interests include modular dynamic modeling and control of robotic systems, bi-manual manipulation, and geometrical representations of the environment.

Academic Experience

University of Manchester (United Kingdom)

[10/2023–present] Marie Curie Fellow.
- Development of modular dynamic modeling and control formulations for branched robots

[06/2024–08/2024] Co-supervision of M.Sc. students.
- Student: Hangzheng An. Supervisor: Bruno Vilhena Adorno.
- Student: Tianyi Dong. Supervisor: Bruno Vilhena Adorno.
- Student: Tingyu Chen. Supervisor: Bruno Vilhena Adorno.

[01/2024–04/2024] Teaching Assistant.
- Course: Robotic Manipulators (M.Sc. students). Supervisors: Murilo M. Marinho and Xiaoxiao Cheng.

Technical University of Munich (Germany)

[02/2023–09/2023] Postdoctoral Research Associate.
- Development of MPC strategies for robotic manipulators using dual quaternion algebra

Federal University of Minas Gerais (Brazil)

[08/2022–02/2023] Postdoctoral Research Associate.
- Development of dynamic models for tiltrotor UAVs based on dual quaternion algebra

[02/2019–07/2019] Teaching Assistant.
- Course: Robotic Manipulators (undergraduate students). Supervisor: Bruno Vilhena Adorno.

[08/2018–12/2018] Teaching Assistant.
- Course: Laboratory of Projects III (undergraduate students). Supervisor: Bruno Vilhena Adorno.

[02/2016–07/2016] Teaching Assistant.
- Course: Laboratory of Projects III (undergraduate students). Supervisor: Bruno Vilhena Adorno.

[06/2013–06/2015] Coordinator of the Teaching Assistant team.
- Course: Computer Programming (undergraduate students). Supervisor: Osvaldo Sérgio Farhat de Carvalho.

[11/2012–06/2013] Teaching Assistant.
- Course: Computer Programming (undergraduate students). Supervisor: Osvaldo Sérgio Farhat de Carvalho.

Fellowships and Funding Received

United Kingdom

[10/2023–10/2025] **Marie Curie Postdoctoral Fellowship**
- Funding Agency: UK Research and Innovation (UKRI) - EP/Y024508/1

Brazil

[08/2018–01/2022] **Ph.D. Study Fellowship**
- Funding Agency: The Coordination for the Improvement of Higher Educational Personnel of Brazil (CAPES)

[08/2015–06/2017] **M.Sc. Study Fellowship**

- Funding Agency: The Coordination for the Improvement of Higher Educational Personnel of Brazil (CAPES)

Education

[08/2017–06/2022] **Ph.D. in Electrical Engineering with focus on Robotics**
Dynamic Modeling of Robotic Systems: A Dual Quaternion Formulation.
- Development of a systematic strategy for the dynamic modeling of branched robots
- Formulation of a dual quaternion Newton-Euler formalism
- Proposal of a dynamic modular composition approach

Supervisor: Bruno Vilhena Adorno
Department of Electrical Engineering, Federal University of Minas Gerais, Brazil

[07/2015–06/2017] **M.Sc. in Electrical Engineering with focus on Robotics**
Whole-Body Control of a Mobile Manipulator Using Feedback Linearization and Dual Quaternion Algebra.
- Development of a whole-body control strategy for nonholonomic mobile manipulators
- Application of feedback linearization and dual quaternion algebra

Supervisor: Bruno Vilhena Adorno
Department of Electrical Engineering, Federal University of Minas Gerais, Brazil

[06/2009–07/2015] **B.Sc. in Control and Automation Engineering**
Implementation of a Machine Vision Algorithm for Electrical Outlet Recognition.
- Implementation of machine vision algorithms for self-charging robots

Supervisor: Bruno Vilhena Adorno
Department of Electronic Engineering, Federal University of Minas Gerais, Brazil

[01/2006–11/2008] **VTE in Mechatronics**
Federal Centre of Technical Education of Minas Gerais, Brazil

Publications

Peer-reviewed international journals[1]

1. **F. F. A. Silva**, J. J. Quiroz-Omaña, and B. V. Adorno. 2022. "Dynamics of Mobile Manipulators Using Dual Quaternion Algebra." Journal of Mechanisms and Robotics, pp. 1–24. ISSN: 1942-4302. doi: 10.1115/1.4054320. arXiv: 2007.08444. URL: https://arxiv.org/abs/2007.08444. **I.F. (2022): 2.576**

2. **F. F. A. Silva** and B. V. Adorno. 2018. "Whole-Body Control of a Mobile Manipulator Using Feedback Linearization and Dual Quaternion Algebra." Journal of Intelligent & Robotic Systems 91 (2): 249–62. doi: 10.1007/s10846-017-0686-3. **I.F. (2018): 2.020**

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[1] I.F. stands for Impact Factor according to the Clarivate Analytics' Journal Citation Reports.

Journal preprints

1. **F. F. A. Silva** and B. V. Adorno, "Dynamic Modeling of Branched Robots using Modular Composition," Aug. 2023. [Online]. Available: http://arxiv.org/abs/2208.01795.

Peer-reviewed national and Latin American conference papers

1. **F. F. A. Silva** and B. V. Adorno. 2016. "Whole-Body Control of a Mobile Manipulator Using Feedback Linearization Based on Dual Quaternions." In 2016 XIII Latin American Robotics Symposium and IV Brazilian Robotics Symposium (LARS/SBR), 293–98. IEEE. doi: 10.1109/LARS-SBR.2016.56

Workshop papers

1. A. Teimoorzadeh, **F. F. A. Silva**, L. F.C. Figueredo, and S. Haddadin. 2023. "Smooth real-time motion planning based on a cascade dual-quaternion screw-geometry MPC." In International Workshop on Human-Friendly Robotics, 164-180. doi: 10.1007/978-3-031-55000-3_12

2. **F. F. A. Silva** and B. V. Adorno. 2019. "Wrench Control based on Dual Quaternion Algebra." In Workshop on Applications of Dual Quaternion Algebra to Robotics, International Conference on Advanced Robotics (ICAR). doi: 10.5281/zenodo.3566650

Editorial and review activities

- Web of Science profile: https://www.webofscience.com/wos/author/record/364088
- ORCID profile: https://orcid.org/0000-0003-2130-3636
- Verified reviews: 10.

Reviewer work (selected journals): IEEE International Conference on Intelligent Robots and Systems; International Journal of Advanced Robotic Systems; Journal of Control, Automation and Electrical Systems; IEEE Robotics and Automation Letters, Nonlinear Dynamics.

Boards, committees and positions of trust

Federal University of Minas Gerais (Brazil)

[10/2017–03/2020] Board member of the Graduate Program in Electrical Engineering (Student Representative).

[05/2016–05/2017] Board member of the Graduate Program in Electrical Engineering (Student Representative).

Participation in Evaluation Boards

Participation in the evaluation board for one M.Sc. thesis and one B.Sc. thesis.

Non-academic Experience

[09/2014–09/2015] Federal University of Minas Gerais / Laboratory of Transports (Nucletrans) - Internship on Control and Automation Engineering: Research on machine vision for maintenance of railway lines. Supervisor: Marcelo Franco Porto. Minas Gerais, Brazil.

[04/2009–10/2009] Destec - Internship on Mechatronics Vocational and Technical Education: Assembling of electronic components, installation of overhead crane load measuring systems and simulation of industrial process for process optimization. Minas Gerais, Brazil.

Languages

[Portuguese] Mother language.

[English] Advanced level.

[French] Basic level.

July 22, 2025