

Monica Spisar, PhD

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EXPERIENCE

Software engineer | Machine learning engineer @ Recurse Center, USA

2021 & 2024

Participated in two full sessions (3 months each) of RC's self-directed learning retreat for software engineers.

2024 - Built neural networks from scratch. Wrote about the design of deep neural networks. Evaluated ML models, including CNNs, GANs, transformers. Basics of mechanistic interpretability of LLMs for the transformer architecture. Learned Rust. Wrote about Rust memory management. Read Designing Data-Intensive Applications (Kleppmann).
2021 - Learned Go. Built a ray tracing engine. Worked through Python for Data and Computer Science - MIT 6.000, Computer System Engineering - MIT 6.033. Read Code: The hidden language of computer hardware and software (Petzold). Translated my research, data science, and scientific computing skills to backend software engineering.

Software engineer | Data engineer @ Lantern, USA

2022 - 2024

Member of a technical team responsible for delivering a distributed service to millions of concurrent users.

Data engineering & analytics - Designed and built a streaming data pipeline, migrated a data warehouse: reduced data storage and processing costs by 50%. Instrumented a large, complex code base to emit observability and privacy-respecting usage data, accelerating outage recovery. Created dashboards to support developer, infrastructure, business, and client services teams' requirements. Designed efficient, cost effective data warehouse queries.

Backend & Infra - Code for core services. Configured, deployed services to cloud providers. Monitored performance. Worked with Go, Python, Rust, GCP, Docker, Terraform, OpenTelemetry, Superset, Big Query, Honeycomb, Datadog, Tailscale. Participated in hiring and onboarding. Supported internal adherence to data privacy commitments.

Portfolio Manager / Scientific Liaison @ University of Oxford, UK

2019 - 2021

Built and oversaw delivery of a \$1.2MM bioscience portfolio focused on longevity interventions: scouted, scoped projects. Delivered >50 research proposals in under 6 months. Led grant funding process: Developed funding guidelines, award process protocols, engaged expert reviewers, authored summary materials for Advisory Board. Managed a complex mix of disparate advisory board objectives. Drafted original research proposals for sister portfolios under the funding umbrella. Mentored new team members. Enabled exceptional partners to make inroads on drug discovery for longevity medicines. Additional details: monicaspisar.com/posts/hedging-bets-longevity.

COO @ Mineral Deposit Research Unit, University of British Columbia, Canada

2013 - 2015

Co-led strategy for research and training initiatives, sponsorships, fundraising. Led operations, finance (budget O(\$MM)), core team. Upgraded operations with transparent, intuitive systems to support a distributed research team. Board liaison. Resolved friction points between industry expectations and institutional inertia. Planned and executed a unit reorganization to increase impact and operational effectiveness. Designed and delivered training programs. Redesigning MDRU's information systems. Safety protocols for remote international fieldwork expeditions.

Program Manager & Industry Grants Officer @ University of British Columbia, Canada

2011 - 2013

Targeting MD/PhDs, delivered a program for cross-disciplinary training and development of entrepreneurial skills. A key outcome: the founding of a 3D tissue printing startup, now a thriving company - Aspect Biosystems. Subsequently oversaw Industry grants (university-wide). Negotiated 200+ industry-academia agreements annually, working within the University-Industry Liaison Office, in close coordination with UBC Legal and Finance.

Founder/Director @ Little Stars Child Development Center, Canada

2010 - 2014

Founded an early childhood education center. Trained educators to deliver a bespoke curriculum. Directed operations.

Research engineer | Data scientist @ Kardium (Employee #16), Canada

2008 - 2011

Device delivery guidance - Led deployment imaging for a class III medical device for transcatheter mitral valve repair. Integrated multiple medical imaging modalities to meet requirements for accurate catheter delivery guidance.

Product R&D - Led device performance characterization (computer simulations, lab), preclinical trial design, initial clinical evaluation for a class II device for sternal closure. Product research: observed coronary artery bypass surgeries and cath lab procedures, worked closely with expert clinicians to define specs (performance and UX).

Patents - 8888791, 9700363: Surgical instrument and method for tensioning and securing a flexible suture

Participated in hiring processes, onboarding. The team grew to >30 people during my tenure; we worked on a highly effective consensus model for R&D and hiring decisions.

EDUCATION + RESEARCH TRAINING

Postdoctoral Research Scientist @ Sorbonne University, France

Led research on high resolution ultrasound imaging of angiogenesis. Computer simulations of small particle dynamics in microscopic blood vessels. Designed and built a microfluidics vascular flow prototype for high resolution ultrasound imaging. Mentored doctoral students.

PhD, Biomedical Engineering - Medical Imaging, University of Michigan, USA

Thesis - Optoacoustic detector arrays for medical imaging applications.

Thesis research - Designed, built, tested a laser-based ultrasound imaging system with novel detection technology. Met clinical requirements for imaging sensitivity and resolution for a catheter-based imaging device. Built the optical system and tuning electronics. Wrote custom signal capture, processing, and image reconstruction software. Work focused on subnanometer control of effective optical path length across a synthetic array detector. Improved sensitivity by 10x. Mentored an undergraduate assistant. Presented results at conferences.

Pre-thesis research - Small scintillation (gamma) camera for breast imaging. Used statistical image reconstruction methods to identify optimal detector configuration. Customized Monte Carlo photon transport simulation software (in C) to include parallel processing. Built and evaluated a prototype gamma camera.

Courses (select) - MAT: linear algebra, statistics; EECS: digital signal processing and analysis; NERS: physics of medical imaging (nuclear imaging); BME: medical imaging systems (radiography/CT, ultrasound, MRI/fMRI), medical imaging lab*; Neurosci: neurophysiology.

Teaching - BME510 Medical Imaging Lab - TA

BSc, Physics, University of Toronto, Canada

Courses - classical mechanics, electricity & magnetism, thermal physics, quantum physics, electromagnetic theory, statistical mechanics, condensed matter physics, optics, laser physics, relativistic electrodynamics, nuclear and particle physics, high energy physics; calculus, multivariable calculus, linear algebra, analysis, ordinary differential equations, partial differential equations, complex analysis, statistics; medical imaging.

PEER-REVIEWED PUBLICATIONS

Google Scholar | ResearchGate

PERSONAL BLOG *samples from <https://monicaspizar.com>*

Designing neural networks | Building a longevity bioscience portfolio | Picture perfect: AI + medical imaging | OpenTelemetry Collectors for all | Rust: Memory management | Mainstreaming longevity

SOFTWARE SKILLS

Machine learning & data science: PyTorch, NumPy, SciPy, LangChain, LangFuse, end-to-end ML pipeline development
Data & observability: PostgreSQL, Redis, BigQuery, Rockset, OpenTelemetry, Looker, Honeycomb, Datadog, Grafana
Languages: Python, Go, Rust, SQL, TypeScript/JavaScript | Frameworks: React, Node/Next.js, OpenAPI
Infra: Docker, Terraform | Cloud: GCP, AWS | Dev tools: Git, Bash | AI code assistants: Cursor + Claude, GitHub Copilot

SOFTWARE PROJECTS *samples from <https://github.com/msyvr>*

Neural network, from scratch | Monte Carlo-optimized agent | OpenTelemetry Collector with custom exporter