

Mario Rodríguez Cantelar, PhD

✉ mario.rcantelar@gmail.com |  Google Scholar |  GitHub

Education

Ph.D. in Automatic Control and Robotics

Cum Laude – International Mention
Universidad Politécnica de Madrid

Sep. 2020 – Dec. 2025

Madrid, Spain

M.Sc. in Automation and Robotics

Final Grade: 9.0/10 (Distinction)
Universidad Politécnica de Madrid

Sep. 2018 – Sep. 2019

Madrid, Spain

B.Sc. in Industrial Electronics and Automation Engineering

Universidad Politécnica de Madrid

Sep. 2013 – Sep. 2018

Madrid, Spain

Skills

Research Areas: Conversational AI, Human-Robot Interaction (HRI), Natural Language Processing (NLP), Affective Computing, Open-Domain Dialogue Systems, Social Robotics.

Core Competencies: Reinforcement Learning (RLHF/RLAIF) for Alignment, Neural Response Generation, Multilingual Evaluation, Dialogue Management Frameworks, Personality & Emotion Integration.

Programming & Frameworks: Python (Strong), C/C++, MATLAB, PyTorch, TensorFlow, scikit-learn.

DevOps & Cloud Infrastructure: Docker, AWS, MS Azure, AMT, GCP, Git.

Languages: English (Full Professional Proficiency), Spanish (Native).

Relevant Experience

Speech Technology and Machine Learning Group (UPM)

Research Scientist

Sep. 2019 – Present

Madrid, Spain

- **Main Organizer, DSTC11 Track 4:** Led the “Robust and Multilingual Automatic Evaluation” challenge. Curated **18 multilingual corpora (>3M turns)** and coordinated international teams (NYU, CMU, USC, NUS, Tencent AI, Unbabel, Microsoft Azure) via [ChatEval](#) to benchmark metric robustness across English, Spanish, and Chinese.
- **RLHF & Reward Modeling:** Building multi-objective reward models using **ArmoRM** and **Mixture-of-Experts (MoE)**. Integrating four dialogue datasets annotated for commonsense, multiculturalism, and empathy to train AI feedback systems for dialogue evaluation.
- **Real-Time Conversational AI:** Designed a modular dialogue system integrating multilingual ASR, toxicity detection, and **zero-shot hierarchical topic classification**. Combined with emotion-aware TTS to generate safe and empathetically aligned responses.
- **Multimodal Benchmarking (CVQA):** Co-developed a culturally grounded Visual QA benchmark. Led Q/A design and metadata curation to validate multimodal consistency and address cultural bias in VQA models.

Center for Automation and Robotics (UPM-CSIC)

Research Engineer

Jun. 2019 – Present

Madrid, Spain

- Researching **Multimodal LLMs** that fuse user signals (speech, facial expressions, gestures, and text) for emotionally aware response generation. Developing audio-visual perception for continuous attention tracking and emotion-conditioned TTS to create a bidirectional affective loop.
- Designed and deployed a modular architecture for a social robot, integrating affective, perceptual, and dialogue modules. The system is containerized with **Docker** for cross-platform deployment and robustness.
- Developed a **fuzzy logic-based emotional system** with personality traits. The model fuses real-time sensor inputs with vocal emotion inference to generate synchronized expressive responses.
- Supervised Bachelor’s and Master’s theses (2020–2024) on emotional modeling, multimodal integration, and conversational architectures, all graded with the highest distinction.

Institute for Creative Technologies - Natural Language (USC)*Visiting Research Scholar*

Sep. 2023 – Dec. 2023

Los Angeles, California

- **Chain-of-Emotion Prompting:** Built emotion-rich multilingual corpora using GPT-based prompting, introducing the “Chain-of-Emotion” method to elicit structured emotional responses (empathetic reaction, internal emotion, neutral engagement).
- **LLM Fine-Tuning:** Evaluated and fine-tuned instruction-tuned multilingual dialogue LLMs using **LoRA** to reproduce structured response formats with high emotional interpretability.
- **RLAIF & Alignment:** Applied Reinforcement Learning from AI Feedback (RLAIF) using **PPO and DPO** training strategies with AI-aligned preference pairs. Optimized models were validated via automatic metrics and human evaluation for empathy and coherence.

Amazon Science (Alexa Prize)*Research Assistant*

2020 – 2021 / 2022 – 2023

Boston, Massachusetts

- **Alexa Prize Socialbot Grand Challenge:** Selected twice among the top nine international teams (SGC4: Team Genuine², SGC5: Team Thaurus) to build open-domain socialbots serving real-world users.
- **Dialogue Management Strategy:** Led system integration using the COBOT framework. Designed the “Selecting Strategy” module to orchestrate response logic across classifiers (emotion, topic, toxicity), ensuring safe and context-aware interactions.
- **Affective Speech Synthesis:** Designed prosody-aware TTS strategies to dynamically convey emotional tone in voice output, improving naturalness and user alignment.
- **Full-Stack Integration & AWS Deployment:** Led the complete code integration of ASR, conversational agents, and TTS modules. Orchestrated the full system architecture on **AWS** using **Docker**, ensuring scalable, robust, and low-latency operation in a production environment.

Universidad Politécnica de Madrid (UPM)*Teaching Assistant*

2022 – 2024

Madrid, Spain

- **Lab Instructor (Data Acquisition Systems):** Designed and supervised lab assignments for undergraduate engineering students. Mentored students on hardware-software integration, concurrency, and debugging complex embedded systems.
- **Embedded Systems Engineering:** Developed **C++** firmware for STM32 microcontrollers. Implemented real-time applications using **FreeRTOS** (priority-based scheduling), Finite-State Machines (FSM), and efficient sensor data acquisition.

Johns Hopkins University (JHU)*Research Fellow*

Jun. 2020 – Aug. 2020

Baltimore, Maryland

- **JSALT 2020 Workshop (CHANEL Project):** Selected for the Frederick Jelinek Memorial Summer Workshop to research “Chat/Dialogue Modeling and Evaluation”. Focused on **low-resource languages** and **AI Safety**, implementing metadata-based filtering to mitigate harmful content.
- **Robust Evaluation Resources:** Developed multilingual tools for open-domain dialogue evaluation, including pipelines for machine translation, sentiment analysis, and automated content moderation.

Artificial Intelligence Lab (UPM)*Research Intern - Laboratory Technician*

May 2017 – Aug. 2017

Madrid, Spain

- **NLP & Knowledge Representation:** Applied Natural Language Processing and OWL ontologies to automate protocol generation for synthetic biology.
- **Full-Stack Engineering:** Developed web modules for the BioBlocks platform using the **MEAN stack** (MongoDB, Express, Angular, Node.js), enabling interactive user interfaces for biological design.

Ingeniarius Lda.*Robotics Research Intern*

Jun. 2016 – Sep. 2016

Coimbra, Portugal

- **Autonomous Mobile Robotics:** Designed and built a mobile robot using **ROS** and Arduino. Implemented high- and low-level control architectures for autonomous navigation tasks.
- **System Integration:** Modeled custom 3D components in Blender and led the electromechanical integration and field testing of the prototype.

Selected Publications

Personal Assistant with Emotional and Multilingual Capabilities for Social Robots

M. Rodríguez-Cantelar

PhD Dissertation, Universidad Politécnica de Madrid ([UPM](#)), 2025

Overview of Robust and Multilingual Automatic Evaluation Metrics for Open-Domain Dialogue Systems at DSTC11 Track 4

M. Rodríguez-Cantelar, C. Zhang, C. Tang, K. Shi, S. Ghazarian, J. Sedoc, L.F. D'Haro, A. Rudnicky

Proceedings of the Eleventh Dialog System Technology Challenge (DSTC11) Workshop ([SIGDIAL-INLG](#)), 2023

Genuine2: An Open Domain Chatbot Based on Generative Models

M. Rodríguez-Cantelar, D. de la Cal, M. Estecha-Garitagoitia, A. Grande Gutiérrez, D. Martín, N. Rodríguez Nuñez Milara, R. Martínez Jiménez, L.F. D'Haro

Proceedings of the Alexa Prize Socialbot Grand Challenge 4 ([SGC4](#)), 2021

THAURUS: An Innovative Multimodal Chatbot Based on the Next Generation of Conversational AI

M. Estecha-Garitagoitia, **M. Rodríguez-Cantelar**, A. Garrachón Ruiz, C.G. Fernández García, S. Esteban-Romero, C. Conforto, A. Saiz Fernández, L. F. Fernández Salvador, L.F. D'Haro

Proceedings of the Alexa Prize Socialbot Grand Challenge 5 ([SGC5](#)), 2023

CVQA: Culturally-diverse Multilingual Visual Question Answering Benchmark

D. Romero, ..., **M. Rodríguez-Cantelar**, et al.

Proceedings of the Thirty-eighth Conference on Neural Information Processing Systems ([NeurIPS](#)), 2024

Automatic Detection of Inconsistencies and Hierarchical Topic Classification for Open-Domain Chatbots

M. Rodríguez-Cantelar, M. Estecha-Garitagoitia, L.F. D'Haro, F. Matía, R. Córdoba

[Applied Sciences](#), 2023

An Emotional Model Based on Fuzzy Logic and Social Psychology for a Personal Assistant Robot

G. Fernández-Blanco Martín, ..., **M. Rodríguez-Cantelar**

[Applied Sciences](#), 2023

Automatic Evaluation of Non-Task Oriented Dialog Systems Using Sentence Embedding Projections

M. Rodríguez-Cantelar, L.F. D'Haro, F. Matía

Proceedings of the International Workshop on Spoken Dialogue Systems Technology ([IWSDS](#)), 2020

Cutting Through Overload: Efficient Token Dropping for Speech Emotion Recognition in Multimodal Large Language Models

J. Bellver-Soler, **M. Rodríguez-Cantelar**, R. Córdoba, L.F. D'Haro

Proceedings of the 15th International Workshop on Spoken Dialogue Systems Technology ([IWSDS](#)), 2025

Honors & Awards

Merit-based Ph.D. Fellowship, Spanish Ministry of Science, Innovation, and Universities.

Podium in the [Cybertech Classic 2019](#), RESET, UPM Student Association.

Selected among the **Top 10 Business Ideas** in the **XI UPM Business Creation Competition (ActúaUPM)** for the social assistance robot [RoSa](#), featured on national TV shows such as [El Hormiguero](#) and [RTVE](#).

1st Robotics Craftmanship International Academy 2016, Ingeniarius, Lda., University of Coimbra.

Erasmus+ Traineeship Scholarship, University of Coimbra, 2016.

Intellectual Property & Software Registries

Territorial Intellectual Property Registry, Community of Madrid

- **THAUMOD: Training Hub for Advanced and Unified MultiODal training and evaluation**

Registry: 16/2025/3810 · Application: M-001498/2025 · Author: Universidad Politécnica de Madrid · Granted on 11 Jun 2025.

- **ORCHESTRA: mOdular aRCHitecture for multimodal and multilingual convErSaTional and Robust AI systems**

Registry: 16/2025/3812 · Application: M-001500/2025 · Author: Universidad Politécnica de Madrid · Granted on 11 Jun 2025.