

JOÃO GASPARGAS CUNHA

PhD researcher · Robotics Software Engineer · C++ & ROS



Contact Information

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Technical Skills

Domains: autonomous systems, human-robot collaboration, real-time simulation, evolutionary algorithms, artificial intelligence

Languages: C++ 17/20 (primary), C, Python, Lua, MATLAB, SQL

Build & packaging: CMake, vcpkg, multi-config builds, cross-platform Win/Linux/macOS

CI/CD & tooling: GitHub Actions (build matrices, release automation), Doxygen, Git

Quality & verification: unit testing (Catch2, GTest), static analysis (clang-tidy), code coverage (codecov)

Robotics: ROS/ROS2, CoppeliaSim, Gazebo, Universal Robots, MiR, KUKA

UI/Graphics: Dear ImGui

Spoken Languages

English (C2), Portuguese (native)

Summary

Doctoral researcher in Robotics and Artificial Intelligence. Over the course of my PhD, I've come to realise the days I enjoy most are the ones I spend solving problems through code. My engineering background gave me a lasting interest with making things run faster on fewer resources, and a conviction that code should be readable and easy to understand. Now I'm eager to keep growing as a robotics engineer and bring that mindset to a team building robotic systems that matter, wherever in the world it happens to be.

Experience

Doctoral Researcher

University of Minho + TU Eindhoven

Guimarães, PT & Eindhoven, NL (Jan 2023 – present)

- Architect and maintainer of multiple open-source C++ libraries.
- Built a Dynamic Field Theory simulation engine.
- Developed a neuroevolutionary algorithm that optimizes continuous-time neural-field architectures for robotic deployment.
- Best Innovation in HRI Award - Winner IEEE RO-MAN 2025.

R&D Robotics Engineer

DTx Digital Transformation CoLab

Guimarães, PT (Sep 2019 – Jan 2023)

- Involved across the full development cycle of two CE-certified production robotic cells for a major int. manufacturing company.
- Palmyra: Collaborative robot cell that increased productivity by 7.11%, while reducing ergonomic risk.
- AROMA: Autonomous MOBILE MANipulator (UR10e + MiR200) system that self-navigates between workstations, palletizes parts, and sorts defects via computer vision. The system uses a ROS-based architecture.

Education

PhD, Electrical & Computer Engineering

University of Minho + TU Eindhoven, ongoing (FCT doctoral scholarship). Robotics and AI.

MSc, Industrial Electronics & Computer Engineering

University of Minho. Avg. 16/20; Dissertation 20/20; Awarded the Ministry Academic Merit Scholarship as top student of the final year (19.7/20 average).

Selected Open-Source Projects

★**dynamic-neural-field-composer**: C++20 real-time simulation library + interactive app. Benchmarked 15-41% faster than the next fastest framework.

★**neat-dnfs**: C++20 framework evolving continuous-time neural-field architectures for autonomous robot control. CMake/vcpkg, CI + static analysis + release workflows, clang-tidy, codecov, Doxygen, cross-platform (Windows, Linux, macOS)

Academic Profiles

 ResearchGate Joao-Cunha-34

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 CiênciaVitae 7317-6678-04F4

My research sits at the intersection of **cognitive and evolutionary robotics**. I developed neuroevolutionary methods that automatically design Dynamic Neural Field architectures for human–robot collaboration, and built the open-source C++ software that makes these models reproducible and deployable on real robots. My interests span **evolutionary computation**, **dynamic field theory**, and **software engineering**.

First Author Papers

- [1] NeuroEvolution of Dynamic Neural Field Architectures for Human-Robot Joint Action, *Robotics and Autonomous Systems*, under review
- [2] neat-dnfs: A NeuroEvolutionary Framework for Evolving Dynamic Neural Field Architectures, July 2026, *ACM Genetic and Evolutionary Computation Conference*
- [3] Dynamic Neural Field Based Anticipatory Action Selection for Human Robot Collaboration: A Virtual Reality Experiment, July 2026, *International Conference on Social Robotics*, in press
- [4] Robustness and Adaptability in a Dynamic Neural Field Architecture Subject to Degeneration, November 2025, *ROBOT 2025: Advances in Robotics, Lecture Notes in Networks and Systems*
- [5]* From Handcrafting to a Certified and Ergonomic Collaborative Workstation: The Digital Transformation Process, March 2021, *IEEE International Conference On Intelligence And Safety For Robotics*

Co-Author Papers

- [6] Ergonomics and Collaborative Robotics: The synergy to prevent workload in industrial assembly tasks, January 2024, *12th International Conference on Human Interaction and Emerging Technologies*
- [7] Human–Robot Interaction in Industrial Settings: Perception of Multiple Participants at a Crossroads Intersection Scenario with Different Courtesy Cues, May 2022, *MDPI Robotics*
- [8] Physical Ergonomic Improvement and Safe Design of an Assembly Workstation through Collaborative Robotics, February 2021, *Safety*
- [9] The transformation of manual workstations with collaborative robotics: the workers' perceptions, January 2021, *Human Systems Engineering and Design*
- [10] Safety Requirements for the Design of Collaborative Robotic Workstations in Europe – A Review, July 2020, *Advances in Intelligent Systems and Computing*

Grants and Awards

- Best Innovation in HRI NeuroDesign Award - Winner, December 2025, *IEEE International Conference on Robot and Human Interactive Communication 2025*
- FCT Doctoral Scholarship- Competitive National Funding, January 2022, *Fundação para a Ciência e a Tecnologia (FCT)*
- Academic Merit Scholarship - Best Student of the Year, November 2021, *Ministry of Science Technology and Higher Education*

