

# AMANUEL AYALEW

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## SUMMARY

Software Engineer with strong experience in backend systems and growing expertise in Machine Learning, with a focus on research-driven development. Experienced in building and improving scalable applications, as well as conducting research on predictive coding-based transformer architectures and quantum machine learning models. Skilled in experimentation, performance analysis, and exploring biologically inspired learning approaches. Passionate about applying machine learning systems in real-world, data-driven environments, particularly in financial systems.

## EDUCATION

### Bachelor of Science in Software Engineering

2021 – 2026

Addis Ababa University (AAiT)

## PROFESSIONAL EXPERIENCE

### Icog Labs

July 2025 – Present

#### AI Engineer Intern

- Conducted research on predictive coding-based transformer architectures as alternatives to backpropagation
- Design and executed experiments using NGC-Learn to evaluate learning efficiency and model behavior
- Explored biologically inspired learning methods for improved interpretability and training efficiency
- Analyzed experimental results and contributed to ongoing research in advanced machine learning systems

### Alet Systems

April 2024 – December 2024

#### Software Engineer

- Tested and validated backend APIs to ensure system reliability and performance
- Contributed to the development of backend features and system improvements
- Debugged and resolved production-level issues in backend systems
- Supported full-stack and mobile application maintenance

## PROJECTS

### Predictive Coding Transformer (Research Project)

- Explored predictive coding-based transformer architectures as an alternative learning paradigm to backpropagation
- Conducted experiments to evaluate convergence behavior, efficiency, and performance
- Investigated biologically inspired approaches for improving interpretability in deep learning systems

### Quantum Variational Circuits for Machine Learning

- Implemented quantum variational circuits (QVCs) for machine learning tasks
- Achieved up to 10× reduction in model parameters while maintaining comparable performance to classical neural networks

## SKILLS

- **Programming:** Python, TypeScript
- **Machine Learning & Data:** PyTorch, scikit-learn, pandas, NumPy
- **Backend & Data Engineering:** REST APIs, PostgreSQL, SQL, Airflow
- **Tools & Technologies:** Git, Linux, Nodejs

## CERTIFICATIONS & ACHIEVEMENTS

Machine Learning Specialization  
Machine Learning Certification – AAiT (2023)

Finalist – A2SV Generative AI for Africa Hackathon (2023)  
Finalist – Reboot the Earth Hackathon (2024)