

Abebe Sendek Feleke

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Profile

Researcher with 2+ years of experience in Reinforcement Learning and adaptive network optimization for 5G/Wi-Fi systems. Background in mechatronics, robotics, and control with hands-on experience in RL algorithms (PPO, DQN, LSTM, Q-Learning) for sequential decision-making under uncertainty, and implementing data-driven NMPC controllers.

Work Experience

Research Assistant · *Leibniz Universität Hannover*, Germany

Apr 2025 – May 2026

- Designed and evaluated RL-based strategies (PPO, LSTM) for adaptive, real-time optimisation of heterogeneous 5G/Wi-Fi communication systems under dynamic, partially observable conditions; formulated as Markov Decision Processes with continuous state/action spaces.
- Researched Multipath QUIC and Access Traffic Steering, Switching, and Splitting (ATSSS) for resilient multi-path decision-making under link uncertainty and failure.
- Developed and evaluated adaptive algorithms for autonomous sequential decision-making in uncertain, dynamic environments.
- Co-authoring research paper: *Multi-Access Traffic Steering in Real-World 5G with Deep Reinforcement Learning* (in preparation).

Research Assistant · *Universität Duisburg-Essen*, Germany

May 2024 – Apr 2025

- Researched RL-based network optimization strategies (PPO, DQN) for intelligent traffic management in 5G/Wi-Fi heterogeneous networks.
- Investigated ATSSS mechanisms for seamless multi-path connectivity and adaptive load balancing.
- Prototyped adaptive algorithms for real-time performance optimization in dynamic wireless environments.

AI Research Engineer · *Omdena*, Remote

Feb 2024 – Apr 2024

- Applied Reinforcement Learning (Q-Learning) to design an adaptive decision-making agent for dynamic real-world environments.
- Engineered an LLM-based conversational system using Retrieval Augmented Generation (RAG), reducing response latency through optimized retrieval pipelines.
- Directed a globally distributed team of 30+ engineers, delivering a production-ready AI system on schedule.

Mechanical Engineer Intern · *Anbessa City Bus Enterprise (ACBE)*, Ethiopia

Feb 2017 – Jul 2017

- Worked in the Automotive Engines Maintenance department
- Conducted Mathematical design of car engine parts washing machines
- Designed 3D CAD models and 2D engineering drawings using SolidWorks

Education

M.Sc. Mechanical Engineering (Mechatronics) · *Universität Duisburg-Essen*, Germany

2019 – 2022

Relevant coursework: Control theory, vision-based control, robotics, kinematics, system optimization, diagnosis & prognosis.

Thesis: **Evaluation of different machine learning approaches and time series prediction strategies for dynamical system models in model predictive control.** Conducted a systematic benchmarking study of NARX, LSTM, Bi-LSTM, and GRU neural networks for nonlinear dynamical system identification; evaluated multi-step-ahead time series prediction strategies; implemented a Nonlinear Model Predictive Control (NMPC) controller using the best-performing architecture and validated closed-loop performance in MATLAB. Demonstrated the viability

of data-driven neural models as predictive components within a closed-loop control pipeline directly relevant to learning-based and data-driven MPC research.

B.Sc. Mechanical Engineering · *Arba Minch University*, Ethiopia
Thesis: Design and structural analysis of a single-stage gearbox for conveyor drive systems.

2014 – 2018

Research & Project Experience

Multi-Sensor Fusion for Localisation in Dynamic Environments · *Universität Duisburg-Essen*, Jun – Jul 2020
Research Project

- Developed a data-driven optimisation pipeline for GPS localisation accuracy using multi-sensor fusion in uncertain, dynamic conditions.
- Tools:* Kalman filter (sensor fusion), Particle Swarm Optimisation, Python & MATLAB.

Autonomous Plant Care Robot for Greenhouse Applications · *Universität Duisburg-Essen*, Nov 2020 – Feb 2021
Group Project

- Developed a 3-DOF autonomous robot system for automated plant care in greenhouse environments, integrating mechanical design, sensor integration, and embedded control systems.
- Designed and stress-analyzed the robot’s mechanical structure in SolidWorks, including tool carrier (end effector) kinematics for accessing multiple plants on a shelf with varying pot sizes.
- Selected and integrated stepper motors for precise motion control; programmed ultrasonic and time-of-flight sensors using Arduino for plant detection, collision avoidance, and controlled water flow delivery.
- Developed simulation models in MATLAB Simscape to validate mechanical and control system performance before physical implementation.
- Managed collaborative engineering project across mechanical design, embedded programming, and system integration phases.

Articulated Arm Robot · *Universität Duisburg-Essen*, Project

May – Jul 2021

- Designed a 6-DOF articulated robot arm and developed an Android Augmented Reality app to visualize the robot in 3D.
- Tools:* SolidWorks, Blender (FBX/animation), Unity Engine + C# (AR for Android).

AI Financial Planner · *OptimumAI*, Team Project (Remote)

Apr – Jun 2024

- Built an AI-powered financial planning assistant processing user data and market signals to generate personalized investment strategies, deployed on AWS.
- Tools:* Machine Learning, LLM (RAG-based), NLP, Python, AWS.

Technical Skills

Programming	Python, MATLAB, C++, Arduino, ROS, Linux, Git/GitHub, L ^A T _E X
ML / RL	PPO, DQN, LSTM, Bi-LSTM, GRU, NARX, Q-Learning, RAG, Deep Learning
Research Areas	Reinforcement Learning, Network Optimization, Sensor Fusion, NMPC, Robotics, 5G/6G
Design Tools	SolidWorks, MATLAB Simscape, Blender, Unity Engine

Languages

Amharic	Native
English	Fluent
German	Intermediate (B2)

Certifications

- Control of Mobile Robots
- ROS for Beginners: Basics, Motions & OpenCV
- Machine Learning Specialization (Coursera)
- Deep Learning Specialization (Coursera)
- Generative AI with LLMs (Coursera)