# Antonio Guillen-Perez

Email: aguillenperez@ucdavis.edu • Alt Email: antonio_algaida@hotmail.com • Mobile: +1-510-203-8412
Personal Website • LinkedIn: antonioguillenperez • GitHub: AntonioAlgaida • Google Scholar: Antonio Guillen-Perez

Dedicated AI research scientist with a Ph.D. in computer science, bringing over 5 years of experience in **deep reinforcement learning** (DRL), **autonomous vehicles**, and **sustainability**. Expert in applying DRL to **multi-agent coordination**, with a track record of significant contributions to major AI conferences (NeurIPS, CVPR, AAAI) and leading IEEE journals. Committed to pushing the boundaries of AI research and its application in real-world challenges.

## EXPERIENCE

**Hewlett-Packard Enterprise (HPE) - AI Labs**                      Milpitas-San Jose, CA
*AI Research Scientist*                                                        *Sep 2022 - Now*

- Led **Multi-Agent Deep Reinforcement Learning** (MADRL) research projects for sustainable computing, focusing on data center energy optimization, workload shifting, and carbon footprint reduction.
- Co-authored the paper **SustainDC: Benchmarking for Sustainable Data Center Control**, accepted for presentation at **NeurIPS 2024 Datasets and Benchmarks Track**.
- Developed **AI-based cooling solutions** and Computational Fluid Dynamics **(CFD) surrogate models** for energy efficiency, integrating MADRL and **genetics algorithms** for real-time optimization.

**Polytechnic University of Cartagena**                                      Cartagena, Spain
*Associate Lecturer*                                                         *Sep 2018 - Jun 2022*

- Taught theoretical and practical classes in **communication network theory** and **distributed systems and services**, with emphasis on network optimization and distributed services performance.
- Conducted research on network optimization algorithms and applied distributed techniques in academic applications.

**Dolphin Wave — Startup**                                                    Murcia, Spain
*ML Engineer and Data Scientist*                                             *Feb 2018 - Sep 2018*

- Applied ML models (XGBoost, LightBGM, and Neural Networks) for urban mobility studies, utilizing WiFi & BLE RSSI signals @ 2.4 and 5GHz for precise environmental positioning and sensing.
- Utilized FB Prophet, ARIMA, and LSTM networks for **Multimodal Time Series Forecasting** in demand prediction, thereby enriching business intelligence tools.

**Polytechnic University of Cartagena**                                      Cartagena, Spain
*Research Intern in the Department of Information and Communications Technologies*                *Sep 2014 - Sep 2018*

- Developed an intelligent traffic light control system using **DRL**, improving urban traffic management.
- Researched and applied **generative models** for security and optimization in urban settings, enhancing intelligent system capabilities.

## EDUCATION

**Polytechnic University of Cartagena**                                      Cartagena, Spain
*Ph.D. in Computer Science, Autonomous Vehicles, and Wireless Communications; CUM LAUDE.*     *Sep 2018 - Jun 2022*

- **Thesis**: "Contribution to Enhancing the Cognitive Capability of Intelligent Transportation Systems (ITS) Using Artificial Intelligence". **Link**: doi:10.31428/10317/11206.
- Key focus on AI and **DRL** for improving urban traffic management and **Connected Autonomous Vehicles** (CAVs).
- Achieved significant reductions in waiting times (56%) and carbon emissions ($\approx 45\%$) at traffic intersections.
- Engaged in interdisciplinary research, integrating 5G/6G mobile network for CAVs, and explored Learning-from-Demonstrations to accelerate **MADRL** training ($\times 5$) .

**University of California, Davis**                                            Davis, CA
*Predoctoral Stay - Researcher Visitor*                                       *Jun 2021 - Jan 2022*

- Focused on AI in healthcare, specifically early detection of throat cancer, achieving over 90% accuracy. Pioneered a new research direction for disease detection using multimodal neural networks. Nature Paper Link

**Polytechnic University of Cartagena**                                      Cartagena, Spain
*Master and Bachelor's Degree in Electrical, Electronic, and Communications Engineering*     *Sep 2012 - Sep 2018*

- Specialized in Communications Systems and Wireless Networks. Conducted comprehensive studies on UAV network performance and developed a wireless sensor network for environmental monitoring.

## Selected Research Contributions <span style="float:right">View more on Google Scholar</span>

### Journal Articles

- **Guillen-Perez, A.**, & **Cano, M.-D.**, "Multi-Agent Deep Reinforcement Learning to Manage Connected Autonomous Vehicles at Tomorrow's Intersections," *IEEE Transactions on Vehicular Technology*, vol. 71, no. 7, pp. 7033-7043, 2022. doi:10.1109/TVT.2022.3169907.

- **Guillen-Perez, A.**, & **Cano, M.-D.**, "Learning from Oracle Demonstrations (LfOD) – A new approach to develop AIM control algorithms based on MADRL," *IEEE Access*, vol. 10, pp. 53601-53613, 2022. doi:10.1109/ACCESS.2022.3175493.

- **Guillen-Perez, A.**, et al., "Flying Ad Hoc Networks: A New Domain for UAV Network Communications." *Sensors*, vol. 18, no. 10, article 3571, 2018. doi:10.3390/s18103571.

### Conference Proceedings

- Naug, A.*, **Guillen-Perez, A.***, Gutierrez, R.-L.*, et al., "SustainDC: Benchmarking for Sustainable Data Center Control," *Accepted for NeurIPS 2024 Datasets and Benchmarks Track*, Poster presentation, 2024. doi:2408.07841.

- Naug, A.*, **Guillen-Perez, A.***, et al., "Concurrent Carbon Footprint Reduction (C2FR) Reinforcement Learning Approach for Sustainable Data Center Digital Twin," *2023 IEEE 19th International Conference on Automation Science and Engineering (CASE)*, pp. 1-8, 2023. doi:10.1109/CASE56687.2023.10260633.

- **Guillen-Perez, A.**, et al., "WiFi Networks on Drones," *2016 ITU Kaleidoscope: ICTs for a Sustainable World (ITU WT)*, pp. 1-8, 2016. doi:10.1109/ITU-WT.2016.7805730.

### Workshops

- Naug, A.*, **Guillen-Perez, A.***, et al., "Real-time Carbon Footprint Minimization in Sustainable Data Centers with Deep Reinforcement Learning," *NeurIPS 2023 Workshop on Tackling Climate Change with Machine Learning*, 2023. Link. **Award: Best ML Innovation**. Award Link.

- Naug, A.*, Gutierrez, R.-L.*, **Guillen-Perez, A.***, et al, "Sustainable Data Center Modeling: A Multi-Agent Reinforcement Learning Benchmark," *NeurIPS 2023 Workshop on Tackling Climate Change with ML*, 2023. Link.

## Skills

- **Programming & Development:** Expert in **Python**; proficient in **Java**, **Matlab**, and **Jupyter Notebook**. Skilled in **Git** for version control, along with practical experience in **Docker** for containerization and familiarity with cloud platforms like **AWS** and **Google Cloud**.

- **Artificial Intelligence & Machine Learning:** Experienced with **PyTorch** and **TensorFlow** for AI model research and development. Proficient in DRL using **RLLib**, **RAY**, and **OpenAI Gym**.

- **Computational Modeling & Simulation:** Proficient with **CFD tools** (6SigmaDCX) for thermal and energy modeling, and knowledgeable in **FMU/FMI** and **Modelica** for physical system simulations.

- **Collaboration & Communication:** Effective collaborator within interdisciplinary teams, with a strong grasp of LaTeX for documentation and the **Adobe Suite** for creating visuals. Demonstrated proficiency in conveying complex concepts clearly and effectively.

## Advanced Coursework and Specializations <span style="float:right">View more on LinkedIn</span>

- **Deep Reinforcement Learning:** Focused studies in cutting-edge techniques and applications, including:

  - *Deep Reinforcement Learning Nanodegree* (Udacity) - Comprehensive coverage of advanced DRL algorithms and their practical applications.

  - *Practical Reinforcement Learning* (Coursera) - Hands-on experience with DRL techniques and frameworks.

- **Autonomous Vehicle Systems:** Completion of the Self-Driving Cars Specialization (Coursera, University of Toronto), encompassing:

  - *Introduction to Self-Driving Cars* - Foundations of autonomous vehicles. Hands-on experience with CARLA simulator.

  - *State Estimation and Localization* - Techniques for accurate vehicle positioning.

  - *Visual Perception for Self-Driving Cars* - Implementing computer vision and sensor fusion.

  - *Motion Planning for Self-Driving Cars* - Strategies for dynamic path planning and decision-making.

- **Natural Language Processing:** Key courses on NLP, focusing on modern techniques and models, including:

  - *Natural Language Processing with Attention Models* (Coursera) - Part of *Natural Language Processing Specialization* from DeepLearning.AI. Comprehensive exploration of attention mechanisms and their application in NLP.

- **Generative AI:** Foundational and advanced topics in generative models, including:
    - *How Diffusion Models Work* (DeepLearning.AI) - Exploring the cutting-edge world of diffusion-based generative AI.
    - *Introduction to Generative AI* (Coursera) - A primer on generative AI technologies and their practical applications.

## REFERENCES

- **Prof. J. Sebastian Gomez-Diaz**                                             UC Davis, US
  *Professor and MS Program Director, Electrical and Computer Eng.*        *Email: jsgomez@ucdavis.edu*

- **Prof. Maria Dolores Cano Banos**            Polytechnic University of Cartagena (UPCT), Spain
  *Professor and Lead Researcher, R&D Group in AI and Networking*      *Email: mdolores.cano@upct.es*