

Cesar A. Contreras

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[LinkedIn](#) | [Website](#) | [Research](#)

BIO

PhD candidate at the University of Birmingham researching variable autonomy for mobile manipulation, with applications to nuclear decommissioning and electric-vehicle battery disassembly. My work combines human intent prediction, inspectable LLM planning, perception, extended reality and human-robot interaction. I hold an MSc with Distinction in Computational Neuroscience and Cognitive Robotics and have a background in mechatronics and software engineering.

EDUCATION

University of Birmingham | Birmingham, UK

PhD candidate in Robotics

Sep 2023 - Sep 2027 (expected)

- Research: variable autonomy control applied to mobile manipulation; robotics, nuclear decommissioning, cognitive sciences, artificial intelligence and XR.
- Year 3 assessment completed by September 2026.

University of Birmingham | Birmingham, UK

MSc Computational Neuroscience and Cognitive Robotics - Distinction

Sep 2022 - Sep 2023

- Thesis: Falling Ball - Gravity perception and eye tracking during object interception in VR.
- Courses: Probabilistic Robotics; Mind, Brains and Models; Brain Imaging; Electrophysiological Approaches in Cognitive Neuroscience.

Anahuac University North Campus | Huixquilucan, Mexico

BSc Mechatronics Engineering

Aug 2016 - Dec 2020

- Dissertation: Robot Operating System for Industry 4.0.
- Minors: Industrial Automation; Automotive Mechanics Design; Entrepreneurial Studies.
- Courses included robotics, industrial networks, computer vision, CAD, AR/VR, digital circuits, bioengineering, MEMS and embedded systems.

RESEARCH AND TEACHING EXPERIENCE

Extreme Robotics Lab, University of Birmingham | Birmingham, UK

Robotics Researcher

Feb 2023 - Present

- February-August 2023: VR, mixed reality and cognitive robotics research. September 2023-present: variable autonomy for mobile manipulation, supported by NDA and UKNNL, and work within REBELION.
- Fukushima placement, Naraha, Japan, May-July 2024: Fukushima Daiichi decommissioning bogie collaboration.
- Second Fukushima placement, Naraha, Japan, November 2025-January 2026: 3D mapping on a stair-climbing robot with agentic LLMs. Second Fukushima task completed.

University of Birmingham, School of Mathematics | Birmingham, UK

Teaching Assistant

Jul 2026 - Sep 2026

- Jinan University-University of Birmingham Joint Institute (J-BJI).

EARLIER EXPERIENCE

Sensorimotor Computation Lab (Yeo Lab) | Birmingham, UK

Graduate Research Assistant

Oct 2022 - Sep 2023

- Designed and conducted simulated eye-tracking and movement experiments; analysed human biomechanics and movement prediction.
- Cleaned experimental data and developed statistical models and visualisations. Calibrated sensors and built device bridges for XR experiments and physics simulations.

Grupo Importadores | Piedras Negras, Mexico

Software Engineer

Mar 2021 - Feb 2023

- Developed software and supported a website launch associated with a 50% increase in customer engagement.
- Maintained computers and servers through updates, diagnostics and maintenance, with reported uptime of 95%.

Dreamlands' Guild | Texas, USA

Software Engineer

Feb 2021 - Sep 2022

- Built Flutter applications and Unity games with C#; used Python to connect software and hardware systems.

Laboratory of Automation and Manufacturing, Anahuac | Huixquilucan, Mexico

Junior Robotics Engineer

Jun 2020 - Dec 2020

- Worked in a four-person team integrating ROS with laboratory equipment.
- Conducted more than 50 robot simulations using CIROS Studio, Gazebo, CoppeliaSim, MoveIt and MATLAB, including integration with ROS.

CADIT, Anahuac University | Huixquilucan, Mexico

Technology and Innovation Engineer

Aug 2019 - Dec 2020

- Investigated DICOM-based 3D printing of jaws and teeth in three materials; simulated prosthesis designs.
- Adapted 3D-printing hardware for in-house materials, reducing equipment costs by more than 30%. Prototyped human-machine interface equipment and led a three-person rapid-prototyping team.

Laboratory of Automation and Manufacturing, Anahuac | Huixquilucan, Mexico

Mechatronics Student Club Captain

Jan 2019 - Dec 2020

- Led a six-person team on time-based projects, reporting up to 15% shorter completion times and 5-10% lower product costs.
- Designed CAD models and electronic schematics, programmed embedded systems and evaluated prototypes.

SKILLS AND INTERESTS

Programming: Python, C#, MATLAB, C, C++, Assembly; PLC programming (LD, FBD, ST, IL).

Robotics and ML: ROS 1/2, Gazebo, Isaac Sim, MoveIt, CoppeliaSim, NumPy, SciPy, Pandas, Scikit-learn, PyTorch; UR, KUKA and Mitsubishi robot arms.

Frameworks and SDKs: Flutter, OpenCV, UltraLeap, FOVE, OpenXR, OpenGL, Vuforia, POLHEMUS Fastrak.

Software and tools: Unity, CIROS Studio, Factory I/O, FluidSIM, Proteus, Creo, SolidWorks, Simulink, Mastercam, Multisim, Polyscope, Siemens LOGO!, Microsoft Office, PyCharm, Spyder, VS Code, Git, Docker; Windows and Linux.

Languages: English and Spanish (native/bilingual); French (basic). Interests include robotics, assistive AI, adaptive XR, simulation, computer vision and smart environments.

PUBLICATIONS AND RESEARCH OUTPUTS

- Interactive and Inspectable LLM Planning for Human-in-the-Loop EV Battery Disassembly. *Frontiers in Robotics and AI* 13, 1916454 (2026). Accepted article; final formatted version forthcoming. [\[Paper\]](#)
- GUIDER: Evaluating Goal-Free Human Intent Inference for Teleoperated Manipulation on Real-Robot Data. preprint arXiv:2608.15446. (2026). [\[Paper\]](#)
- Panel session: Safety consideration for automated and AI technologies. *The Role of Innovation in the Nuclear Back-End: Harnessing Robotics and Advanced Technologies for Safer, More Efficient Activities*, pp. 85-92. OECD Publishing, Nuclear Energy Agency. (2026). [\[Paper\]](#)
- Introducing autonomous robotic technologies to safety-critical industries. *The Role of Innovation in the Nuclear Back-End: Harnessing Robotics and Advanced Technologies for Safer, More Efficient Activities*, pp. 79-82. OECD Publishing, Nuclear Energy Agency. (2026). [\[Paper\]](#)
- Intent-driven LLM ensemble planning for flexible multi-robot manipulation. *Frontiers in Robotics and AI* 13, 1727433 (2026). [\[Paper\]](#)
- Probabilistic human intent prediction for mobile manipulation: An evaluation with human-inspired constraints. *Journal of Intelligent & Robotic Systems* 112(2), 36 (2026). [\[Paper\]](#)
- Haptic Teleoperation in Extended Reality for Electric Vehicle Battery Disassembly Using Gaussian Mixture Regression. *Journal of Field Robotics* 43(2): 1130-1151 (2026). [\[Paper\]](#)
- An Exploratory Study on Crack Detection in Concrete through Human-Robot Collaboration. preprint arXiv:2508.11404. (2025). [\[Paper\]](#)
- Utilizing Vision-Language Models as Action Models for Intent Recognition and Assistance. preprint arXiv:2508.11093. (2025). [\[Paper\]](#)
- A mini-review on mobile manipulators with Variable Autonomy. *Frontiers in Robotics and AI* 12 (2025): 1540476. [\[Paper\]](#)
- Advanced robotics for automated EV battery testing using electrochemical impedance spectroscopy. *Frontiers in Robotics and AI* 11 (2025): 1493869. [\[Paper\]](#)
- Technoeconomic Assessment of Electric Vehicle Battery Disassembly - Challenges and Opportunities from a Robotics Perspective. *IEEE Access* 13: 716-733 (2025). [\[Paper\]](#)
- Semi-Autonomous Robotic Disassembly Enhanced by Mixed Reality. *Proceedings of the 2024 4th International Conference on Robotics and Control Engineering*. (2024). [\[Paper\]](#)
- Multi-robot task planning for efficient battery disassembly in electric vehicles. *Robotics* 13(5), 75 (2024). [\[Paper\]](#)
- Electric Vehicle Battery Disassembly using Interfacing Toolbox for Robotic Arms. *Batteries* 10(5), 147 (2024). [\[Paper\]](#)
- Hyperparameter-optimized CNN and CNN-LSTM for Predicting the Remaining Useful Life of Lithium-ion Batteries. 2023 Eleventh International Conference on Intelligent Computing and Information Systems (ICICIS). IEEE. (2023). [\[Paper\]](#)
- Harnessing CNN-DNC and CNN-LSTM-DNC Architectures for Enhanced Lithium-Ion Remaining Useful Life Prediction. 2023 Eleventh International Conference on Intelligent Computing and Information Systems (ICICIS). IEEE. (2023). [\[Paper\]](#)
- Teleoperation of a Robotic Arm Using Eye Tracking in a Mixed Reality Environment. Working paper, Zenodo, 10.5281/zenodo.21879565. (2023). [\[Paper\]](#)
- Falling Ball - Gravity perception and eye tracking during object interception in VR. MSc thesis, University of Birmingham, Zenodo, 10.5281/zenodo.21890465. (2023). [\[Paper\]](#)
- ROBOCART: A self-navigating shopping cart for the supermarket. preprint, Zenodo, 10.5281/zenodo.21889524. (2023). [\[Paper\]](#)

PEER REVIEWS

- IEEE Access: 47 manuscripts during 2024-2026.
- IEEE ICRA: 2 manuscripts in 2025.
- Computers & Electrical Engineering: 2 manuscripts in 2024.

RESEARCH FUNDING

NDA studentship (2023-2027), funded by the Nuclear Decommissioning Authority and supported by the United Kingdom National Nuclear Laboratory (UKNNL), for variable autonomy in mobile manipulation.

REBELION: research and development of an automated process for lithium-ion battery repurposing and recycling. UKRI support is acknowledged under Grant 10079049 in the GUIDER journal paper; the wider EU consortium identifies Grant 101104241.

Additional RTX computers funded by GalacNo Ltd.

TALKS AND PRESENTATIONS

- COSIMO-IDAI Generative AI Series: LLM orchestration and practical generative AI workflows. University of Birmingham, 27 February 2026.
- Master class on the role of LLMs for the entertainment and business industry. Bucharest, Romania, 29 October - 2 November 2025.
- KM Talks, UKNNL: Probabilistic Human Intent Recognition for Mobile Manipulators. United Kingdom, 25 September 2025.
- Workshop on the Role of Innovation in the Nuclear Back-End: panel on robotics and advanced technologies. Cumbria, UK, 31 March - 4 April 2025.

PROJECTS

- ROBOCART: simulated self-navigating shopping cart using A* planning, Kalman filtering and range sensing to navigate towards predicted shopper positions.
- Particle-filter localisation: Monte Carlo localisation using odometry and range data for indoor service robots.
- Flexible robotics workcell: coordinated industrial robots using state-dependent outputs and emergency-stop behaviour.
- Mandible 3D scan and print: processed medical tomography into a segmented model and produced a 3D-printed replica.

CERTIFICATIONS AND AWARDS

- Unity Junior Programmer; Unity Creative Core; Deep Reinforcement Learning (Hugging Face).
- Robotics: Aerial Robotics; Robotics: Perception (University of Pennsylvania).
- 125th Anniversary Travel Fund recipient; NDA PhD Student Bursary; MSc Distinction (2023); Anahuac University Academic Excellence (2020).

OTHER EXPERIENCE

INGENIA co-founder, Anahuac University; ASUA community volunteer; Interact Club treasurer, Rotary District 4110, Piedras Negras, Mexico.