Karthik Sairam

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PROFESSIONAL SUMMARY

ML Engineer with a research-driven Master's degree and publications in NLP. Proven ability to build and deploy novel neuro-symbolic and LLM-based systems from concept to completion.

DevOps Specialist skilled in cloud infrastructure and MLOps. Architected and automated CI/CD pipelines and monitoring solutions that improved operational efficiency by over 30%.

EDUCATION

University of Colorado Boulder   August 2023 - May 2025
Master of Science in Computer Science   *GPA: 3.94/4*
- Thesis: Exploring argumentative structures for domain adaptation in conversation prediction tasks (NLP,AI)
- Relevant Coursework: Natural Language Processing, **Advanced Topics in Neuro-Symbolic NLP**, Advanced Topics in **Computational Lexical Semantics**, Probability Statistics in CS

PES University   August 2019 - May 2023
*Bachelor of Technology in Computer Science, **Specialization in Network and Cyber Security***   *GPA: 8.96/10*

SKILLS

ML/NLP: TensorFlow, Keras, **Hugging Face Transformers**, LangChain, LLMs, **RAG**, **Agentic Systems**, Graph Classification, NetworkX, Data Annotation & Analysis
Programming & Scripting: Python, C/C++, SQL, Linux, Streamlit
Systems & Databases: Git, Elastic Search, MongoDB, PostgreSQL, Monitoring
Cloud & DevOps: AWS (S3, EC2), Docker, Kubernetes, Jenkins, Ansible, Infrastructure as Code

EXPERIENCE

Machine Learning Intern   June 2025 - Sep 2025
Cambium Assessment
- Co-authored a paper on the impact of an NLP-based writing tool on student revision patterns, accepted for presentation at the AIME Conference at NCME 2025.
- Engineered the core data processing pipeline and developed a novel classification algorithm to categorize student writing edits for the study.

DevOps Intern   January 2023 - June 2023
Sprinklr
- Developed Python-based automation for data processing pipelines and implemented Infrastructure as Code (IaC) using Ansible for 100+ AWS S3 buckets and MongoDB, improving MLOps efficiency by 30%
- Architected and implemented automated Elastic Search monitoring solutions and CI/CD pipelines using Python and Jenkins, increasing NOC team efficiency by 30% and significantly reducing manual intervention.
- Engineered automated health checks and real-time monitoring dashboards, enhancing deployment reliability by 40% and reducing incident response time by 25%

Graduate Teaching Assistant (CSCI 3753: Operating Systems)   January 2024 - May 2024
University of Colorado Boulder
- Led technical instruction for 30+ CS students in core operating systems concepts, resulting in a 15% improvement in average project grades compared to previous semesters

Research Intern   August 2022 - December 2022
Center for Information Security Forensics and Cyber Resilience
- Conducted an extensive feasibility study on integrating Blockchain for optimizing HealthCare 4.0 and drafted a literature review paper titled "Blockchain and Security in Healthcare: A Systematic Review"

Undergraduate Teaching Assistant (Applied Cryptography)   August 2022 - December 2022
PES University
- Organized and led Capture The Flag (CTF) competitions, fostering hands-on learning and practical skill development.

Projects

AI Research Assistant: A Multi-Document Agentic RAG System   October 2025
- Engineered a sophisticated reasoning agent with autonomous multi-tool RAG capabilities, enabling it to dynamically select and synthesize information across multiple documents to deliver complex, comparative insights.

Chat with My Research: A Conversational RAG Application   October 2025
- Built and deployed an end-to-end conversational AI application using Streamlit and LangChain, leveraging a RAG pipeline with Google's Gemini model to provide interactive, factually-grounded Q&A on technical research.

Food Hazard Detection: A Neuro-Symbolic Approach   August 2024 - December 2024
- Developed a neuro-symbolic food hazard detection model leveraging **LLMs** (Llama-3.1-8B) achieving **5x improvement** in classification precision and **3x in recall** than the BERT baseline.
- Engineered a novel graph-based classification system using ConceptNet and custom knowledge graphs, reducing **concept drift by 60%** while improving hazard detection **accuracy by 15%**

Multimodal Emotion Cause Analysis in Conversations   September 2023 - December 2023
- Designed and implemented deep learning architecture combining **LSTM** networks and BERT-based transformers for emotion causality detection.
- Engineered and optimized multimodal feature extraction pipeline and model architecture using **TensorFlow** and **Keras**, achieving 47% improvement in training accuracy while maintaining inference latency.

Comparative analysis of contextual word embeddings (Independent Study)   August 2024 - December 2024
- Developed a comparative analysis of contextual word embeddings for a low-resourced language using Python, **mBERT, Word-2-Vec, and FastText**, achieving up to 94% F1-score in classification while demonstrating the benefits of contextual embeddings over traditional methods.

Leadership Experience

President   May 2024 - May 2025
American Association of Engineers of Indian Origin   *University of Colorado Boulder*
- Fostered an interdisciplinary mindset by launching an innovative 'Research Speaker Series,' creating a platform for students to engage directly with cutting-edge academic research across different domains.
- Enhanced student networking opportunities by orchestrating 7 academic and professional events, demonstrating strong communication and teamwork skills through collaborative initiatives with industry leaders like Apple.

Publications

- "Paraphrase Generation and Deep Learning Models for Paraphrase Detection in a Low-Resourced Language: Kannada", Advances in Data-Driven Computing and Intelligent Systems (ADCIS 2023), Goa, India (**Link**)

- "Paraphrase Detection in a Low Resourced Language: Kannada" 8th International Conference for Convergence in Technology (I2CT), Pune, India (**Link**)