

# Amanuel Mersha

## AI/ML Engineer

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**Summary:** I'm an ML researcher and engineer, specializing in deep learning, applied to vision and NLP problems as I demonstrated throughout my research and professional career. I introduced two memory and compute-efficient deep learning models. Furthermore, I've mastered the techniques of efficiently training models and deploying them with maximum accuracy and throughput. Going forward, I aspire to make meaningful contributions to the industry by advancing theory and building ML-powered systems.

## Work Experience

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### Machine Learning Engineer

07/2023 - Present

**BitzBrain Research** — Addis Ababa, Ethiopia

- Reproduced papers and conducted NLP research on low-resource multilingual datasets.
- Implemented image and text retrieval systems with a multimodal language model, and vector databases.
- Significantly reduced training and deploying cost of language models through innovative techniques.

### Researcher and Lecturer

09/2016 - Present

**Addis Ababa University** — Addis Ababa, Ethiopia

- Developed a student-course analysis tool using graphical models, leading to a complete curriculum transformation.
- Led a team and developed an Activity Planning, Monitoring, and Reporting System to manage over 500 of the university's offices and eliminated the tedious and error-prone paper-based reporting system.
- Made a timetable scheduler using a genetic algorithm to schedule more than 50 courses across our school, ending the subscription cost for commercial software.
- Teach courses - Introduction to Artificial Intelligence, Algorithms and Data Structure, and Web Programming.

### Software Engineer

09/2021 - 09/2023

**Lumos Technologies** — Addis Ababa, Ethiopia

- Assembled a team and produced a school management system that serves over 6,000 students.
- Built a deep learning-based computer vision receipt analyzer and replaced the slow manual procedure.
- Designed and developed system architecture, security, and business logic, and applied front-end integration.

### Founder and Developer

09/2021 - 05/2023

**Sefere App** — Addis Ababa, Ethiopia

- Launched a startup intending to boost the visibility of small businesses through mobile and web apps.
- Implemented a self-improving content-based recommendation and feed ranking system using various ML algorithms.

### Computer Vision and Robotics Engineer

01/2017 - 09/2018

**4Kbots AI and Robotics Lab** — Addis Ababa, Ethiopia

- Built a ROS-based control system for a three-player RoboCup team and won the RoboCup championship.
- Formulated the game strategy and wrote object detection and tracking scripts for a multi-agent system.
- Used SLAM algorithms to construct a central 3D point cloud map that all robots utilize for navigation.

# Technical Projects

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## Science Question and Answering Chatbot | [GitHub Code](#) | July 2023

- A chatbot that answers questions related to scientific inquiries.
- Information Extraction, Retrieval Augmented Generation (RAG), LLM, Rephrasing, and Semantic Search.

## Boosting image retrieval with accurately labeled small data | [Paper](#) | [GitHub Code](#) | December 2023

- A simple image retrieval training method that uses fewer data for better semantic content ranking.
- A 30% average mAP image retrieval recall increase over various models.

# Skills

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- **Programming Languages:** Python, C/C++, C#, JavaScript, TypeScript
- **Machine Learning:** Deep Learning, Content-based Information Retrieval and Extraction, Computer Vision, LLM, LangChain, Reinforcement Learning, Feature Engineering, Optimization, RAG, Recommendation System, Semantic Search, Object segmentation, and tracking
- **ML Frameworks:** PyTorch, TensorFlow, Keras, Lightning, Scikit-learn, Pandas, Gensim, VectorDB, MLFlow, SciPy, ONNX, OpenCV, NLTK, SpaCy, AutoML
- **ML Tools:** TensorBoard, Weight & Biases, Google Cloud Platform (GCP), AWS, Sagemaker, ROS, Gazebo Simulator
- **Databases:** MySQL, MS SQL Server, MongoDB, PostgreSQL, Redis, NoSQL, Vector Databases
- **Web Frameworks:** ReactJs, ASP.NET Core, NodeJs, Django, Flask, FastAPI

# Education

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## MSc in Artificial Intelligence | Addis Ababa University

12/2020 - 07/2023, Addis Ababa, Ethiopia

- Thesis - Reinforcement Learning Based Layer Skipping Vision Transformer for Efficient Inference

## BSc in Artificial Intelligence | Addis Ababa University

09/2011 - 07/2016, Addis Ababa, Ethiopia

- Graduated with Distinction

# Publications

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- **RL-based layer skipping Vision Transformer** | [Paper](#) | [GitHub Code](#) | Vision Transformers: Theory and Applications Workshop at NeurIPS (November 2022)
- **DistillEmb: Distilling word embeddings via contrastive learning** | [Paper](#) | [GitHub Code](#) | Transfer Learning for NLP Workshop at NeurIP (November 2022)
- **Dynamic Transformer Network** | [Paper](#) | [GitHub Code](#) | Workshop on Dynamic Neural Networks at ICML (July 2022)
- **A translation-based approach to morphology learning for low-resource languages** | [Paper](#) | Proceedings of The Fourth Widening Natural Language Processing Workshop (July 2020)
- **Morphology-rich alphasyllabary embeddings** | [Paper](#) | [GitHub Code](#) | Proceedings of the 12th Language Resources and Evaluation Conference (May 2020)