Karthik Suresh

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Core Skills

ML, DL & Modeling	LLM Agents (LangChain), RAG, Generative Models, Anomaly Detection, Predictive Modeling, Adaptive Experimentation & Bayesian Optimization	$\geq$ 5 yrs
Real time inference & MLOps	MLFlow, Tensorboard, Git, ONNX	$\geq$ 3 yrs
Programming & Data Processing	Python, PyTorch, TensorFlow, scikit-learn, SQL, C/C++	$\geq$ 7 yrs
Distributed Computing	SLURM, OSG (HPC), PySpark (Distributed Data Processing)	$\geq$ 6 yrs
Deployment & Agile Tools	Docker, Singularity, GitHub Projects	$\geq$ 5 yrs
Data Visualization	Matplotlib, Seaborn, Plotly, D3.js	$\geq$ 6 yrs
Web Development	Flask, Django, FastAPI, Streamlit	$\geq$ 3 yrs
AWS cloud	SageMaker, Bedrock	$\geq$ 1 yr

Professional Experience

Postdoctoral Research Associate — September 2023 – Present
College of William and Mary — *Williamsburg, VA, USA*

- **AID2E** – AI assisted Distributed Detector Design Optimization for EIC.
  - Built a scalable, distributed optimization service for ∼$100M detector design at the Electron Ion Collider, delivering real-time design inference tools that enabled projected savings of ∼$3M for national lab physicists.
- **RAG4EIC** – Retrieval Augmented Generation for EIC — arXiv:2205.09185 & Interactive App
  - Built a modular **LLM-based RAG platform** with grounded answers, citation integrity, and real-time evaluation using RAGAS and Uncertainty Quantification, achieving ∼80% accuracy in the first such system in Nuclear Physics.

Graduate Researcher — October 2018 – September 2023
University of Regina — *Regina, SK, Canada*

- **AI-assisted Detector Design Optimization** for ECCE — arXiv:2205.09185 & Interactive App
  - Designed and deployed cost-efficient ML optimization pipelines for an $11.5M tracker (saving $1.5M), with real-time Pareto exploration, 3D visualization, and scalable, production-grade workflows through the $1.4M AID2E project.
- **Computer vision for Particle Identification** – Built a **real-time CNN classifier** for photon–neutron detection and enhanced sensor calibration to improve system accuracy and reliability.
- **Partial Wave Analysis** – Built scalable **Big Data pipelines** and applied **Bayesian modeling** to extract insights from noisy sensor data in the $40M **GlueX** experiment, enabling the most precise `ds-ratio` measurement.

Education

PhD, Hybrid Meson Spectroscopy
University of Regina, Oct 2018 – Sep 2023
[Thesis]

M.Sc, Physics
Central Univ. of Karnataka, Aug 2016 – Jun 2018
[Thesis]

B.Sc, Physics
University of Madras, Aug 2013 – May 2016

Other Projects

LLM/ML Hackathon Platform Development & Operations — 2022–2025
ePIC Hackathon, AI4EIC Hackathon & Vibe coding hackathon

- Built scalable **hackathon platforms** with OAuth2 leaderboards and real-time result pipelines for AI4EIC and ePIC workshops.
- Designed and led the first **vibe coding hackathon** in nuclear physics, driving data generation and **ML benchmarking pipeline** setup.

Track Reconstruction using Neural Network — June 2018
D. Samuel and K. Suresh 2018 JINST 13 P10035

- Designed a **neural network** for track reconstruction from noisy multi-sensor data, achieving **60% higher accuracy** vs. traditional methods under high-noise conditions.