Mulat Tiruye

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Professional Summary

MSc Computer Engineering student with expertise in High-Performance Computing (HPC), Artificial Intelligence (AI/ML), and Software Engineering. Published researcher with a strong background in developing scalable systems, optimizing machine learning models, and contributing to real-world applications. Passionate about advancing scientific research and creating impactful technologies in artificial intelligence, distributed systems, AI-driven solutions, and cloud computing.

Education

University of Pisa - Pisa, Italy | 09/2023 – Present

MSc in Computer Engineering

- **Relevant Coursework**: Cloud Computing, Intelligent Systems, Advanced Networking, Software Systems Engineering, Distributed Systems, Cybersecurity, Quantum Computing.
- **Focus Areas**: Artificial Intelligence and Machine Learning, HPC & Networking, AI-Driven Hardware Acceleration, Cloud Infrastructure, And Software Engineering.

SUTD & Chang Gung University - Singapore/Taiwan | 09/2021 – 03/2023

Master of Engineering and Science (Dual Degree) in Nano Electronics Engineering and Design

- Dissertation: *Dual Mode Systolic Array-Based Processing Element for CNN Accelerator*
- Graduated with First Class Honors (GPA: 3.75/4)

KIIT University - India | 07/2017 – 08/2021

B. Tech in Electronics and Electrical Engineering

- Graduated with First Class Honors (GPA: 9.22/10)

Skills

- **Programming Languages:** Python, Java, C, C++, CUDA, JavaScript, HTML, CSS.
- **AI & Machine Learning:** PyTorch, TensorFlow, Keras, CNN, DNN, Deep and Machine Learning, Multimodal Learning, Computer Vision.
- **Cloud Computing:** Google Cloud Platform (GCP), AWS, Hadoop, Kubernetes, Docker.
- **Networking:** TCP/IP, DNS, OSPF, VLAN, VPN, network security protocols.
- **Software Development:** REST APIs, distributed systems, microservices architecture.
- **Database Management:** MongoDB, PostgreSQL, MySQL
- **Research & Development Tools:** Git, Jupyter Notebook, OpenCV, MATLAB.
- **Soft Skills:** Leadership, team collaboration, critical research analysis, effective communication, and technical writing.

Research Interests

- **High-Performance Computing (HPC) and Advanced Networking:** Expert in optimizing high-performance distributed systems for scalable AI and federated learning, with a focus on network efficiency (e.g., FED-OPT over high-speed interconnects).
- **Artificial Intelligence and Machine Learning (AI/ML):** Application of cutting-edge AI techniques across deep and machine learning, multimodal learning, computer vision, natural language processing (NLP), federated learning (FL), and deep learning (DL) optimization.
- **Cloud Computing and Distributed Systems:** Development of scalable cloud-based architectures and distributed systems.
- **Software Engineering and AI Integration:** Building robust, secure, and scalable software systems.

Project

Network-Automation System *(In Progress)* | Dec 2024 – Present

- Designing automates network system device provisioning, including automatic creation of configuration files for IP routers using static parameters (IP address, AS number, BGP neighbors).

Mobility Behavior Monitoring | Oct 2024 – Dec 2024

- Developing a software system to monitoring system leveraging smart sensor data to analyze user mobility patterns, detecting anomalous behavior through pressure time-series analysis.
- Applied machine learning algorithms to categorize activity (e.g., gaming, sports) and environment (e.g., slippery, plain) to identify deviations in behavior.

Cybersecurity Bulletin Board System | June 2024 – Sep 2024

- Created a secure communication platform implementing advanced encryption and access control mechanisms.
- Designed using C++ and OpenSSL for enhanced cryptographic performance and reduced vulnerabilities, achieving a 30% reduction in security breaches.

Fire Detection System | Jul 2024 – Sep 2024

- Conducted a comparative analysis of YOLOv7, YOLOv8, and YOLOv11 models for real-time fire detection using a curated dataset of diverse fire scenarios.
- Achieved the highest accuracy of 93% mAP with YOLOv8, balancing inference speed (0.4ms) and computational efficiency (8.1 GFLOPS).

Cloud-Based Letter Counting System | May 2024 – Jul 2024

- Built a scalable system using Hadoop for processing large datasets, reducing computation time by 20%.

Object Recognition Using Yolov5 | Mar 2024 – May 2024

- Developed and optimized a CNN-based object recognition model, improving recognition accuracy by 18%.
- Utilized TensorFlow and PyTorch for training and deploying the model in real-time applications.

Preemptive Scheduler Performance Analysis | Feb 2024 – Mar 2024

- Designed and implemented a preemptive priority scheduler with two queues, ensuring high-priority jobs preempt low-priority ones without resumption.
- Evaluated response times of low-priority jobs across scenarios, including constant interarrival times and exponential interarrival times, while varying system workloads up to 100%.
- Applied techniques such as queue prioritization modeling**,** workload calibration, and response time analysis to optimize system efficiency and ensure robust results.

Database Management System: CineLink Platform | Nov 2023 – Feb 2024

- Created a database management system to handle over 12,000 movies and 10,000 user profiles, optimized with MongoDB and Neo4j.
- Reduced query time by 15% through database indexing and introduced personalized recommendations.

High-Speed PLL Design for AI Applications | Apr 2022 – Jun 2022

- Designed a Phase-Locked Loop (PLL) achieving 155 MHz stability, reducing jitter by 20% for AI hardware integration.
- Simulated and verified PLL performance using LTSPICE, optimizing signal integrity for high-speed interconnects.

Professional Experience and Development Course

Singapore University of Technology and Design | Jun 2022 – Mar 2023

- Engaged students in AI-focused labs, increasing participation by 25%.
- Enhanced model training efficiency by 15% through Python-based preprocessing optimization.

Harvard CS50's Introduction to Artificial Intelligence with Python | 2024

- Explored AI fundamentals, including neural networks, NLP, and TensorFlow.
- Built practical projects in computer vision and machine learning.

Harvard CS50's Introduction to Programming with Python | 2024

- Mastered Python programming, focusing on data structures, algorithms, and APIs.
- Developed hands-on projects showcasing Python's real-world applications.

Deep Learning CNN: Convolutional Neural Networks with Python | Udemy, May 2022 – Jun 2022

- Built and optimized CNN architectures for computer vision using Python.
- Completed practical deep learning projects for real-world tasks.

Convolutional Neural Networks in Python: CNN Computer Vision | Udemy, Mar 2022 – May 2022

- Applied CNN principles to image classification and object detection projects.
- Leveraged Python for hands-on computer vision implementations.

Publication

- **MA Tiruye**, OB Gerba, T.Hui Teo. "A 155 MHz Low-Jitter PLL for Enhanced Signal Integrity in High-Speed Interconnects". IEEE. [2024]
- **M.A. Tiruye**. "Dual Mode Systolic Array-Based Processing Element for CNN Accelerator." Chang Gung University Library, 2023.
- Shi Hui Chua, T. Hui Teo, **Mulat Ayinet Tiruye**, I-Chyn Wey. "Systolic Array-Based Convolutional Neural Network Inference on FPGA". IEEE. [2023]
- Tan Rong Loo, T. Hui Teo, **Mulat Ayinet Tiruye**, I-Chyn Wey (2023). "High-Performance Asynchronous CNN Accelerator with Early Termination". IEEE. [2023]

Awards and Scholarships

- **MAECI Scholarship**, Italian Government, August 2023 to July 2025
- **NEED Scholarship**, SUTD, August 2021 to March 2023
- **Betere Science Scholarship**, Ethiopian Government, September 2017 to October 2021

Professional Members

- IEEE (Institute of Electrical and Electronics Engineering) Members (Feb 2024 to Present)
- IEEE Young Professionals (Feb 2024 to Present)

Language Competency

- English: Fluent language
- Italian: Beginner (Intermediate)
- Amharic: Native language

Privacy Statement

- Autorizzo il trattamento dei miei dati personali ai sensi del D. Lgs. 196/2003 e del GDPR (Regolamento UE 2016/679) ai fini della ricerca e selezione del personale.