

JOÃO SOUSA

AI Researcher & Engineer

@jpsousa.ai.96@gmail.com

+351 935451052

Paredes, Porto, Portugal

https://jpsousaup.github.io/cv/

joao-sousa96

jpsousaup

0000-0003-3879-6908



EXPERIENCE

Freelance AI Engineer

Avanti-AI (Startup)

2025 – Present

Remote

- Built AI system for analog gauge reading using Florence-2 and YOLO-OBb.
- Created synthetic datasets for robust model training.

FCT Research Fellow

University of Porto, Fraunhofer IWS, LIACC

2022 – 2025

Porto / Dresden

- Developed AI tools for laser-based additive manufacturing, integrating multimodal perception and intelligent control.
- Created a multimodal AI model and developed a novel loss function (JEMA), leveraging supervised contrastive and representation learning, to enable interpretable multimodal alignment using energy-based models.
- Trained multimodal models and reinforcement learning controllers for intelligent decision-making.
- Deployed real-time AI models in C++ using ROS 2.

Product & Systems Engineer

INEGI

2018 – 2022

Porto, Portugal

- Worked on industrial automation and cloud-edge systems, focusing on data acquisition, processing, and intelligent analytics.
- Supported R&D proposals with industry partners.

Intern

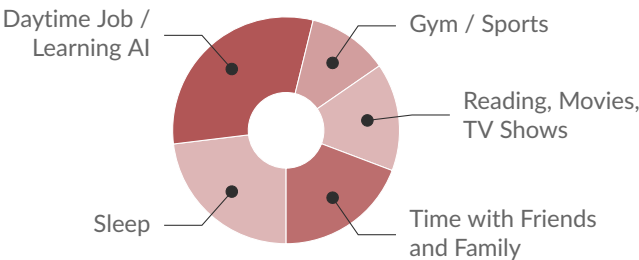
ESI Group

2018

Porto, Portugal

- Programmed KUKA robots for welding and AM.

A DAY OF MY LIFE



MY LIFE PHILOSOPHY

“Guided by curiosity, shaped by continuous learning, and driven to create meaningful impact”

MOST PROUD OF



PhD Research Impact

Developed and deployed state-of-the-art AI models with enhanced interpretability and explainability for real-time decision-making.



Best Paper Award – IMECE’22

Recognized for applying reinforcement learning with Gymnasium and PPO to thermal simulation in laser additive manufacturing.



Teaching & Mentorship

Lectured and co-supervised theses in AI and automation.

STRENGTHS

Hard-working

Motivator & Leader

Curious about AI

Problem Solver

Python

C++

PyTorch

TensorFlow

JAX

Hugging Face Transformers

Scikit-learn

OpenCV

Stable-Baselines

Florence-2

LLaMA

OpenAI

ViT

DINO

SAM

ResNet

YOLO

SQL

InfluxDB

MCAP

Docker

Git

LANGUAGES

Portuguese



English



SELECTED PUBLICATIONS

Journal Articles

- B. Brandau, **J. P. Sousa**, R. Hemschik, F. Brueckner, and A. F. Kaplan, "Cross-Modality Transfer for DED-LB/M: AI-Based Prediction of Schlieren Phenomena from Coaxial Imaging," *Additive Manufacturing Letters*, 2025. DOI: 10.1016/j.addlet.2025.100298.
- J. Ferreira, R. Darabi, A. Sousa, *et al.*, "Gen-JEMA: Enhanced Explainability Using Generative Joint Embedding Multimodal Alignment for Monitoring Directed Energy Deposition," *Journal of Intelligent Manufacturing*, 2025. DOI: 10.1007/s10845-025-02614-4.
- **J. Sousa**, B. Brandau, R. Darabi, *et al.*, "Artificial Intelligence for Control in Laser-Based Additive Manufacturing: A Systematic Review," *IEEE Access*, 2025. DOI: 10.1109/ACCESS.2025.3537859.
- **J. Sousa**, B. Brandau, R. Hemschik, *et al.*, "JEMA-SINDYc: End-to-End Control using Joint Embedding Multimodal Alignment in Directed Energy Deposition," *Additive Manufacturing*, 2025. DOI: 10.1016/j.addma.2025.104888.
- **J. Sousa**, A. Sousa, F. Brueckner, L. P. Reis, and A. Reis, "Human-in-the-Loop Multi-Objective Bayesian Optimization for Directed Energy Deposition with In-Situ Monitoring," *Robotics and Computer-Integrated Manufacturing*, 2025. DOI: 10.1016/j.rcim.2024.102892.
- **J. Sousa**, R. Darabi, A. Sousa, F. Brueckner, L. P. Reis, and A. Reis, "JEMA: A Joint Embedding Framework for Scalable Co-Learning with Multimodal Alignment," *arXiv preprint arXiv:2410.23988*, 2024, Under review at Computer Vision and Image Understanding.
- J. Peixoto, **J. Sousa**, R. Carvalho, G. Santos, R. Cardoso, and A. Reis, "End-to-End Solution for Analog Gauge Monitoring Using Computer Vision in an IoT Platform," *Sensors*, 2023. DOI: 10.3390/s23249858.
- J. Peixoto, **J. Sousa**, R. Carvalho, *et al.*, "Development of an Analog Gauge Reading Solution Based on Computer Vision and Deep Learning for an IoT Application," *Telecom*, 2022. DOI: 10.3390/telecom3040032.

Conference Proceedings

- **J. Sousa**, R. Darabi, A. Sousa, *et al.*, "Enhancing Sample Efficiency for Temperature Control in DED with Reinforcement Learning and MOOSE Framework," in *Proceedings of the ASME 2023 International Mechanical Engineering Congress and Exposition*, vol. 3: Advanced Manufacturing, New Orleans, LA, USA, 2023. DOI: 10.1115/IMECE2023-113629.
- **J. Sousa**, R. Darabi, A. Reis, M. Parente, L. P. Reis, and J. de Sá, "An Adaptive Thermal Finite Element Simulation of Direct Energy Deposition With Reinforcement Learning: A Conceptual Framework," in *Proceedings of the ASME 2022 International Mechanical Engineering Congress and Exposition*, vol. 2B: Advanced Manufacturing, Columbus, OH, USA, 2022. DOI: 10.1115/IMECE2022-95055.

EDUCATION

Ph.D. in Mechanical Engineering

University of Porto

 January 2022 – July 2025

Focus on Artificial Intelligence for laser-based additive manufacturing. Research includes multimodal learning, reinforcement learning, and real-time process control.

M.Sc. in Mechanical Engineering


University of Porto

 September 2014 – July 2019

Specialization in Automation, Instrumentation, and Control. Master's thesis focused on control systems and data acquisition systems.

REFEREES


Prof. Luís Paulo Reis

 University of Porto (FEUP)

 lpreis@fe.up.pt

Director of LIACC
President of the GA of APPIA
Porto, Portugal

Prof. Armando Sousa

 University of Porto (FEUP)

 asousa@fe.up.pt

Associate Professor
Porto, Portugal


Dr. Frank Brueckner

 Fraunhofer IWS

 Frank.Brueckner@iws.fraunhofer.de

Technology Field Manager Additive Manufacturing and Surface Technology
Dresden, Germany

Prof. Ana Reis

 Faculty of Engineering, University of Porto (FEUP)

 arlr@fe.up.pt

Pro-Director DEMec
Porto, Portugal