# Akshay BALLAL

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## SUMMARY

Versatile AI Engineer with a background in developing deep learning models and using AI in products. I have authored two open source libraries, out of which one has over 250,000 downloads with 500 stars on GitHub. I am pursuing an MSc. in Artificial Intelligence and Engineering Systems at Eindhoven University of Technology and have six years of prior industry experience. I have extensive expertise in machine learning, software development, and engineering.

## EDUCATION

### EINDHOVEN UNIVERSITY OF TECHNOLOGY, NETHERLANDS                    *2023 - Present*
MSc. ARTIFICIAL INTELLIGENCE AND ENGINEERING SYSTEMS
• ML Team Lead at Serpentine AI - research group developing AI models for brain signal processing.

### BIRLA INSTITUTE OF TECHNOLOGY, MESRA                               *2013-2017*
BACHELOR OF ENGINEERING - MECHANCIAL ENGINEERING

## WORK EXPERIENCE

### ASML, NETHERLANDS                              *November 2024 - Present (9 months)*
MACHINE LEARNING INTERN

• Employed Deep Learning Models on optical sensor data to predict KPIs for metrology.

• Provided uncertainty estimation with Bayesian Inference methods to make the model more robust.

• Developed Denoising Diffusion Models resulting in 93% accuracy in process drift prediction.

• Implemented Mechanistic Interpretability techniques like Sparse Autoencoders and Post-hoc XAI like GradCam.

### FABHEADS AUTOMATION, INDIA

CHIEF PRODUCT OFFICER                           *December 2019 - July 2023 (3.5 years)*

• Spearheaded product strategy contributing to the successful launch of innovative products and features.

• Established customer feedback loops, enabling continuous iteration and measurable product improvements.

• Directed cross-functional software and hardware teams to ensure the timely delivery of high-quality products.

• Co-inventor of 7 patents in the fields of Additive Manufacturing and Composites.

HEAD, ENGINEERING                              *July 2017 - December 2019 (2.5 years)*
• Joined the startup as the first founding employee.

• Pioneered the development of Asia's first carbon fiber 3D printer by leading a team of 10 engineers.

• Built backend for the slicer in Django with tool-path optimizations, resulting in 20% faster prints than other slicers.

## PROJECTS

### ARTIFICIAL INTELLIGENCE MOTOR IMAGERY                 *September 2023 - July 2025*
• Developed a robust deep learning model to predict limb movements from EEG Motor imagery data in real-time.

• Implemented data pipelines to handle real-time data with filtering and buffering.

• Presented a live demo of the application at Dutch Design Week 2024.

### STARLIGHT SEARCH                                      *February 2025 - Present*
HTTPS://WWW.STARLIGHT-SEARCH.COM
• Built a multi-platform desktop application that indexes local files and allows semantic search across them.

• Used RAG techniques like hybrid search and reranking to improve retrieval quality.

• Used Ollama for local large language models and OpenAI, Gemini API for cloud LLMs.

• Used LanceDB for local vector store and SQLite as a traditional database.

### Lumo Agent

*February 2025 - Present*

- An open-source agentic library and an agent API server that can be used to make intelligent chat applications.
- Implemented CodeAgent architecture where the agent writes Python code to execute tool calls.
- Implemented tracing for agent observability and tracking using LangFuse.
- Deployed the agent as an API on AWS cloud services using EC2 instance.

### EmbedAnything

*February 2024 - Present*

- Author of the library 500 GitHub stars and over 250,000 downloads.
- Provides fast multi-modal embeddings generation.
- I have contributed several models to open-source projects.

## Skills

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|---|---|
| **Programming Languages** | ***Experienced:*** Python \| Typescript \| Rust ***Familiar:*** Matlab \| C++ |
| **DevOps** | Git \| CI/CD Pipelines \| Docker \| LangFuse |
| **MLOps** | HuggingFace \| Weights & Biases |
| **Frameworks & Libraries** | PyTorch \| Tensorflow \| LangChain \| Llamaindex \| LangGraph |
| **Web/Mobile Development** | SvelteKit \| React \| Supabase \| FastAPI \| Cloudflare |
| **Languages** | ***Fluent:*** English ***Beginner:*** Dutch |