Carlos **Espinosa**

COMPUTER ENGINEERING · CONTROL ENGINEER

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Education

Ph.D. in Computer Engineering — *Santa Cruz, CA*
UNIVERSITY OF CALIFORNIA SANTA CRUZ, AUTONOMOUS SYSTEMS LAB — *2017 - PRESENT*
- Research focused on the control and guidance of fixed-wing UAVs.

M.Sc. in Autonomous Navigation Systems — *Mexico City, Mexico*
CENTER FOR RESEARCH AND ADVANCED STUDIES OF THE NATIONAL POLYTECHNIC INSTITUTE — *2013 - 2016*
- Thesis: *"Design and Implementation of the Control of a Two DoF Gimbal"*

B.E. in Automation and Control — *Mexico City, Mexico*
SCHOOL OF MECHANICAL AND ELECTRICAL ENGINEERING, NATIONAL POLYTECHNIC INSTITUTE — *2008 - 2012*
- Thesis: *"Automation Proposal for a palletizing Cell using RobotStudio for the Industrial Robot ABB IRB460 Simulation"*

Technician in Machines with Automated Systems — *Mexico City, Mexico*
CENTER FOR SCIENTIFIC AND TECHNOLOGICAL STUDIES NO. 9, NATIONAL POLYTECHNIC INSTITUTE — *2004 - 2008*

Work Experience

University of California Santa Cruz — *Santa Cruz, CA*
TEACHING ASSISTANT

CSE12 COMPUTER SYSTEMS & ASSEMBLY LANGUAGE. — *Jan. 2018 - PRESENT*
- Instructed students in lab assignments for logic design, computer architecture, MIPS and RISCV assembly programming.
- Programmed Python scripts for the automatic grading of the Lab assignments and to run MOSS Stanford copy detection software on student's labs.

ECE118: INTRODUCTION TO MECHATRONICS — *Sep. 2021 - Dec. 2021*
- Assist the students in the development of their 5-week small autonomous robot project (mechanics, electronics, and software).
- Support in creating and maintaining the hardware used to evaluate the autonomy of the students' robot.
- Testing and maintaining the electronic boards used by the students.

The MathWorks — *Natick, MA*
ENGINEERING DEVELOPMENT GROUP INTERN — *Jun. 2020 - Sep. 2020*
- Prototyping of Simulink Blocks for the integration of GStreamer and Simulink for the development of a Hardware-In-the-Loop workflow using the Unreal Engine Co-simulation for UAVs and the UAV Toolbox Support Package for PX4 Autopilots.

UAV DEVELOPMENT INTERN — *Jun. 2019 - Sep. 2019*
- Worked on the development of a reference application for the Simulink & Unreal Engine Co-simulation for UAVs and implemented a 3D Rapidly Exploring Random Tree RRT for Quad-rotor trajectory generation using System Objects in Simulink.

SOFTWARE ENGINEER INTERN — *Jun. 2018 - Sep. 2018*
- Development of Python scripts to improve the use of machine translation engines to translate the MATLAB & Simulink documentation.

Panasonic of Mexico — *State of Mexico, Mexico*
TECHNICAL SUPPORT ENGINEER — *Jun. 2016 - Jul. 2017*
- Main Support Engineer at national level for the Authorized Service Centers in the category of air conditioner and home appliances.

Technological Institute of Tlalnepantla — *Mexico City, Mexico*
LECTURER — *Feb. 2016 - Jun. 2016*
- Taught undergraduate-level engineering courses on Micro-controllers and Analog Electronics.

Mexican Navy Research Center (INIDETAM) — *Veracruz, Mexico*
RESEARCH INTERN — *Jan. 2015 - Jun. 2015*
- Design and programming the electronic System of a gyro-stabilized camera (Results used to obtain the master's degree).

Projects

Small Autonomous Robot — *Nov. 2017*
- Five weeks final project for the UCSC Mechatronics CMPE218 class.
- Development of a small autonomous robot with the ability of effectively and robustly navigate a standardized field while capable of reliably solving a task.

UAV Camera Gimbal — *2015 - 2016*
- Mathematical modelling, control design and prototype implementation of a two-axis Pan-Tilt camera unit designed for a UAV aircraft for intelligence, surveillance, and reconnaissance purposes.

3rd SIMEVANT 2015 — *Oct. 2015*
- Organizer at the Third Mexican Symposium of Unmanned Aerial Vehicles
- Activities: Logistics and planning of activities for the organization of a symposium for 200 people, in addition to the coordination and organization on the days of the event.

Robotic cell 3D Design and Simulation — *2011 - 2012*
- Design of an Industrial Robotic Palletizing Cell using RobotStudio.

CNC Machining

- Design and fabrication of mechanical parts using CNC machinery as well as conventional milling machine and lathe. *2008*

Publications

"Sliding mode line-of-sight stabilization of a two-axes gimbal system"

C. Espinosa, K. Mayen, M. Lizarraga, S. S. H. Romero and R. Lozano,

2015 Workshop on Research, Education and Development of Unmanned Aerial Systems (RED-UAS), Cancun, 2015, pp. 431-438.

"Real-time video stabilization algorithm based on efficient block matching for UAVs"

K. Mayen, C. Espinosa, H. Romero, S. Salazar, M. Lizarraga and R. Lozano,

2015 Workshop on Research, Education and Development of Unmanned Aerial Systems (RED-UAS), Cancun, 2015, pp. 78-83.

"Partitioned Gaussian Process Regression for Online Trajectory Planning for Autonomous Vehicles"

P.Vlastos, A.Hunter, R.Curry, C.Espinosa and G.Elkaim

2021 21st International Conference on Control, Automation and Systems (ICCAS), pp. 1160-1165

Honors

2017 - PRESENT	**UC MEXUS-CONACYT Fellowship (Mexican NSF PhD),** Awarded a five-year fellowship by the Mexican National Science and Technology Council and the UC MEXUS to pursue a Ph.D. in Computer Engineering.
2017	**Regents' Fellowship UCSC,** A limited number awarded to first-year graduate students in master's and doctoral programs.
2013 - 2015	**CONACYT Fellowship (Mexican NSF Master),** Awarded a two-year fellowship by the Mexican National Science and Technology Council to pursue a Master degree.
2012	**Fellowship of the Training Program for Researchers of the National Polytechnic Institute,** Grant for students participating in research activities within the National Polytechnic Institute.
2009 - 2012	**Alfredo Harp Helú Foundation Scholarship,** Grant financial support to students of academic excellence.
2009	**Academic Excellence Program of the National Polytechnic Institute,** Recognition for the GPA obtained in the first and second semester of the Bachelor of Engineering in Automation and Control.

Languages

English:	Full professional proficiency
Spanish:	Native proficiency
French:	Limited working proficiency
German:	Elementary proficiency

Skills

Programming Languages:	**C**	Experienced	**MATLAB**	Experienced
	C++	Familiarity	**MIPS Assembly**	Familiarity
	Python	Experienced		
Software/Libraries:	MATLAB & Simulink Tools (Familiar with the PX4 PSP for Simulink), OpenCV, Linux/UNIX, MPLAB, Unreal Engine Editor, Microsoft Office Suite.			
PCB layout design:	Eagle, Proteus Design Suite, Altium.			
Mechanical Design:	Solidworks, AutoCAD and Inventor, Experience using machine tooling (Manual and CNC Lathe, Milling machine and Laser cutter).			
Embedded Systems:	PIC, DsPIC, I2C, UART, SPI, Sensor integration, Experience using single-board computers Raspberry Pi and Gumstix, Familiarity with the Pixhawk PX4 platform.			
Robotics Engineering:	Feedback Control, Computer Vision, Camera Inertial stabilization, UAV's, Simulation, Familiarity with ROS and Gazebo.			
Electrical Engineering:	Sensor Design, Analog Filter Design, Signal conditioning.			
Computer Engineering:	Computer Architecture, Digital Logic Design, VLSI System Design.			
Applied Mathematics:	Modeling, Control Theory, Linear Dynamical Systems, Frequency Domain and State Space Analysis.			