

DUARTE SANTOS

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RESEARCH INTERESTS

Third-year Biological Engineering student at Instituto Superior Técnico with a strong interest in genetic engineering, synthetic biology and translational biomedical research. Academic background includes recombinant DNA technology, CRISPR-Cas9 gene editing, molecular biology and microbiology. Currently conducting a research project at GIMM investigating the effects of angiotensin II receptor blockers on pancreatic cancer cell membranes using mammalian cell culture and fluorescence spectroscopy. Aspires to understand disease mechanisms at the molecular level and contribute to the development of next-generation cellular and genetic therapies.

EXPERIENCE

Research Associate | Institute for Systems and Robotics *Apr 2025 – Current*
Conducted research on *Lisbon, Portugal*

Humanoid Locomotion Researcher | Instituto Superior Técnico, ISR-Lisbon *Mar 2025 – Present*
Master's thesis in humanoid locomotion control and deployment *Lisbon, Portugal*

- Developed and evaluated multiple locomotion strategies (legged-only, whole-body, and reference-tracking enhanced gaits) for a humanoid robot using reinforcement learning and optimal control.
- Built equivalent training and validation environments across several physics simulators (e.g., MuJoCo, Isaac-based tools, and others) to study sim-to-sim robustness and policy transfer.
- Designed and analyzed stair-climbing and hazardous-terrain locomotion using depth-camera perception, integrating terrain estimation into the control pipeline for safe foothold selection.

LLM-based Task Planning Researcher | FOMO-HODOR Project (ISR-Lisbon & UT Austin) *October 2025 – Present*

Foundation Models for Humanoid Domestic Robots *Lisbon, Portugal / Austin, USA*

- Leveraging large language models to translate natural language instructions into high-level task plans and robot-executable code for general-purpose domestic service scenarios.
- Investigating long-horizon task decomposition, memory, and commonsense reasoning to tackle GPSR-like tasks from RoboCup@Home and other complex human-robot interaction benchmarks.
- Collaborating in an international team (Lisbon–Austin) to integrate LLM-based decision making with existing perception, navigation, and manipulation pipelines on real robotic platforms.

Intelligent Robots and Systems Group, ISR-Lisbon *Apr 2025 – Present*
Member of SocRob@Home research and competition team *Lisbon, Portugal*

- Contributed to research on domestic service robots, focusing on human-robot interaction, perception and sensor fusion, and robust task execution in unstructured indoor environments.
- Supported the development and evaluation of benchmark scenarios inspired by RoboCup@Home and EU-funded projects (e.g., MOnarCH, RoCKIn), including social behaviors and user engagement.
- Worked within a multidisciplinary team integrating navigation, manipulation, and dialogue modules into a unified software stack for autonomous operation in realistic human-centered settings.

Institute for Systems and Robotics | Intelligent Robots and Systems Group *Apr 2025 – Current*
Conducted research on *Lisbon, Portugal*

Foundation Models for Humanoid Domestic Robots *October 2025 – Current*
Conducted research on *Lisbon, Portugal*

Study of angiotensin II receptor blockers' effects on tumor cell structure *Apr 2026 – July 2026*
GIMM - Gulbenkian Institute for Molecular Medicine | Final Bachelor's Project *Lisbon, Portugal*

- Conducted research on tumor biomechanics, investigating the effects of angiotensin II receptor blockers (losartan and valsartan) on pancreatic cancer cell properties.

- Performed fluorescence spectroscopy on ductal adenocarcinoma cell lines to evaluate changes in membrane fluidity and lipid organization.
- Analyzed how these biophysical alterations could influence tumor progression, metastasis, and response to therapy, contributing to research on novel strategies to enhance the effectiveness of chemotherapy and immunotherapy.

Open Laboratories Monitor | Department of Bioengineering, IST

Guided high school students during laboratory visits at IST.

Apr 2025 – May 2025

Lisbon, Portugal

INESC-MN | EMBS - Engineering, Medicine and Biology Society

Organized bioengineering-focused events and case studies, supporting student networking.

Oct 2023 – Oct 2024

Lisbon, Portugal

NEBIST - Núcleo de Engenharia Biológica do Instituto Superior Técnico

Created content on scientific topics and student life for the NEBIST newsletter.

Oct 2024 – Oct 2025

Lisbon, Portugal

Student Mentor

Helped first-year students integrate into the IST academic environment.

Sept 2024 – June 2025

Lisbon, Portugal

IEEE Student Branch | EMBS - Engineering, Medicine and Biology Society

Organized bioengineering-focused events and case studies, supporting student networking.

Oct 2023 – Oct 2024

Lisbon, Portugal

EDUCATION

Instituto Superior Técnico (IST), University of Lisbon

Master of Science | *Electrical and Computer Engineering*

September 2023 – November 2026 (Expected)

Lisbon, Portugal

- Current GPA: 18.3 / 20
- Relevant Coursework: Model Predictive Control, Autonomous Systems, Machine Learning, Computer Vision

Kungliga Tekniska Högskolan (KTH Stockholm)

Exchange Studies | *Systems, Controls and Robotics*

August 2024 – January 2025

Stockholm, Sweden

- Obtained the Maximum Grade of A
- Relevant Coursework: Reinforcement Learning, Artificial Neural Networks and Architectures, Safe Robot Planning, Introduction to Robotics

Instituto Superior Técnico (IST), University of Lisbon

Bachelor of Science | *Electrical and Computer Engineering*

Sept 2020 – July 2023

Lisbon, Portugal

- GPA: 16 / 20
- Relevant Coursework: Genetic Engineering, Biochemistry and Molecular Biology of the Cell, Microbiology, Enzyme Engineering

SKILLS

Laboratory Skills: Molecular Cloning · Mammalian Cell Culture · PCR · Fluorescence Spectroscopy · Protein Expression and Purification

Programming: Python (Advanced) · C (Advanced) · MATLAB (Intermediate) · R (Intermediate) · LaTeX (Intermediate)

Bioprocess & Analytical Skills: Bioreactor Design · Separation Processes · Transport Phenomena · Statistical Analysis of Experimental Data

LANGUAGES

English (C1 - IELTS Academic Band 8.0) · **Portuguese** (Native) · **French** (Elementary)