

Afonso Bispo Certo, Ph.D. Student

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I'm a PhD student at Técnico and researcher at ISR/LARSyS, working on robot task planning with Large Language Models. I focus on enabling robots to understand and act on natural language commands.

Education

- 2025–Present **Ph.D. in Electrical and Computer Engineering**, Instituto Superior Técnico.
Thesis title: *Adaptive Planning for Natural Human-Robot Interaction: Real-Time Multi-modal Feedback and Hierarchical Goal Reasoning*
- 2022–2024 **M.S. in Electrical and Computer Engineering**, Instituto Superior Técnico.
Thesis title: *End-to-End Robot Task Planning from Transcriptions of Voice Commands*
- 2019–2022 **B.S. in Electrical and Computer Engineering**, Instituto Superior Técnico.

Employment History

- 2022–Present **Team Member & Researcher**, SocRob@Home. Research on intelligent robotic systems for home environments, focusing on General Purpose Service Robots (GPSR) and natural language command execution.

Research Publications

Conference Proceedings

- 1 **A. Certo**, B. Martins, C. Azevedo, and P. U. Lima, “Large Language Model-Based Robot Task Planning from Voice Command Transcriptions,” in *2025 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Oct. 2025, pp. 21 018–21 023. [DOI](#): 10.1109/IROS60139.2025.11246378.

Technical Articles & Blog Posts

- 1 P. Bordalo-Machado, **A. Certo**, R. Serra, R. Coimbra, H. Jain, and D. Soni. “AI-Driven Task & Motion Planning for Service Robots with Oracle Cloud Infrastructure,” Oracle AI & Data Science Blog. (Dec. 2025), [URL: https://blogs.oracle.com/ai-and-datascience/ai-driven-task-motion-planning-service-robots-with-oci](https://blogs.oracle.com/ai-and-datascience/ai-driven-task-motion-planning-service-robots-with-oci).

Fellowships, Honors & Awards

- 2025 – 2029 **FCT Doctoral Studentship (Bolsa de Doutoramento)**, Fundação para a Ciência e a Tecnologia.
Fully funded 4-year individual PhD fellowship for research in LLM-based robot task planning.
- 2024 **Joy in Motion Academic Award**, Critical TechWorks / Instituto Superior Técnico.
Awarded for developing an assistive navigation project supporting blind pedestrians.

Research Projects & Collaborations

- 2025 – 2026  **FOMO-HODOR: Foundation Models for Humanoid Domestic Robots** – *Researcher*
FCT / UT Austin Portugal Program (Ref: 10.54499/2024.14126.UTA)
Contributing to LLM and foundation model integration for service robotics task planning.
- 2025  **Oracle OCI Task & Motion Planning Pilot** – *Lead Contributor*
Industry Collaboration with Oracle AI & Data Science
Developed AI-driven task and motion planning pipelines for domestic service robots using OCI Generative AI tools.

Academic Activities & Outreach

Talks & Presentations

- Oct 2025  **Large Language Model-Based Robot Task Planning from Voice Command Transcriptions**, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2025) (Hangzhou, China).
Oral paper presentation.
-  **Language-Guided Robot Task Planning: From Transcriptions to Context-Aware Actions**, ELLIS Lisbon PhD and Postdoc Symposium (Lisbon, Portugal).
Poster and oral presentation.
- Jul 2025  **Research Pitch**, 2025 LARSyS Annual Meeting (Lisbon, Portugal).
Pitch presentation on M.Sc. thesis outcomes.

Mentorship & Supervision

- 2026 – Present  **Pedro Pereira** (M.Sc. Thesis in Electrical and Computer Engineering)
Co-Supervisor (with Prof. Pedro U. Lima) – “Active Preference Elicitation and Memory Architectures for LLM-Based Social Humanoid Task Planning”
Instituto Superior Técnico
- 2025 – Present  **António Moraes** (M.Sc. Thesis in Electrical and Computer Engineering)
Technical Advisor (with Prof. Pedro U. Lima & Prof. Bruno Martins) – “Towards More Natural Human-Robot Interaction Using Full-Duplex Speech Frameworks”
Instituto Superior Técnico
- 2025  **Diogo Falcão** (B.Sc. Capstone Project)
Mentor – “Enhancing Robotic Perception with Open-Set Object and Human Feature Detection”
Instituto Superior Técnico
- 2025 – Present  **Vítor Fonseca** (SocRob@Home Team Mentorship)
Team Mentor – “Object Perception and Automatic Point-Cloud Segmentation for Semantic Mapping”
Instituto Superior Técnico
-  **Beatriz Pimenta** (SocRob@Home Team Mentorship)
Team Mentor – “Speech Pipeline and Skill Implementation for RoboCup”
Instituto Superior Técnico

Academic Activities & Outreach (continued)

Competitions & Fieldwork

- Jul 2026  **RoboCup@Home**, SocRob@Home & Listex@Home Teams (Incheon, South Korea). Benchmarked LLM task planning pipelines with SocRob@Home while providing software integration and field support for the joint Listex@Home humanoid initiative (IST / UT Austin).
- Sep 2025  **euROBIN European Parliament Research Showcase**, European Parliament (Brussels, Belgium). Demonstrated cooperative AI and service robotics research outcomes directly to EU policy-makers.
- Nov 2024  **euROBIN Coopetition 2024** (Nancy, France). Participated in multi-institutional benchmarking, sharing software publicly to promote collaboration and reproducibility in robotics research.
- Jul 2024  **RoboCup@Home**, SocRob@Home Team (Eindhoven, Netherlands). Achieved 3rd place overall, testing LLM-based task planning systems in realistic domestic scenarios.
- May 2024  **RoboCup@Home Portugal Open**, SocRob@Home Team (Paredes de Coura, Portugal). First live deployment and realistic benchmark testing of the LLM-based task planner developed for M.Sc. research.
- Jul 2023  **RoboCup@Home**, SocRob@Home Team (Bordeaux, France). Achieved 2nd place overall and won the Best GPSR Award, benchmarking autonomous service systems in complex environments.

Outreach & Public Engagement

- Sep 2025  **European Researchers' Night**, Pavilhão do Conhecimento (Lisbon, Portugal). Interactive public demonstrations showcasing humanoid robot capabilities to engage visitors of all ages in science and technology.
- Jul 2025  **26th Anniversary of Pavilhão do Conhecimento**, Pavilhão do Conhecimento (Lisbon, Portugal). Live interactive demonstrations featuring a humanoid robot as part of the science center's annual anniversary celebration.
- 2024 – Present  **High School STEM Outreach & Robotics Demos**, Instituto Superior Técnico (Lisbon, Portugal). Hosted interactive live demonstrations on the SocRob@Home testbed for visiting high school students, introducing core concepts in service robotics and perception.

Leadership & Community

- 2016 – Present  **Scout Leader & Youth Mentor**, Associação de Escoteiros de Portugal. Led youth groups in outdoor expeditions and community service projects, while mentoring scouts in STEM initiatives including the ESA and Raspberry Pi Foundation 'Mission Zero' program. Spearheaded the digital transition to virtual activities during the COVID-19 pandemic.

Leadership & Community (continued)

2019 – 2023



Maker, HackerSchool (Instituto Superior Técnico).

Developed open-source hardware/software projects, including 'HSTable' (a DIY interactive smart table) and a mechanical physical Turing Machine. Facilitated technical workshops on programming and electronics, and served on the Marketing & Communications team (2021–2022) managing recruitment campaigns and project promotions.