# MAXIMILIANO ROJAS LEMA

Electrical Civil Engineer / Master of Engineering Sciences

## Profile

As an engineer and researcher, I am trained to develop comprehensive solutions that address both the problem and its context. I enjoy tackling challenges in a structured manner, from their definition to potential steps and execution goals, always considering and adapting to unforeseen circumstances. My foundations are resilience, creativity, curiosity, and applied knowledge.

## Work Experience

**present**

### Virtual Human Developer

***Chaturbate - Remote***

- Programming of Natural Language Cognitive Architectures based on Docker and Python.
- Modeling in Daz Studio for virtual humans.
- Unreal Engine 5 for the creation of immersive virtual spaces and experiences.
- Systems integration and coordiantion through API's.

### Robotics Engineering

***Renshi Robotics Studio, Shenzhen, China - Remote***

- The goal of this project is to build a navigation framework that leverages a Large Language Model (LLM) and a Semantic Map to interpret high-level instructions and guide a Reinforcement Learning (RL) agent to execute low-level control tasks. The system should understand natural language commands, extract semantic navigation goals, and perform task-specific actions in a cluttered environment.
- Semantic Map Processor: Parses the environment layout, identifies objects, and annotates their positions.
- Function Library: Encodes standard movement primitives.
- Instruction Parser: Receives user natural language instructions and extracts actionable goals using the LLM.
- Task Generator: Maps parsed instructions into a structured "Task Type" format with associated semantic goals.
- Task Mode Processor: Receives "Task Type" and environmental information, configuring the RL agent's mode of operation.
- Traditional and RL Controller: Implements the agent's decisions using both classical navigation algorithms and reinforcement learning-based approaches.

## Contact


**Email**
maximiliano.rojas.lema@gmail.com

**Phone**
+56979728492

**Website**
https://magical-engineering.com/


## Technologies

- Python
- C++
- Pytorch
- CAD Design (Fusion 360)
- Robotic Simulation / Digital Twins (Isaac Sim)
- ROS/ROS2
- Unreal Engine
- PCB Design (Eagle)
- Isaac Sim / Isaac Lab

## Languages

| | |
|---|---|
| **English** | B2 |
| **Spanish** | Native |

## Robotics Engineering

***Renshi Robotics Studio, Shenzhen, China - Remote***

- Import and integrate a biologically inspired flexible structure into a stomach model.
- Implement a Python interface for:
  - Controlling spherical joints independently within $\pm 30^\circ$ cone constraints.
  - Detecting collisions between the structure and the stomach environment.
- Write a script to randomize joint angles with collision-free initialization.
- Fix issues with the 3D models.
- Documentation.

## Robotics Engineering

***Renshi Robotics Studio, Shenzhen, China - Remote***

- Creation and setup of a mobile robot for Isaac Sim.
- Creation and configuration of training environments for Isaac Lab.
- Adaptation of "Sim-to-Real Transfer for Mobile Robots with Reinforcement Learning: from NVIDIA Isaac Sim to Gazebo and Real ROS 2 Robots".

## Robotics Engineer

***Renshi Robotics Studio - Shenzhen, China - Remote***

- Developed a synthetic data generation and object detection system using NVIDIA Isaac Sim and Replicator.
- Modeled 3D scenes with six object categories, each featuring five variations in randomization.
- Built an object detection pipeline based on the UR10 palletizing example.
- Generated and collected domain-randomized synthetic datasets.
- Trained a domain-randomized object detection model for real-world applications.

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### Robotics Engineer

***Nazarbayev University Institute of Smart Systems and Artificial Intelligence - Astana, Kazakhstan - Remote***

- Mentoring a master's candidate in the area of deep reinforcement learning applied to robotics.
- Solving technical problems in reinforcement learning.
- Designing digital twins for simulation in Isaac Sim and Isaac Lab.
- Designing and testing training pipelines.

### Robotics Engineer

***PUCV School of Computer Science - Valparaíso, Chile***

- Design of a humanoid robot for interaction with children with autism spectrum disorder (PUCV university research).

### Assistant Developer

***Valparaíso Makerspace - Valparaíso, Chile***

- Internship
- Design of didactic introductory experiences in electronics.
- Technical Assistant for Fondecyt (R&D): "New Challenges for Education in Chile: Support for Independent Living of Adults with Intellectual or Developmental Disabilities" (1190789).

## Education

### Publication in Q1 WoS Scientific Journal

***MDPI - "Automation Control and Robotics in Human-Machine Cooperation"***

- "Easy-to-Use Deep Reinforcement Learning Library for AI-Based Mobile Robots in Isaac Sim" Applied Sciences 12, no. 17: 8429.
- Click here to view the article.

### Specialization in Modern Robotics: Mechanics, Planning, and Control, Electronic Engineering, Robotics, and Mechatronics

***Northwestern University, Coursera***

- Kinematics and Dynamics.
- Motion Planning and Control.
- Robotic Manipulation and Mobile Robots.
- Mobile Manipulation.
- Click here to view the certificate.

### Foundations of Project Management

***Google, Coursera***

- Click here to view the certificate.

### Master of Engineering Sciences, Electrical Engineering

***PUCV***

- Thesis: "Deep Reinforcement Learning Library for AI-Based Mobile Robots in Isaac Sim."

### Degree in Electrical Civil Engineering

***PUCV***

- Thesis: "Development of a Service Robot Platform for Deep Learning and Robotics Applications."