

# Ricardo Gonzalo Cruz Castillo

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Montreal, QC, Canada

## EDUCATION

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### McGill University

*M.Sc. in Electrical and Computer Engineering – GPA: 3.58/4.00*

*I'm a member of the Mobile Robotics Lab and I'm supervised by Hsiu-Chin Lin.*

Aug 2025 –

*Important Coursework: Machine Learning, Natural Language Understanding, Robotics*

### Tecnológico de Monterrey – ITESM

*B.Sc. in Robotics and Digital Systems – GPA: 94/100*

*I made the Dean's Honor List and had the highest GPA in my class.*

Aug 2020 – Dec 2024

*Important Coursework: Machine Learning, Computer Vision, Embedded Systems*

## EXPERIENCE

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### Artificial Intelligence Coordinator – HEY Banco

Monterrey, MEX • May 2025 – Aug 2025

*Development and Implementation of AI-driven user interaction features*

- Reduced model size by quantizing weights, cutting Kubernetes pod loading time by 37.5%, improving deployment speed and resource efficiency.
- Created a custom dataset of over 2000+ audio samples to fine-tune an in-house Text-To-Speech (TTS) model.
- Voice-cloned our service provider by using the custom TTS model, reducing costs by 33% and enabling scalable, in-house voice generation.

### Summer Scholar – Robotics Institute, Carnegie Mellon University

Pittsburgh, USA • Jun 2024 – Aug 2024

*SafeAir: Safety-informed Tree Search for Robust Navigation under Distribution Shifts in General Aviation. Working Paper – Poster – Video*

- Applied machine learning models within the Pytorch Lightning framework in human-centered, multi-agent scenarios involving autonomous robots.
- Used a general aviation dataset for training a transformer-based trajectory prediction model.
- Implemented remediation techniques enhancing safety and collision avoidance and improved performance by 70%.
- Ensured safe, long-horizon navigation by leveraging Monte Carlo Tree Search biased by a TF model.

### Undergraduate Research Trainee - MACRObotics Research Group, McGill University

Montreal, CA • Aug 2023 – Dec 2023

*Acoustic Tactile Sensing for Mobile Robot Wheels. Working Paper – Video*

- Established a communication architecture, enabling integration of ROS2, TCP/IP, and SPI protocols within a system.
- Developed scripts in C++, C, and Python for the Arduino and BeagleBone microcontrollers and signal processing.
- Generated a dataset from acoustic data with the purpose of training a self-supervised NLP model.
- Enabled real time visualization with ROS2 using python's 'matplotlib' library.

## UNDERGRAD MAJOR PROJECTS

### Manchester Robotics, Puzzlebot 2

Mar 2024 – Jun 2024

*Research kit for autonomous vehicle development: Obstacle Avoidance and Payload Delivery*

- Avoided obstacles detected with a LiDAR using the Bug 0 algorithm.
- Used ArUco marker camera-based localization and an extended Kalman Filter for robust localization.
- Defined a gRPC-ROS2 architecture for image visualization on the web and task offloading.
- Designed and mounted a gripper for payload transportation.

### Manchester Robotics, Puzzlebot 1

Feb 2023 – Jun 2023

*Research kit for autonomous vehicle development: Computer Vision and Trajectory Planning*

- Coursed through an educational program designed by MCR that delves into ROS, Computer Vision, Math, and Kinematics.
- Generated a dataset by capturing, curating, and classifying images personally for training a computer vision model in PyTorch.
- Implemented YOLOv8 and other algorithms for trajectory planning based on traffic-signs and road recognition.

## VOLUNTEER WORK

### MapaTec, An Inclusion Oriented Interactive Map

Mar 2023 – Jun 2023

*Complementary project for the "Implementacion de Robotica Inteligente" course*

- Created a demo of a real-time map of our home institution.
- Incorporated features oriented at helping people with motor disabilities such as highlighting accessibility points e.g. wheelchair ramps and elevators and showing how busy halls and buildings are.

### STEM Tutor, Sin miedo a la Corriente

Jun 2022 – Aug 2022

*A social program that brings closer robotics and STEM fields to the youth enrolled in public schools.*

- Conducted hands-on workshops on circuit board assembly and Arduino programming for junior high school students.
- Fostered a community of learning and collaboration by creating a sentiment of belonging by chatting with my students.
- Helped create better opportunities for underprivileged children.

## SKILLS

### Programming Languages

4 Years: C++, C, Python  
2 Years: MATLAB/SIMULINK  
1 Year: Java, R-Studio, SQL

### Technologies

Windows/Linux environment, Free-RTOS, ARM-Cortex, Pytorch, Azure MLStudio, Azure Devops, SKLearn, SciPy, Jupyter, Pandas, Keras, Numpy OpenCV, ROS, Docker, Git.

### Languages

Spanish: Native  
English: Fluent  
French: Basic