

# Carlos Gutiérrez Álvarez

PHD STUDENT IN ARTIFICIAL INTELLIGENCE & ROBOTICS

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## Education

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### University of Alcalá

Alcalá de Henares, Spain

PHD IN ARTIFICIAL INTELLIGENCE & ROBOTICS

2021 - present

- Advisor: Dr. Roberto J. López Sastre

### Complutense University of Madrid

Madrid, Spain

MSC IN MATHEMATICAL ENGINEERING

2018 - 2019

- Thesis: "BERT for Question Answering"

### Complutense University of Madrid

Madrid, Spain

BSc IN PHYSICS

2014 - 2018

- Honors thesis

## Professional Experience

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### University of Alcalá

Madrid, Spain

SPANISH SCIENCE MINISTRY PRE-DOCTORAL SCHOLARSHIP

Sep. 2021 - Present

- Doctoral Thesis: "Reinforcement Learning for Visual Semantic Navigation"
- Working with a FPI scholarship by Spanish Science Ministry.

### Accenture Technology

Madrid, Spain

SENIOR AI ENGINEER

Feb. 2019 - Sep. 2021

- Development of cognitive systems: Virtual assistants, NLP and Image Recognition.
- Development of a telephonic virtual assistant for one of the biggest Spanish electrical companies including:
  - Design of custom NLP neural architectures in Tensorflow.
  - CI/CD using Jira's suite and agile methodologies in AWS.
  - Design of workflows and reporting using Kibana and Elasticsearch.
  - Design of conversational flows using RASA.
  - Deployment of the whole system in AWS via Kubernetes.
- Implementation of Salesforce Einstein solutions for CRMs.

### Banco Santander

Las Rozas, Spain

PLANNIFICATION ASSISTANT

June 2018 - Feb 2019

- Part of the Planning, Productivity and Quality department at Banco Santander, where we mainly make predictions for the working curves for different front and back office services.
- Development and improvement of company's reports and digital tools in cooperation with IT department.
- Collaboration with business, front and back office areas in designing pilot processes for efficiency improvements.
- Improvement of data acquisition and analysis in collaboration with IT department.
- Collaboration with business areas in the development of SLAs and KPIs related to the planning, adhesion, and efficiency of the services.
- Design and acquisition of quality reports using QlikView.

## Research Experience

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### University of Alcalá - Dept of Telecommunications and Signal Theory

Madrid, Spain

ADVISOR: DR. ROBERTO JAVIER LÓPEZ SASTRE

Sep. 2021 - Present

- Development of reinforcement learning agents for visual semantic navigation in indoor environments.
- Integration of robotic platforms to help children with functional diversity.
- Implementation of artificial intelligence solutions over robotic platforms using ROS.
- Use of Embodied AI techniques to improve the interaction between robots and its environment.
- Development of offline reinforcement learning algorithms to improve the learning process from pre-recorded datasets.

### Tokyo Institute of Technology - Dept of Computer Science

Tokyo, Japan

ADVISOR: DR. ASAKO KANEZAKI

March 2024 - Sep. 2024

- Offline reinforcement learning for robotic navigation tasks.
- Exploration of meta reinforcement learning solutions for the sim-to-real gap in real robots.
- Use of TSUBAME 4.0 supercomputer for training deep reinforcement learning models.

### Complutense University of Madrid - Dept of Nanomaterials

Madrid, Spain

ADVISOR: DR. RAFAEL PEREZ

Dec. 2017 - June 2018

- Collaboration with the Nanomagnetism and Magnetization Processes Group at the Institute of Materials Science of Madrid (ICMM).
- Development of  $Fe_{90}Si_5B_5$  alloys using voltaic arc melter.
- Production of microwires by the Taylor-Ulitovsky technique.
- Characterization of its magnetic properties by Vibrant Sample Magnetometer (VSM) and Kerr Magnetometry techniques.
- Characterization of its structural properties by X-Ray Diffraction (XRD).

## Publications

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### PUBLISHED

**Gutiérrez-Alvarez C**, Acevedo-Rodríguez F.J., López-Sastre R.J., Kanezaki A., OffNav: Offline Reinforcement Learning for Visual Semantic Navigation, in ICRA Human-aligned Reinforcement Learning for Autonomous Agents and Robots Workshop, 2024.

Lafuente-Arroyo S., Maldonado-Bascón S., Delgado-Mena D., **Gutiérrez-Alvarez C**, Acevedo-Rodríguez F.J., Multisensory Integration for Topological Indoor Localization of Mobile Robots in Complex Symmetrical Environments, in Expert Systems with Applications, 2023.

**Gutiérrez-Alvarez C**, Ríos-Navarro P., Flor-Rodríguez-Rabadán R., Acevedo-Rodríguez F.J., López-Sastre R.J., Evaluation of Visual Semantic Navigation Models in Real Robots, in IROS Late Breaking Results, 2023.

**Gutiérrez-Alvarez C**, Hernández García S, Nasri N, Cuesta-Infante Alfredo, López-Sastre RJ, Towards Clear Evaluation of Robotic Visual Semantic Navigation, in ICARA, 2023.

Nasri N, López-Sastre RJ, Pacheco-da-Costa S, Fernández-Munilla I, **Gutiérrez-Álvarez C**, Pousada-García T, Acevedo-Rodríguez FJ, Maldonado-Bascón S. Assistive Robot with an AI-Based Application for the Reinforcement of Activities of Daily Living: Technical Validation with Users Affected by Neurodevelopmental Disorders. Applied Sciences. 2022

### PREPRINTS

**Gutiérrez-Alvarez C**, Ríos-Navarro P., Flor-Rodríguez-Rabadán R., Acevedo-Rodríguez F.J., López-Sastre R.J., Visual Semantic Navigation with Real Robots. arXiv 2023.

## Presentations

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### CONTRIBUTED PRESENTATIONS

**Gutiérrez-Álvarez, C**, Flor-Rodríguez-Rabadán R., Acevedo-Rodríguez F.J., López-Sastre R.J., Kanezaki.A, OffNav: Offline

Reinforcement Learning for Visual Semantic Navigation. Poster presentation at Human-aligned Reinforcement Learning for Autonomous Agents and Robots Workshop, ICRA 2024, Yokohama, Japan.

**Gutiérrez-Álvarez, C**, Flor-Rodríguez-Rabadán R., Acevedo-Rodríguez F.J., López-Sastre R.J., Kanezaki.A, OffNav: Offline Reinforcement Learning for Visual Semantic Navigation. Late breaking results at ICRA 2024, Yokohama, Japan.

**Gutiérrez-Álvarez, C**, Ríos-Navarro P., Flor-Rodríguez-Rabadán R., Acevedo-Rodríguez F.J., López-Sastre R.J., Evaluation of Visual Semantic Navigation Models in Real Robots. Poster and oral presentation: IROS 2023, Detroit, Michigan.

**Gutiérrez-Alvarez C**, Hernández García S, Nasri N, Cuesta-Infante Alfredo, López-Sastre RJ, Towards Clear Evaluation of Robotic Visual Semantic Navigation, in ICARA 2023, Abu Dhabi, United Arab Emirates.

## SEMINARS AND WORKSHOPS

**Autumn 2024.** *El Futuro de la Robótica Móvil: Navegación Basada en Visión Semántica.* Mobile Week Alcalá de Henares, University of Alcalá, Madrid, Spain.

**Summer 2024.** *Reinforcement Learning para la robótica.* Workshop at Msc in Telecommunications Engineering, University of Alcalá, Madrid, Spain.

**Summer 2023.** *Basics of Robotic Navigation.* Seminar at Axpe Consulting, Madrid, Spain.

## INVITED TALKS

**Spring 2023.** *Abro Micro: Inteligencia artificial e interpretación de conferencias.* Podcast. Madrid, Spain.

## Teaching Experience

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Fall 2024 **Image Processing and Computer Vision**, Teaching Assistant at University of Alcalá, Madrid.

Fall 2023 **Circuits Theory**, Teaching Assistant at University of Alcalá, Madrid.

## Mentoring

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2023-2024 **Alejandro Martín Sánchez**, BSc in Computer Science, University of Alcalá. Honors in final BSc project.

## Awards, Fellowships, & Grants

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2021 **FPI Graduate Research Fellowship**, Spanish Science Ministry

109.070€

## Outreach & Professional Development

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### CERTIFICATIONS

2024 **Deep Reinforcement Learning Course**, Hugging Face.

2021 **Certified Machine Learning Specialty**, Amazon Web Services.

2020 **Certified Cloud Practitioner**, Amazon Web Services.

2020 **TensorFlow Developer Certification**, Coursera.

2019 **Deep Learning Specialization**, Coursera.

### PEER REVIEW REVISOR

2024 **Expert Systems with Applications**, ESWA.

2023 **Computer Vision and Pattern Recognition**, CVPR.

2023 **International Conference on Learning Representations**, ICLR.