JULIO CESAR RODRIGUEZ CERVANTES

Ph.D. Student in Electrical Engineering (Automatic Control) — CINVESTAV Guadalajara
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Mechatronics engineer and Ph.D. student in Electrical Engineering specializing in **cooperative control of multi-UAV systems**. My research develops **bearing-only formation controllers and state estimators** that operate directly on the unit sphere S^2, using robust nonlinear control to enable scalable drone swarms in GPS-denied environments. I combine strong theoretical work (MATLAB/Python simulations, ROS 2 and Gazebo, hardware-in-the-loop experiments) with hands-on industrial experience in automation, project control, and teaching.

Education

CINVESTAV — Unidad Guadalajara — **Guadalajara, México**
Ph.D. in Electrical Engineering — Automatic Control — *Jan 2025 – Dec 2029*

- Focus: bearing-only formation control strategies for quad-rotor systems and multi-agent coordination.
- Designed and analyzed distributed control algorithms and state estimators on S^2 to improve autonomy and robustness of UAV swarms.
- Developed high-fidelity simulations in MATLAB and Python, and a custom experimental platform (ROS 2, Gazebo, ESP32-Drone) for hardware-in-the-loop validation.
- Conducted real multi-quadrotor flight experiments; a journal article is in preparation. Funded by SECIHTI.

Instituto Tecnológico de La Laguna — **Torreón, México**
M.Sc. in Electrical Engineering — Mechatronics and Automatic Control — *Aug 2021 – Aug 2023*

- Thesis: formation controllers for quad-rotor multi-agent systems, with experimental validation on nano aerial robots.
- Built a ROS-based platform for coordination and communication among multiple vehicles. Funded by CONACYT (now SECIHTI).

Instituto Tecnológico de La Laguna — **Torreón, México**
B.Eng. in Mechatronics — Automation and Control — *Aug 2016 – Jul 2021*

- Internship: developed the control subsystem for a 2-DOF cooperating table for an arc-welding robot, with communication to a Fanuc ARC Mate 100iC robot.

Experience

UNIVER (Universidad Univer) — **Guadalajara, Jalisco, México**
Adjunct Professor — *Oct 2026 – Present*

- Professor in Higher Education. Design and teach the Automation and Control course for Mechatronics Engineering students.

Universidad del Valle de México — **Zapopan, Jalisco, México**
Adjunct Professor — Academy of Health Sciences — *Aug 2025 – Present*

- Teach undergraduate engineering courses in the Biomedical Engineering, Biotechnology Engineering, and Pharmaceutical Chemistry-Biotechnology (B.Sc.) programs.

- Courses include Analog and Digital Electronics, Circuit Analysis and Design, Power Electronics, Kinetics and Dynamics, Differential and Integral Calculus, Advanced Programming, Physiological Modeling, and Image Processing.
- Designed course materials and laboratory sessions spanning circuit theory, embedded/analog systems, mechanics, and programming.

GD Installazioni **Zapopan, Jalisco, México**
Mechatronics Engineer *Mar 2024 – Sept 2024*

- Installed and commissioned automation equipment and conveyor systems for PepsiCo Gatorade (Indianapolis, USA) and E80 Group (Chicago, USA) projects.
- Installed and configured LGV (Laser Guided Vehicle) robots and supervised electromechanical warehouse equipment.
- Managed inbound/outbound warehouse logistics and inventory using SAP, and trained technical staff on automated machinery.

MCC Manejo de Contrato Consultores **Chiapas, México**
Project Control Assistant *Jan 2023 – Mar 2024*

- Collaborated with the CFE-Andritz-Hydroproject and CFE-Andritz-Seisa consortia on the repowering of the "Peñitas" and "Angostura" hydroelectric plants.
- Oversaw contractual schedules, additional/extraordinary works, incident handling, inbound shipments, and onsite material tracking.
- Monitored personnel attendance and man-hours per activity, and reconciled contractual schedules with stakeholders.

Instituto Tecnológico de La Laguna **Torreón, México**
Adjunct Professor — Department of Basic Sciences *Jan 2023 – Jun 2023*

- Designed and taught Differential Equations and Integral Calculus for Mechatronics and Chemical Engineering students.

Publications

- **J. C. Rodríguez**, H. M. Becerra, J. Ruiz León, "Bearing Estimation on S^2 via Tangent-Space Measurements for UAV Formation Control," *23rd Int. Conf. on Electrical Engineering, Computing Science and Automatic Control (CCE)*, 2026.
- F. G. López Ruiz, **J. C. Rodríguez**, H. M. Becerra, J. Ruiz León, "Bearing-Only Super-Twisting Control for Multi-Quadrotor Formations," *22nd Int. Conf. on Electrical Engineering, Computing Science and Automatic Control (CCE)*, pp. 1–6, 2025.
- **J. C. Rodríguez-Cervantes**, A. Dzul, H. Ríos, "Formation Control Design for Multi-Quad-Rotors with Experimental Validation," *Congreso Nacional de Control Automático (CNCA), AMCA*, Acapulco, México, 2023.
- **J. C. Rodríguez-Cervantes**, A. Dzul, H. Ríos, "Diseño de Control de Formación basado en Modos Deslizantes para un Grupo de Quad-Rotors," *XXV Congreso Mexicano de Robótica (COMRob)*, 2023.
- O. I. Santellano, J. A. Pámanes, **J. C. Rodríguez**, J. J. Pámanes, "Optimal Motions of a Welding Robot for Cooperative Tasks with a 2-DOF Positioner," *XXIII Robotics Mexican Congress (ComRob)*, pp. 145–151, 2021.

Invited Talks and Presentations

- *"Multi-Agent Formation Control Based on Bearings"* (Workshop on Robotics and Motion Planning)
  Invited Lecture — CIMAT *Guanajuato, México · Mar 2026*
- *Cinvestav Guadalajara Week, 37th Anniversary — "Intelligent Systems"*
  Participant — CINVESTAV Guadalajara *Zapopan, México · Nov 2025*

- *"Collaborative Robotics in Industry: Optimization and New Trends"*
  Invited Speaker — Universidad Iberoamericana Torreón *Torreón, México · Oct 2024*

Certifications

- SAM 3: Computer Vision with Meta's Segment Anything Model 3 — Centro (Sept 2026).
- OSHA 10: General Industry Outreach Training Course (IACET CEU=1.2, Actively Proctored) — Jul 2024.

Skills

- **Languages:** Spanish (Native), English (Professional working proficiency)
- **Technical:** ROS, ROS 2, Python, C++, C, MATLAB, Gazebo, Git, LaTeX, Linux, CAD (SolidWorks, AutoCAD), Agile (Scrum)