Mohan **Krishnamoorthy, PhD**

Technology Leader · Decision Guidance · Strategic Advisor · AI Fluent Builder

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Technology leader and R&D specialist with over 15 years in applied AI, optimization and decision science. Leads engineering teams and advises startup founders, turning complex, uncertain problems into decisions people can act on, using AI tools to work faster without cutting corners on quality.

Areas of Interest

Algorithm Engineering; Machine Learning & Optimization; Decision Science; Responsible AI; Human-AI Orchestration; Scientific Computing

Experience

Synod IntelliCare — *Toronto, ON*

Chief Technology Officer & Founding Engineer — *04/2026–09/2026*

- Used AI coding assistants across a FastAPI/Python and React/TypeScript stack to ship features about 30% faster, while maintaining quality through peer review and automated checks.
- Took a healthcare AI fairness-auditing platform from design to production on AWS (EC2, RDS, S3, IAM) in a few weeks, benchmarking bias against Canadian census data.
- Secured accelerator and research partnerships with the Vector Institute and Sheridan College, strengthening investor and academic credibility.
- Led a 5-person engineering team across backend, infrastructure and frontend, establishing SRS gap analysis reviews, task tracking and cross-functional syncs.
- Set architecture and security direction, protecting patient data with OAuth2/PKCE authentication, RBAC and audit logging.
- Shaped company strategy, product positioning and go-to-market priorities with the executive team.

Self-employed — *Greater Toronto Area, ON*

Consultant & Strategic Advisor — *11/2025–Present*

- Built an AI portfolio allocation model using mathematical programming and Monte Carlo simulation, validated through backtesting and forward testing on 10 years of market data.
- Built budgeting models that identify where to spend and where to cut, reducing planned costs by about 15%.
- Use AI assistants to turn a founder's nuanced question into a working model in days instead of weeks, then pressure test it on real-world scenarios.
- Advise founders directly, translating decision math into recommendations they can act on with confidence.

University of Ottawa — *Ottawa, ON*

Researcher — *09/2024–09/2025*

- Designed a context-sensitive Human-AI orchestration framework assigning optimal collaboration modes (HITL, HOTL, HITLFE, HOOTL) by decision criticality and latitude.
- Applied a 4C model (Communication, Coordination, Cooperation, Collaboration) to allocate responsibility between people and AI, reducing automation bias in high-stakes work.

Self-employed — *Greater Toronto Area, ON*

Consultant — *10/2023–09/2024*

- Built mathematical programming models for workforce staffing optimization, reducing overtime and idle time for a services client.

Argonne National Laboratory — *Lemont, IL*

Postdoctoral Appointee, then Research Consultant — *10/2018–06/2023*

- Built MÆSTRO, an open-source stochastic trust-region solver that fits Monte Carlo simulations to experimental data using active machine learning, replacing blind trust with verifiable local approximations.
- Built and published Apprentice and Outer Optimization, packages for surrogate modeling and automated weight tuning in high-energy physics simulations.
- Packaged methods into an HPC workflow adopted for derivative-free stochastic optimization problems.

George Mason University — *Fairfax, VA*

Graduate Research Assistant, PhD Candidate — *2013–2018*

- Developed SODA, a stochastic optimization algorithm based on deterministic approximations, for control settings in large manufacturing service networks under stochastic feasibility constraints.

National Institute of Standards and Technology (NIST) — *Gaithersburg, MD*

Guest Researcher — *2015–2017*

- Built FactoryOptima, a web-based prototype for composing, optimizing and trade-off analysis of manufacturing service networks from a reusable model repository.

Los Alamos National Laboratory — *Los Alamos, NM*

Research Assistant, then Research Technologist — *07/2008–06/2012*

- Built bioinformatics tools (Tree Viewer, Pruner, Decorator) for Influenza sequence annotation, designed the underlying sequence database schema, and redesigned the HIV project website using an MVC framework and web services.

Education

Ph.D., Computer Science, George Mason University, Fairfax, VA, USA — *2012–2018*

Education (continued)

Master of Science, Computer Science, Rochester Institute of Technology, Rochester, NY, USA *2007–2010*
Bachelor of Engineering, Computer Engineering, Mumbai University, Mumbai, INDIA *2003–2007*

Software Packages

MÆSTRO (Multi-fidelity Adaptive Ensemble Stochastic Trust Region Optimization) *DOC CODE*

Open-source solver that tunes slow, noisy computer simulations until they match real experiment data. It builds a simple stand-in for the simulation as it goes and checks each step against it, so results can be verified rather than trusted blindly. It repeats until the fit is good enough.

Apprentice *DOC CODE*

Open-source tool that builds fast, simple formulas to stand in for slow, costly simulations. Because the formulas are quick to run, they can be optimized quickly.

Outer Optimization *CODE*

Open-source tool that decides how much weight each piece of data deserves when tuning a model. It sets the weights automatically instead of by experience and intuition, so results are reached efficiently and are less subjective.

SODA (Stochastic Optimization based on Deterministic Approximations) *CODE*

Open-source method that finds the best control settings for large manufacturing networks where outcomes are uncertain. It swaps the uncertain parts for simple estimates so answers arrive quickly, while staying within required limits.

FactoryOptima *PAPER*

Web prototype where manufacturing engineers build, optimize and compare factory designs. It draws on a reusable library of performance models and shows the trade-offs between options.

Selected Publications

BROOD: Bilevel and Robust Optimization and Outlier Detection for Efficient Tuning of High-Energy Physics Event Generators *PAPER*

W. Wang, **M. Krishnamoorthy**, J. Muller, S. Mrenna, H. Schulz, X. Ju, S. Leyffer, Z. Marshall. *SciPost Physics*, 2022.

Stochastic Decision Optimization based on Deterministic Approximations of Processes described as Closed-form Arithmetic Simulation *PAPER*

M. Krishnamoorthy, A. Brodsky, D. Menascé. *Journal of Decision Systems*, 2018. Conference version received the Best Paper Award at IFIP WG 8.3 Decision Support Systems, 2018.

Practical algorithms for multivariate rational approximation *PAPER*

A. Austin, **M. Krishnamoorthy**, S. Leyffer, S. Mrenna, J. Muller, H. Schulz. *Computer Physics Communications*, 2020.

Factory optima: a web-based system for composition and analysis of manufacturing service networks based on a reusable model repository *PAPER*

A. Brodsky, M. O. Nachawati, **M. Krishnamoorthy**, W. Z. Bernstein, D. A. Menascé. *International Journal of Computer Integrated Manufacturing*, 2019.

Apprentice for Event Generator Tuning *PAPER*

M. Krishnamoorthy, H. Schulz, X. Ju, W. Wang, S. Leyffer, Z. Marshall, S. Mrenna, J. Muller, J. B. Kowalkowski. *25th International Conference on Computing in High-Energy and Nuclear Physics (CHEP)*, 2021.

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