Mario Jerez

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About

PhD student and robotics researcher with a background in software development, focusing on bio-inspired swarm intelligence. Passionate about centralized and decentralized multi-robot systems for collaborative tasks such as search, foraging, and construction.

Education

Doctor of Philosophy in Computer Science, University of Minnesota — Sept 2024 – Present

- GPA: 3.93/4.00

Bachelors of Arts, Sarah Lawrence College — Sept 2018 – May 2021

- GPA: 3.96/4.00

International Baccalaureate Diploma Programme, Keystone Academy in Beijing — Aug 2016 – May 2018

Awards

Excellence in Small Farms Technology Award – $5000 award from participation in the Farm Robotics Challenge

NSF Research Traineeship: Circularity Impact Program (2025) – Travel and Equipment Award for research related to sustainability

Hispanic Scholarship Fund Scholar (2019) – academic achievement award received as an undergraduate

Publications

E. Temesgen, M. Jerez, G. Brown, G. Wilson, SGL. Divakarla, S. Boelter, O. Nelson, R. McPherson, M. Gini — May 2025
Geofenced Unmanned Aerial Robotic Defender for Deer Detection and Deterrence (GUARD)
arXiv:2505.10770

M. Jerez, K. Duong, Jack. Swanberg, H. Bula, E. Temesgen, M. Gini — May 2025
UAV Coverage Path Planning for Autonomous Deer Detection in the Wild Driven by Ant Colony Optimization
Robots in the Wild ICRA Workshop

Research projects

UAV-based deer deterrence system — Jan 2025 - Apr 2025

- Participated in the Farm Robotics Challenge to solve a problem that a local farmer was facing using robotics. The biggest problem the farmer with whom we partnered faced was crop damage due to deer.
- Organized and project managed a team of 27 graduate and undergraduate students that collaborated to build a quadcopter-based deer deterrence system.
- Lead a small team in designing a novel energy-efficient coverage path planning algorithm to maximize the area that one or multiple drones could search for deer.
- Won the **Excellence in Small Farms Technology Award**
- Wrote paper–UAV Coverage Path Planning for Autonomous Deer Detection in the Wild Driven by Ant Colony Optimization–that was accepted to Robots in the Wild ICRA Workshop. Presented a poster on it at ICRA 2025.

Luminescent Ant Foraging — Nov 2024 - Present

- Developed a decentralized, multi-agent algorithm where agents use luminescence-based communication to find resources and take them to their nest
- Adapted the Glowworm Swarm Optimization algorithm, a variant of the Ant Colony Optimization algorithm, for finding the resources

- Implemented the algorithm with robots in a simulated environment
- Implementing the algorithm with physical robots
- Tools Used: PettingZoo library, ROS, Gazebo, Python, Raspberry Pi, Phasespace system

Experience

Implementation Consultant (Developer), FAST Enterprises – San Juan, PR Feb 2023 – Aug 2024

- Created new Incentives Return for taxpayers in Puerto Rico with a small, bilingual team under a tight deadline
- Worked closely with the Department of Treasury in Spanish to correctly validate information submitted by taxpayers while creating an excellent user experience in both English and Spanish
- Transformed business requests into software changes by writing or modifying code in Visual Basic and editing configuration tables
- Researched problems by querying taxpayer data using Microsoft SQL Server Management Studio
- Resolved errors that occurred in the software used by government employees and in the website used by taxpayers, while working in the Production Support team
- Delivered solutions by unit testing, writing test scenarios and working closely with testers, and migrating changes to the Testing, Staging, and eventually, Production environment.

Full Stack Product Developer, Avolution Inc. – Remote Aug 2021 – Sep 2022

- Delivered new software features to specified requirements using the .NET Framework
- Found and fixed software defects
- Provided level 3 support to customers in the Americas, combining knowledge accrued from consulting with software development knowledge
- Designed and recorded the ABACUS REST API course for the Learning Management System
- Delivered online trainings to clients on ABACUS scripting and the ABACUS REST API in English and Spanish
- Developed requested scripts (in VB and C#) for clients who bought expert assistance hours, and worked closely with Enterprise Architects to deliver a product that met their needs
- Developed a custom visualization tools such as stacked bar chart for customers to use around the world
- Wrote articles on the Knowledge Portal with detailed instructions for clients on how to use the scripts and visualizations that I designed
- Trained technical consultants in scripting and the REST API
- Provided Customer Support in the Helpdesk and on video calls

Teaching Experience

Graduate Teaching Assistant, University of Minnesota – Minneapolis, MN Aug 2024 – Present

- Help manage a class with 250 students and 15 undergraduate Teaching Assistants
- Host weekly office hours to help students with their assignments and improve their understanding
- Assign grading to undergraduate Teaching Assistants' and answer grading-related questions
- Write example solutions for projects and rubrics for assignments. Proofread and improve exams, labs, and project descriptions before they are released to students.
- Write quiz questions

Online Tutor, GoPeer – Remote Apr 2020 – Aug 2021

- Tutored students K-College in Computer Science (Python, Java, Javascript), Physics, Mathematics (General, Calculus, Linear Algebra), Spanish, Writing, and Reading in 45 to 90 minute lessons
- Helped students with homework, projects, and wrote personalized assignment to deepen their understanding
- Individually tutored over 50 students and hosted over 500 lessons with 100% Customer Satisfaction Rate (See Reviews)
- Featured as a Top Tutor on GoPeer social media and in article (See Article)

Mathematics and Calculus Tutor, Sarah Lawrence College – Bronxville, NY Sept 2020 – May 2021

Computer Science Tutor & Lab Assistant, Sarah Lawrence College – Bronxville, NY Sept 2020 – Dec 2020

- Tutored College Students in general Mathematics, Calculus I and II, Linear Algebra and Multivariable Calculus for the Math Resource Center
- Hosted regular Zoom sessions to help students understand math concepts and to help them progress in their homework assignments
- Assisted and answered questions in all labs for the Introduction to Computer Science course taught in Python
- Hosted regular tutoring sessions to help students with their programming assignments and final projects

Teaching Fellow and Residential Assistant, Keystone Academy – Beijing, China Jul 2019 – Aug 2019

- Taught presentation skills in English to ESL High School students
- Coordinated games and activities for children in K-12
- Dorm proctored for the English Immersion Program

Program Mentor, Keru – Phnom Penh, Cambodia May 2019 – June 2019

- Researched the issue of arsenic-contaminated groundwater in Cambodia and wrote a survey for High School students to learn about it
- Guided students in interviewing locals and conducting tests on water samples from various provinces
- Built an affordable water filtration system that utilized rusted nails to remove arsenic from groundwater

Technologies

Languages: Python, Java, Visual Basic, C#, SQL, JavaScript

Libraries & Frameworks: ROS, Gazebo, PettingZoo, VMAS, Gymnasium, TensorFlow, Keras, NumPy, Pandas, Django, React

Tools: Git, VS Code, MSSQL, Analytic Solver