Josep Maria Barbera

PhD Student

📞 (+34) 644 496 426 | ✉ josep.barbera@csic.es | ⌗ jbarciv | in josep-barbera

My research is centered on autonomous vehicles, with a specific focus on **trajectory generation** and **decision-making** in driving scenarios. Additionally, I am exploring related topics such **ODD-aware** and reinforcement learning.

Education

PhD in Robotics: Autonomous Driving
Arganda del Rey, Spain
CENTER FOR AUTOMATION AND ROBOTICS (CSIC-UPM)
2024 - Present
Autopia Program. *Advisor*: Jorge Villagra.

M.S. in Robotics
Madrid, Spain
TECHNICAL UNIVERSITY OF MADRID · GPA: 9.16/10. 13 COURSES WITH A+ OR A.
2023 - 2024
Advisor: Antonio Barrientos.

B.S. in Industrial Engineering. Major in Robotics and Electronics
Madrid, Spain
TECHNICAL UNIVERSITY OF MADRID · GPA: 7.3/10. 6 COURSES WITH A+ OR A.
2017 - 2023
Advisor: Damien Tourret.

Experience

Technical University of Madrid - CEI
Madrid
RESEARCH INTERNSHIP
Feb. 2023 - Aug. 2023
- *Enhanced Neuroevolutionary Algorithms with GPU-based parallelization*
- Configured a GPU microserver with 2 NVIDIA A30 GPUs and 24 CPUs, and implemented CPU-GPU acceleration using Multi-Instance GPU (MIG) and Python's multiprocessing library
- Prepared a poster for the XV CEI Annual Meeting. [pdf]

Technical University of Madrid - Manufacturing Engineering Group
Madrid
Certified LABORATORY PRACTICE MONITOR
Feb. 2023 - May 2023
- *Served laboratory practicals in the Manufacturing Automation and Robotics course*
- Prepared equipment, ensured safety measures, and drafted practice scripts and rules for tool usage
- Clarified doubts and maintained student commitment to completing laboratory tasks

IMDEA Materials Institute
Getafe, Madrid
RESEARCH INITATION FELLOWSHIP
Jun. 2022 - Oct. 2022
- *Contributed to research on computational oscillatory growth instability in directional solidifications*
- Characterized oscillations and identified their occurrence conditions through computational modeling and DNN simulations (C++/Cuda, analyzed with Python)
- Launched GPU cluster simulations and post-processed data for quantitative analysis using Jupyter Notebooks

Publications

Conference: On the Occurrence of Buoyancy-Induced Oscillatory Growth Instability During Directional Solidification of Alloys
[pdf]
2023 MODELLING OF CASTING, WELDING AND ADVANCED SOLIDIFICATION PROCESSES - XVI CONFERENCE
J. M. Barbera, Thomas Isensee, Damien Tourret

M.S. Thesis: Advanced Locomotion for Quadruped Robots Through Reinforcement Learning
[pdf, code]
J. M. Barbera

B.S. Thesis: Computational Study of Oscillatory Growth Instability in Directional Solidification of Alloys
[pdf, code]
J. M. Barbera

Projects

Master [code]
ROBOTICS *Sept 2023 - Sept 2024*
- **Robotic Navigation** Strategies for a Nocturnal Surveillance Application [code]
- A **Drowsiness Driving Alert** implementation with the use of MediaPipe [code]
- Exploring Urban and Natural Dynamics with **k-Means Clustering** [code]
- **Bilateral Control** with Wave Variables using Matlab [pdf]

Bachelor
ELECTRONICS AND AUTOMATION *Sept 2020 - Sept 2023*
- Building a **SCARA robot** - [pdf]
- **FPGA** programming with VHDL - [code]
- Automatic Car Wash Programming in **Microchip Studio** - [code]
- **C++** *object list* to manage an Asteroids-style game by using the OpenGL cross-platform graphics library. [code]
- **Dynamic Backtracking Maze Generator** with a ramdomized version of the depth-first search algorithm. [code]

Languages

Spanish Native
Catalan Native
English Proficient [certificate]

Technical Skills

Languages C/C++, Matlab, Python, Shell
Tools VSCode, Matlab, Jupyter Notebook
Other Git, Latex, Linux

Transferable Skills

Creativity Classical music and Literature is for me a source of great inspiration
Teamwork Worked on joint projects during BSc and MSc. Distributing workloads and reaching a compromise in the completion of tasks.
Leadership Certified Leisure Time Monitor. Volunteering for the past 7 years in summer camps as organizer. Instructor and group leader.