# GAREGIN MAZMANYAN

Engineering Leader | Machine Learning, Computer Vision and Robotics Software
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## SUMMARY

Engineer and manager who builds machine learning and computer vision software and runs the business around it. At Araca, Inc., a semiconductor CMP equipment and services company, leads the Araca Insights analytics product and the slurry-flow computer vision program, owns revenue for two business units, and manages lab staff and company IT. M.S. in Computer Science (University of Arizona, 2026) and two peer-reviewed journal articles on multi-drone control and VR teleoperation. Before moving into software, spent five years running commercial operations for a food manufacturing group of about 500 people.

## EXPERIENCE

### Vice President of Engineering and Operations
*Araca, Inc., Tucson, AZ | Sep 2026 – Present*

- Own the Araca Insights product line: roadmap, architecture, releases, licensing and first-line support.
- Lead the Slurry Flow Visualization program, which turns 4K, 240 fps polishing videos into flow measurements with OpenCV and the SAM 2.1 segmentation model (PyTorch, Hugging Face Transformers), plus FFT analysis to detect platen speed.
- Deliver technical reports to semiconductor and materials customers, including a whole-pad slurry spread measurement built on AI image segmentation.
- Own revenue for the Services business unit (process testing, joint development, training) and the Intelligence business unit (software), from first contact to signed contract and renewal. Prepare quotations and pricing for tools, services and software licenses.
- Supervise two Applications Lab staff on calibration, measurement repeatability and data integrity.
- Hire and train engineers for the Intelligence business unit.
- Run company IT and business systems: Google Workspace administration (SPF, DKIM, DMARC), Cloudflare DNS, devices, backups and data security, and the aracainc.com website (HTML, CSS, JavaScript, Three.js; deployed through GitHub and Vercel).

### Software Engineer, Data Automation and Analytics
*Araca, Inc., Tucson, AZ | Feb 2026 – Aug 2026*

- Built Araca Insights, an offline desktop app for CMP test-stand data (Python 3.11, PySide6 with an embedded Dash and Plotly interface). It imports instrument files, plays back runs, compares and correlates them, and exports Excel and PowerPoint reports, work Araca estimates at 35–95 hours per project when done by hand.
- Added live data acquisition from National Instruments DAQ hardware (nidaqmx) and automated report generation (XlsxWriter, python-pptx).
- Trained process-prediction models with scikit-learn and FLAML AutoML, checked with cross-validation.
- Built an on-premises LLM agent (LangChain, Ollama) that answers plain-language questions about process data and draws charts, so customer data never leaves the site.
- Shipped Insights as a commercial product: Nuitka-compiled Windows binaries, an Inno Setup installer, Ed25519-signed node-locked license keys, and separate Basic and Advanced builds, with uv, pytest, strict mypy, Ruff and pre-commit in the build. Led negotiation of the customer software license agreement.

### Consulting Robotics Engineer (part-time contract)
*802 Secure, Inc. (LOCH Technologies), Emeryville, CA (remote) | Jul 2026*

- Built the camera and onboard-compute side of a counter-UAS interceptor drone: Raspberry Pi 5 companion computer with a Pi Camera Module 3, Pixhawk flight controller running ArduPilot over MAVLink, and ROS 2. Handed the configured prototype to the team at the end of the contract.
- Proposed proportional-navigation guidance for the intercept and drafted the onboard compute hardware plan.

### Robotics Researcher, SmartLab
*University of Arizona, Tucson, AZ | Mar 2025 – Sep 2026*

- Built and flight-tested a decentralized formation controller for six Crazyflie 2.1 quadrotors (Crazyswarm2, Vicon motion capture at 100 Hz). The swarm tracked its formation with 5.7 cm mean RMSE for leaders and 8.4 cm for followers, and no pair of drones came inside the 0.13 m safety threshold. The control loop used 5.23 ms of each 20 ms cycle. First-author paper in Aerospace Science and Technology (2026).

- Built a VR drone teleoperation system: WebXR and Three.js on a Meta Quest 3, connected to ROS 2 on a Jetson Orin NX with ZED camera SLAM. Across 8 trials, the third-person view kept the drone 0.20 m farther from obstacles than first-person view at about the same task time, with 29.8 ms mean tracking latency after optimization (41.9 ms before). Second-author paper in IEEE Aerospace and Electronic Systems Magazine (2026).
- Flashed and configured a 10-drone Crazyflie swarm on two Crazyradio 2.0 radios and flew all 10 together for a paper in preparation (2026).

**Software Engineer Intern**
*Aeyesafe Inc., Edmonds, WA (remote) | Oct 2024 – Dec 2024*

- Wrote the Python backend logic that turns incoming IoT sensor messages into real-time alerts.
- Set up user authentication with AWS Cognito and API Gateway (Lambda functions in JavaScript), with SQS queues and DynamoDB storage.
- Containerized services with Docker and automated testing and deployment with Bitbucket Pipelines (YAML).

**Teaching Assistant and Course Coordinator, Department of Computer Science**
*University of Arizona, Tucson, AZ | May 2023 – Dec 2024*

- Coordinated an introductory computer science course across multiple sections and led weekly labs and office hours for 300+ students.
- Built a real-time coding-practice platform (React, Node.js, PostgreSQL) that gave students instant feedback on exercises.

**Deputy Director for Commercial Affairs**
*LLC AgroPetro, Krasnodar Krai, Russia | Oct 2016 – Aug 2021*

Packaged-food manufacturer; flagship product roasted sunflower seeds.

- Directed commercial strategy and operations for AgroPetro and its affiliated businesses, about 500 employees combined.
- Managed a direct team of 50+ sales representatives.
- Grew annual revenue 150% from 2019 to 2021 through data-driven sales planning and process changes.

## EDUCATION

**M.S. Computer Science, University of Arizona, Tucson, AZ**
*Aug 2025 – May 2026 | GPA 3.875*

**Thesis:** "Adapting Vision-Language-Action Models to New Domains: A Case Study with SimLingo on QCar 2." Committee: Dr. Chicheng Zhang and Dr. Hossein Rastgoftar (co-chairs), Dr. Eduardo Blanco.

- Adapted SimLingo, a vision-language-action driving model built on InternVL2-1B, from the CARLA simulator to Quanser's QLabs digital twin of the QCar 2, steering from a single camera at 4 Hz.
- Collected 10,495 expert frames over 55 runs and fine-tuned with LoRA (rank 32, about 17.6M trainable parameters) using PyTorch Lightning and DeepSpeed stage 2 on one 16 GB GPU.
- Raised route coverage from 4.7% for the pretrained model to 99.1%, with 0.056 m mean lateral deviation against 0.261 m for a LiDAR adaptive-cruise baseline, and cut average displacement error 25% (0.114 to 0.085).
- Reported the limits as well: 60% overall pass rate and 40% on obstacle-avoidance runs, where the LiDAR baseline passed every run. Quanser featured the project on its Community Showcase (2026).

**B.S. Computer Science, magna cum laude, University of Arizona, Tucson, AZ**
*Aug 2022 – May 2025 | GPA 3.723 | Minor in Systems and Industrial Engineering*

**Earlier study**

- UCLA Extension, American Collegiate Los Angeles program, Los Angeles, CA (2021–2022)
- Glion Institute of Higher Education, hospitality program, Switzerland (2014–2016)
- University of Lincoln International Study Centre, International Year One in Business and Management, UK (2013–2014)
- INTO University of East Anglia, International Foundation Certificate in Business and Economics, UK (2012–2013)

## PUBLICATIONS

1. Mazmanyan, G., and Rastgoftar, H. "Decentralized Affine Transformation for Scalable and Safe Multi-Agent Aerial Coordination." *Aerospace Science and Technology*, vol. 180, art. 113539, 2026. doi:10.1016/j.ast.2026.113539
2. Hughes, J. T., Mazmanyan, G., Ghufran, M., and Rastgoftar, H. "VR-Based Control of Multicopter Operation." *IEEE Aerospace and Electronic Systems Magazine*, 41(2):46–55, Feb 2026. doi:10.1109/MAES.2025.3623070
3. Mazmanyan, G. "Adapting Vision-Language-Action Models to New Domains: A Case Study with SimLingo on QCar 2." M.S. thesis, University of Arizona, 2026.

## SERVICE AND AWARDS

- Peer reviewer, IEEE Transactions on Automation Science and Engineering (T-ASE): 2 manuscripts, 2026.
- Runner-up, Amazon AWS Challenge at Hack Arizona (150+ teams).
- Top 0.05% of 444,000+ participants (reached Round 3), TCS CodeVita global coding competition.
- $7,000+ in NSF I-Corps and University of Arizona Forge startup grants.

## TECHNICAL SKILLS

**Languages:** Python, C, C++, JavaScript, Java, SQL, MATLAB, Bash

**Machine learning:** PyTorch, PyTorch Lightning, scikit-learn, FLAML, TensorFlow, Hugging Face Transformers, LoRA/PEFT, DeepSpeed, CUDA, NumPy, pandas, SciPy; vision-language-action models; LLM agents (LangChain, Ollama, RAG)

**Computer vision:** OpenCV, SAM 2 segmentation, video and FFT signal analysis, stereo SLAM (ZED)

**Robotics and embedded:** ROS 2, ArduPilot, PX4, MAVLink, Crazyswarm2, Vicon, Quanser QLabs, Jetson Orin, Raspberry Pi, National Instruments DAQ, Gazebo, RViz

**Software and DevOps:** PySide6/Qt, Dash, Plotly, React, Node.js, PostgreSQL, REST APIs, Docker, AWS (Lambda, API Gateway, Cognito, SQS, DynamoDB), Git, GitHub, CI/CD, pytest, mypy, Ruff, Nuitka, Linux

**IT and web:** Google Workspace administration, Cloudflare DNS, SPF/DKIM/DMARC, Vercel, HTML, CSS, Three.js

**Business:** business unit revenue, pricing and quotations, software license negotiation, federal grant proposals, hiring and supervising staff, sales team management

## COURSES AND TRAINING

**Coursera:** Web Design for Everybody specialization, 5 courses (University of Michigan, 2023); Applied Machine Learning in Python (University of Michigan, 2024); AWS Cloud Practitioner Essentials (Amazon Web Services, 2024)

**Udemy:** ROS 2 for Beginners (2025); Make an Open Source Drone (2026); Practical C++; AWS Certified Developer Associate (DVA-C02) exam preparation, in progress

**FAA:** The Recreational UAS Safety Test (TRUST) certificate, issued by the Academy of Model Aeronautics (2026)

**Business training, Russia:** Strategic Management of Retail Chains, Rusprodsoyuz Academy, Moscow (2017); trade law compliance, Liga Kommersantov, Moscow (2017); owner delegation of operational management, Business Life, Rostov-on-Don (2018)

## ACTIVITIES

- Judo: black belt (Shodan); two-time gold medalist, Arizona State Judo Championships; multiple-time St. Petersburg city champion; volunteer coach at Tucson Dojo.