Ramraj Velmurugan

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AI Systems Architect · Production Agentic Platforms · LLM Orchestration at Scale

SUMMARY

Designed and shipped Marmot — Komodo Health's flagship AI agent platform and the best-in-class offering in healthcare analytics — from prototype to 12 enterprise customers in 7 months. Expert in multi-agent orchestration, LLM evaluation at scale, and production Claude-powered systems. A decade of zero-to-one products with quantified impact.

Featured Project: Marmot — Production AI Analytics Agent Platform

Platform type: Multi-agent orchestration system; NL-to-SQL + analysis agents + independent review agent

Scale: 12 enterprise pharma customers · 330M+ patient records · $15MM ARR (100MM+ in pipeline)

Harness Architecture: Agent/Tool management layer · CAS virtual file system · Pluggable context engineering

Evals: Custom e2e benchmarking framework measuring hallucination rate, SQL accuracy, insight quality

Data Layer: Tenant-isolated Snowflake/Databricks envs · Built-in data governance · SOTA query optimization

Impact: Authored +50% of core systems; Reduced insight turnaround from weeks to minutes; restructured entire org around the platform

EXPERIENCE

Director, Labs → Chief Architect · Komodo Health · SF *May 2025 – Present*

- Architected and productionalized Marmot, a multi-agent AI Analyst platform built on Claude, going from prototype to 12 enterprise healthcare customers in 7 months — $15MM ARR with $100MM+ in pipeline.
- In-prod migration from **Single agent → Agent Swarm** on a virtual Content Addressable Storage (CAS) filesystem, creating a new paradigm of AI Analyst systems.
- Authored 30+ versions of the core system prompt and created a Claude Code **system prompt compiler**
- Designed novel **context editing and context engineering** systems before Anthropic released their flavors
- Built an in-house **multi-LLM framework** that had full parity to all OpenAI, Anthropic and Gemini features.
- Authored an e2e **LLM-as-judge eval framework**: custom benchmarks measuring SQL accuracy, claims-data fidelity, and analytical quality across diverse healthcare use cases (oncology, MS, rare disease LOT analysis).
- Designed and shipped Agent/MCP management layer with enterprise-grade tenant provisioning, role-based access, and versioned tool registries — enabling safe multi-tenant agent deployment in regulated healthcare environments.
- Part of 4-member leadership committee reporting to CEO, overseeing all engineering and product decisions at Komodo; entire org restructured around Marmot's AI-native platform model.
- Achieved SOC 2 Type 1 compliance for the AI platform; provisional patent on core architectural innovations.

Engineering Manager, Compute · Komodo Health · SF *Dec 2024 – May 2025*

- Led 6-member team managing enterprise “MapLab” workspaces and 1,000+ Snowflake accounts.
- Designed and released a highly available underwriting API providing sub-second random OLAP access to 10+ TB of healthcare claims records — $5MM+ ARR.

Engineering Manager, Office of the CTO · Komodo Health · India *Apr 2023 – Dec 2024*

- Guided all data-related architectural decisions across the organization from the Office of the CTO.
- Built Genie — a no-code analytics tool with full SQL expressivity, used by 100+ analysts for the majority of their work. Estimated $50MM+ indirect ARR.

Staff Software Engineer → Senior SWE → Tech Lead · Komodo Health *Oct 2019 – Mar 2023*

- Built Universal Cohort Creator — a central petabyte-scale data serving API powering every product at Komodo, with a de novo multi-engine SQL query builder featuring SOTA query optimization.
- Created Prism (2020 flagship, $20MM+ ARR) — complex healthcare cohort dashboards with no comparable product in the market; architected Serenity, which transformed internal analytics and inspired a full product roadmap shift.

- Spun up the core data interface team from scratch; scaled platform from 10 TB to multi-petabyte, multi-product, dynamically materialized architecture.

Data Scientist · Komodo Health · NYC *Jan 2018 – Oct 2019*

- Full-stack data scientist: prototyped, built, and tech-led Serenity from zero to commercial product with $20MM+ ARR.
- Developed tree-based ML models for entity classification at scale; built internal data visualization tools over terabytes of claims data.

Fellow · Insight Data Science · NYC *Sep – Dec 2017*

- Built TweetMap.live: ingested 18 million tweets from Hurricane Irma, extracted geolocation from unstructured text, and visualized real-time disaster data on a map — a production NLP + geospatial pipeline.

Graduate Research Assistant · UT Southwestern Medical Center · Dallas *2009 – 2017*

- 8 years of computational + biology research: 3D super-resolution microscopy data processing, multidimensional imaging analysis, and custom ML pipelines for biomedical image data at scale.
- Published 13 peer-reviewed papers (819+ citations); co-authored in Nature Methods, Molecular Cancer Therapeutics, and Journal of Autoimmunity.

OTHER TECHNICAL SKILLS

AI/Agent Systems: Multi-agent orchestration, prompt engineering, agent harness design, LLM evaluation & benchmarking, RAG, NL-to-SQL, Claude/Sonnet API

Infrastructure & Data: Snowflake, Databricks, AWS, distributed OLAP systems, petabyte-scale data pipelines

ML & Research: Supervised/tree-based ML, synthetic data generation, model evaluation frameworks, quantitative benchmarking, scientific computing

EDUCATION

PhD, Biomedical Engineering · UT Southwestern Medical Center, Dallas *2009 – 2017*

MSc, Molecular Biology · Université de Montréal, Canada *2008*

BTech, Industrial Biotechnology · Anna University, India *2004 – 2008*

SELECT PUBLICATIONS (819+ CITATIONS)

- Arora HS,...Velmurugan R,... et al. A mechanistic neural network model predicts both potency and toxicity of antimicrobial combination therapies. npj Drug Discovery. 2026. Accepted.
- Sage D, …Velmurugan R, … et al. Super-resolution fight club: assessment of 2D and 3D single-molecule localization microscopy software. Nature Methods. 2019. [392 citations]
- Velmurugan R, Challa DK, Ram S, Ober RJ, Ward ES. Macrophage-mediated trogocytosis leads to death of therapeutic antibody-opsonized tumor cells. Molecular Cancer Therapeutics. 2016. [115 citations]
- Challa DK, Velmurugan R, Ober RJ, Ward ES. FcRn: From Molecular Interactions to Regulation of IgG Pharmacokinetics and Functions. Fc Receptors. 2014. [115 citations]
- Lin D, …Velmurugan R, … et al. A two-stage method for automated detection of ring-like endosomes in fluorescent microscopy images. PLoS One 2019.