Christian Raúl Villarreal Treviño

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EDUCATION

Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) — ***Monterrey, Mexico***
Av. Eugenio Garza Sada 2501 Sur, Tecnológico, 64700 Monterrey, N.L. — *August 2022 - June 2026*
Bachelor of Science - BS Robotics and Digital Systems Engineering | GPA: 4.0 Numerical Grade: 96.07/100
Relevant Coursework: Intelligent robotics, advanced embedded systems, systems on chip, programmable logic, control systems, signals analysis, data structures and algorithms.

- Top 3 Finalist at Xignux Challenge Launch Category 2024 for autonomous vehicle for water monitoring.
- 2nd Place in Products or Services of Technological Base at 24th Expoingenierías with autonomous vehicle for water monitoring.

ACACDEMIC PROJECTS

Differential Drive Robot PID Controller and Vision System with ROS2 and Micro-ROS Interfacing — *Feb 2025 - May 2025*
Manchester Robotics Partner Company Training Project

- Co-developed a digital PID controller for the velocity of the DC motors of a differential drive robot in real time.
- Co-designed controller for the global frame velocity of the robot with ROS2 Humble and MicroROS.
- Crafted a state machine and a computer vision algorithm for decision-making based on color detection.

Dual-Mode Waypoint Navigation System for Prototype Tractor — *Aug 2024 - Dec 2024*
John Deere Partner Company Training Project

- Implemented two navigation modes via wireless communication of waypoint data from camera-based GPS and inertial measurements and encoder interface with microcontroller.
- Enabled actuator speed and direction control via PWM signal generation
- Used I2C, SPI, UART and CAN protocols for sensor data transmission.

John Deere Tractor Automatic Transmission Controller Prototype — *Feb 2024 - Jun 2024*
John Deere Partner Company Training Project

- Developed an embedded system prototype for an automatic transmission controller for an agricultural tractor.
- Refactored bare-metal C transmission control code for real-time execution with a Real-Time Operating System.
- Designed a real-time graphical interface using Python on a Raspberry Pi microprocessor to display attributes.

John Deere Tractor Driving Simulator — *Feb 2024 - Jun 2024*
John Deere Partner Company Training Project

- Built a 3D tractor driving simulator using the Unity game engine and C# programming language.
- Programmed vehicle steering, gear selection, throttle and brake with a DE10-Lite FPGA board in VHDL.
- Established game data visualization on displays and interfaced with a soft-core microprocessor.

EXTRACURRICULAR PROJECTS AND ACTIVITIES

Machine Learning Specialization — *Jan - Feb 2025*
Stanford University DeepLearning.AI Coursera.org

- Mastered fundamental AI concepts and practical machine learning skills and applied best development practices.
- Trained supervised, neural network and decision tree models and learned unsupervised learning techniques.

Unmanned Surface Vehicle at VantTec Student Group — *May 2023 - Ongoing*
VantTec ITESM

- Designed microcontroller printed circuit board for the actuation of motors, waterproof motors, water pumps and other external peripherals and I2C, UART and CAN interfaces for communication with main STM32 PCB.

Xandria Search Engine — *Sep 2023*
HackMTY 2023 ITESM

- Co-designed an advanced search engine that leveraged a large language model (Falcon LLM) and a vector database (Chroma DB) for document queries.
- Honorable Mention in Software Solutions Sponsor Business Softtek.

BlackBox Digital Wallet — *Sep 2022*
HackMTY 2022 ITESM

- Developed a smart digital wallet prototype for wireless financial services with access layered through authentication with Python Django and React framework.
- 1st Place in Insurance Sponsor Business CHUBB's Hackathon Challenge.

SKILLS AND LANGUAGES

Languages: Spanish (Native), English (Native) TOEFLT iBT 115/120, German (Basic), Chinese (Basic).
Soft Skills: Teamwork, critical and scientific thinking, decision-making, attentive listening, leadership.
Programming Languages: Python (Advanced), C++ (Advanced), C (Advanced), MATLAB (Intermediate), Javascript, Dart, SQL.
Technologies / Skills: NVIDIA Jetson, Linux, STM32, Raspberry Pi, Arduino, FGPAs, Git, Github, TensorFlow, PyTorch, Simulink, ROS2, Micro-ROS, Gazebo, CoppeliaSim, Mujoco, Processing IDE, Docker, KiCad, EasyEDA, Unity.