Francisco (Cisco) Zabala

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SUMMARY

Data science lead and delivery architect at AWS working at the intersection of **generative and physical AI**—deploying **language models at the edge** for robotics, digital labs, and embedded applications serving **U.S. Federal customers** across Defense, Intelligence, and Civilian agencies. Expertise on real-world deployments: vision-language-action pipelines, multi-modal reasoning for physical environments, edge inference optimization, and agentic systems for autonomous operations. Published researcher (Caltech) with 10+ years delivering mission-critical AI systems from research to production; founder background scaling ML/IIoT products to both edge and cloud environments.

EDUCATION

California Institute of Technology (Caltech)   Pasadena, CA
Master of Engineering (PhD track), Control & Dynamical Systems   2009 – 2013
California State University, Fullerton   Fullerton, CA
B.S., Electrical & Computer Engineering   2003 – 2007

SELECTED PUBLICATIONS

- E. I. Fontaine, F. Zabala, M. H. Dickinson, and J. W. Burdick, "Wing and body motion during flight initiation in *Drosophila* revealed by automated visual tracking," *Journal of Experimental Biology*, vol. 212, no. 9, pp. 1307–1323, 2009. doi:10.1242/jeb.025379
- F. Zabala, G. M. Card, E. I. Fontaine, M. H. Dickinson, and R. M. Murray, "Flight dynamics and control of evasive maneuvers: the fruit fly's takeoff," *IEEE Transactions on Biomedical Engineering*, vol. 56, no. 9, pp. 2295–2298, Sep. 2009. doi:10.1109/TBME.2009.2027606
- F. Zabala, P. Polidoro, A. Robie, K. Branson, P. Perona, and M. H. Dickinson, "A simple strategy for detecting moving objects during locomotion revealed by animal–robot interactions," *Current Biology*, vol. 22, no. 14, pp. 1344–1350, Jul. 2012. doi:10.1016/j.cub.2012.05.024

CORE SKILLS

GenAI/LLMs: retrieval-augmented generation (RAG) architectures, agentic AI systems, prompt engineering, evaluation frameworks, model fine-tuning; LangChain, vLLM, MCP
ML/CV/Foundation Models: PyTorch, self-supervised pre-training (MAE, DINO), vision transformers, TensorRT, distributed training, model optimization
Cloud/MLOps: Cloud ML platforms (training, inference, pipelines), managed AI services, object storage, compute, containers, serverless, orchestration; Docker, Kubernetes, CI/CD, IaC
Data/Systems: Python, C/C++, SQL, vector databases, streaming platforms, API design
Edge/Robotics: ROS/ROS2, embedded ML (TensorRT, ONNX), camera pipelines, remote sensing, IoT architectures

EXPERIENCE

Amazon Web Services (AWS)   California, USA
Data Science Architect, Physical & Agentic AI   Oct 2024 – Present

- Lead technical strategy and architecture for **U.S. Federal customers**, supporting enterprise-scale engagements across Defense, Intelligence, and Civilian agencies in GenAI/agentic AI domains.
- Architect enterprise-grade multi-agent systems and RAG solutions for mission-critical applications, ensuring compliance with FedRAMP, ITAR, and IL5/IL6 requirements; drive numerous high-priority technical escalations.
- Establish best practices and reference architectures for agentic AI spanning IoT edge deployments, computer vision pipelines, and autonomous robotics systems; mentor data scientists across federal

delivery teams.

- Design evaluation frameworks for LLM applications including hallucination detection, retrieval quality metrics, and agent reasoning validation for high-assurance environments.

Lead Data Scientist, Computer Vision & IoT   Jun 2022 – Oct 2024

- Led delivery of multiple end-to-end CV/IIoT solutions for **U.S. Federal customers**, architecting scalable pipelines from data ingestion through model deployment and monitoring; reduced time-to-production through optimized MLOps frameworks.
- Managed cross-functional teams of data scientists and ML engineers; established CI/CD best practices, project templates, and code review standards adopted across federal practice organizations.
- Built real-time inference systems processing high-volume image streams using cloud multi-model endpoints, achieving high-availability SLA for mission-critical workloads.
- Deployed self-supervised pre-training strategies (MAE, DINO) for geospatial foundation models, achieving significant improvement in downstream object detection tasks with reduced labeled data requirements for federal defense applications.
- Architected hybrid edge/cloud CV solutions enabling real-time inference at tactical edge with periodic model updates from cloud; significantly reduced bandwidth requirements.
- Designed distributed training pipelines for vision transformers on large-scale satellite imagery datasets, optimizing multi-GPU utilization to reduce training time from weeks to days.

Walmart Global Tech   California, USA
Sr. Data Scientist, Computer Vision   Aug 2021 – Apr 2022
Store No. 8 – Walmart's Incubation Arm

- Co-led ML development for rapid incubation-to-production project; designed hybrid heuristic/deep-learning pipeline for real-time shelf monitoring achieving high accuracy.
- Built data collection and annotation infrastructure supporting large-scale weekly labeling operations; established model evaluation frameworks adopted company-wide.
- Architected end-to-end ML solutions for three product verticals (inventory, asset protection, customer analytics), establishing scalable training/inference infrastructure on cloud platform serving nationwide retail operations.
- Led technical design for nationwide rollout of edge CV systems, optimizing model architectures for mobile devices to achieve millisecond inference latency while maintaining high accuracy.

ACROBOTIC   Pasadena, CA
Founder and CTO   Jan 2013 – Aug 2021

- Led engineering teams to deliver custom-built instruments for ML, IoT, robotics, and remote sensing applications.
- Drove customer adoption across DIY communities and National Lab engineers with purpose-built HW/SW products.

California Institute of Technology (Caltech)   Pasadena, CA
Graduate Research Assistant   Sep 2008 – Dec 2012

- Built high-speed videography pipelines and real-time analysis for animal flight experiments.
- Applied unsupervised learning to track 3D wing/body kinematics in fruit-fly flight.

Visiting Scientist, DARPA Grand Challenge   Mar 2007 – Aug 2008

- Implemented vision algorithms for first-gen driverless navigation; contributed to vehicle retrofitting for autonomy.

SELECTED PROJECTS

Multi-Agent RAG Systems *(Python, orchestration frameworks, cloud AI services)*
Architected production multi-agent orchestration system with specialized reasoning agents for document analysis, leveraging frontier LLMs and vector retrieval; implemented evaluation framework achieving high answer accuracy on sensitive datasets.

Geospatial Foundation Model with Pre-training *(Python, PyTorch, cloud ML platforms, Vision Transformers)*
Designed self-supervised pre-training pipeline using Masked Autoencoders (MAE) on large-scale satellite imagery corpus; achieved SOTA results on downstream object detection tasks with significantly reduced labeled data requirements; deployed distributed training infrastructure.

Agentic System for Autonomous Inspection *(Python, ROS2, cloud IoT platforms, LangChain)*
Built autonomous inspection system combining CV perception, LLM-based task planning, and multi-modal reasoning; deployed on cloud edge infrastructure with real-time telemetry and remote model updates.

Real-Time Edge CV for Retail Inventory *(Python, TensorRT, TensorFlow Lite, Android)*
Deployed optimized object detection models on large-scale mobile device fleet achieving sub-100ms latency; designed hybrid cloud/edge architecture for continuous model improvement from production data.

CERTIFICATIONS

AWS Certified Machine Learning – Specialty • AWS Certified AI Practitioner • AWS Certified Security – Specialty • AWS Certified Data Analytics – Specialty • AWS Certified Database – Specialty • AWS Certified Machine Learning Engineer – Associate • AWS Certified Data Engineer – Associate • AWS Certified Solutions Architect – Associate • AWS Certified Developer – Associate • CompTIA Security+