Jorge Ruballos

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SUMMARY

AI and robotics engineer with experience developing end-to-end machine learning systems and evaluating them in real-world, resource-constrained research environments. Currently pursuing a Master's in Robotics with research spanning neural networks, time-series modeling, and intelligent robotic systems. Background in embedded systems and industrial control systems, with strong experience translating technical requirements between researchers, engineers, and stakeholders through training, presentations, and collaborative development. Proficient in Spanish.

EMPLOYMENT HISTORY

Graduate Research Assistant: OSU SHARE Lab September 2023 - Present
Oregon State University, Corvallis, OR

- Develop data features from longitudinal sensor data monitoring older adults in consultation with Oregon Health & Science University (OHSU), the data source, and Dr. Naomi Fitter. Present quarterly updates with other NSF AI-CARING grant recipients to cross-pollinate ideas.
- Augment robot software for ongoing study, NRI Grant: "Robot-Assisted Longitudinal Physical and Cognitive Exercise Interventions for Older Veterans".

Robot-Assisted Exercise Interventions for Older Veterans
Researcher, Programmer, Facilitator
Funded by the NRI Grant: "Robot-Assisted Longitudinal Physical and Cognitive Exercise Interventions for Older Veterans"

- Designed and implemented robot-assisted programs that integrated physical and cognitive exercises for older veterans residing in The Edward C. Allworth Oregon Veterans' Home, an intentional community and skilled nursing facility.
- Refined NAO robot's programmed speech, non-verbal behaviors, and interactions guiding participants through exercises and trivia sessions as part of an in-situ study to identify influences on engagement (see *Publications*).

AI-CARING: Sensor Data Analysis for Early Detection of Cognitive and Physical Decline
Researcher, Data Analyst
Collaborating with Oregon Health & Science University (OHSU), Funded by the NSF AI-CARING Grant

- Built an end-to-end data science pipeline integrating sleep, mobility, and survey data from in-home sensors to engineer temporal features, perform imputation, and train survival and recurrent-event models predicting health outcomes such as falls, hospitalization, and cognitive decline.
- Collaborate with data scientists at OHSU and Georgia Tech (participant in NSF AI-CARING grant) to refine research objectives.

Control Systems Engineer *January 2023 – Present*
Arcadis, Irvine, CA

- Responsible for I&C and SCADA field investigations services for diverse clients and projects for municipal water and wastewater treatment, conveyance systems and facilities.
- Provide field engineering and design services to produce design and construction documents for projects.
- Conduct factory testing, site acceptance testing, field checkout, and startup of I&C and SCADA systems.

Health Care Provider *February 2022 – August 2023*
IHSS, Chino, CA

- Provided home assistive services for my grandmother through the IHSS program.

Engineer (SCADA/Control Systems Department) *October 2016 – January 2022*
Metropolitan Water District, Los Angeles, CA

- Engineer Lead:
  - Directed and created a data acquisition system to gradually replace an older system running on obsolete operating software with limited storage.
  - Control Systems Project manager for Colorado River Aqueduct Radial Gate Replacement. Worked with local plant managers, radio technicians and local field technicians to develop a project schedule for testing and commissioning.
- Administrator of Two Major Database Systems:
  - Managed daily tasks for a private company database consisting of hundreds of reports, 500+ notifications, 25k data points, and data screens. This database is used by various groups across the organization including upper management.
  - Administered the Automatic Meter Reading (AMR) system. The AMR system consists of over 300 metering sites that monitor the amount of water being distributed across Southern California water agencies. It is a tool used by management to determine cost and billing.
- Network and Cyber Security:
  - Conducted bi-monthly security audits and created weekly reports of any new security vulnerabilities.
  - Presented company webinar sessions to create awareness of cyber security issues in the control systems network.
- Software Programming:
  - Developed and updated C++ and Ladder Logic software according to the automation needs of everyday water distribution and treatment.
  - Revised and created internal software documentations, test plans and manuals for long-term support.

TEACHING EXPERIENCE

Graduate Teaching Assistant (Systems Dynamics and Control) September 2025 – Present
Oregon State University, Corvallis, OR

- Graded papers, held bi-weekly office hours, and proctored final exam in collaboration with other GTAs.

Graduate Teaching Assistant (Introduction to Instrumentation and Measurement Systems) September 2024 – December 2024
Oregon State University, Corvallis, OR

- Managed 4 labs per week and demonstrated principles of measurement systems, including transduction, signal conditioning, and data recording, using Arduino as the data acquisition system.
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Supplemental Instruction Leader (Tutor Expert) *August 2022 – January 2023*
Mount San Antonio College, Walnut, CA

- SI leader for *Differential Equations and Linear Algebra*:
  - Prepare and conduct a tutoring program for 15 students in differential equations for two hours, twice per week (or as needed). Sessions consist of a prepared agenda for relevant topics or direct preparation for an exam.
  - Students' average attendance tripled, and their grade increased by over one letter grade.

MENTORING & OUTREACH

OSU Share Lab: Undergraduate Mentoring
Graduate Mentor

- Mentored multiple undergraduate students in the lab, providing guidance across diverse research projects, coding and hardware troubleshooting, and general lab operations.

Research Experience for Undergraduates (REU): Robots in the Real World June 2024 – August 2024 & June 2025 – August 2025
Graduate Lead

- Acted as primary point of contact for all undergraduates, mentors, and advisors to manage questions and concerns.
- Assisted in the organization of weekly seminars and hosted a Q&A panel of graduate students for interested undergraduates.

"Summer Step" at Oregon State University September 2024
Mentor

- Advise and act as a point of contact for a cohort of incoming graduate students, often from historically marginalized communities, seeking guidance for their transition to graduate school.

SKILLS

Software: Python (Pandas, NumPy, Scikit-Learn, PyTorch, TensorFlow, StatsModels), R (tidyverse, reReg, reda), SQL, Git, Linux (Ubuntu), ROS 1 & 2 (MoveIt, URDF/Xacro, Gazebo, RViz), MATLAB, Docker, VS Code, Jupyter.

Machine Learning: Time-series modeling, feature engineering, LSTM & VAE architectures, XGBoost, Random Forest, PCA, clustering, imputation (MICE, VAE), survival & recurrent event analysis, calibration & visualization.

Robotics: C/C++, motion planning (UR5e), Quori & Misty II integration, Arduino, Raspberry Pi, sensor fusion, PID control, simulation (Gazebo, RViz).
Industrial Systems: RSLogix, FactoryTalk, PLCs (Allen-Bradley/Siemens), PanelView HMI, OSIsoft PI, OnSite SCADA, CyberX, Assembly, PSoC (ARM), Spartan-3e FPGA.

Hardware: Analog & digital sensors (flow, temperature, pressure, PIR, ultrasonic, servos), routers/switches (Cisco), servers (HP), embedded communication (Ethernet/IP, Modbus, UART, SPI, I²C).

EDUCATION & CERTIFICATES

Master of Science in Robotics September 2023 – Present
Oregon State University, Oregon
Advisor and Lab: Dr. Naomi Fitter, OSU SHARE Lab
Affiliations: *Robotics Graduate Student Association, Co - President*

Bachelor of Science in Computer Engineering
California State Polytechnic University, Pomona

Engineer in Training Certificate **Global Industrial Cyber Security Professional:** *April 2019*

PUBLICATIONS

Ramya Challa*, **Jorge Ruballos***, and Naomi Fitter: "*I'm glad you remembered my name!" Using Gaze and Names in Robot-Aided Aging Activities,* Aging in Place Workshop at HRI 2024

Jorge Ruballos, Calvin Langdon, and Naomi Fitter: *"You seem fun! Push a button for a joke": How Older Adults Respond to Positive and Negative Robot Prompts,* WPA 2025

Jorge Ruballos, Zane Myers, Naomi Fitter and Bill Smart: *Query Complexity and User Age Affects Perceived Naturalness of Response Delay in Mock LLM-Mediated Conversation with a Robot,* ICRA 2026 (Under-Review)

RELEVANT GRADUATE COURSE WORK

NLP with Deep Learning Spring 2025

- Project: Developed *Judge LLM*, a verifier-guided evaluation framework inspired by *Sample, Scrutinize, and Scale (Zhao et al., 2025)* that uses QLoRA-fine-tuned reward models to assess and rank responses from multiple LLM samples, improving reasoning reliability and alignment with human judgments.

ML Challenges in the Real-World (Applying ML techniques to real world datasets**)** Spring 2025

Intelligent Agents and Decision-Making (Intro to Reinforcement Learning) Winter 2025