

EBASA TEMESGEN

Ph.D. Student in Computer Science

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SUMMARY

Third year Ph.D. candidate in Computer Science with a background in Electrical Engineering and Robotics. Research spans Robotics, Computer Vision, and Planning, and Machine Learning.

SKILLS

Programming Languages: C, C++, Python, MATLAB, Java

Frameworks/Tools: TensorFlow, PyTorch, NumPy ROS, ROS2, Git, Linux, Gazebo, Solidworks, CAD, Siemens NX

Areas of Expertise: Digital Signal Processing, Machine Learning, Computer Vision, Robotics

EDUCATION

Ph.D. in Computer Science

University of Minnesota

May 2027 (Expected)

Minneapolis, Minnesota

M.S. in Computer Science

University of Minnesota

Dec 2024

Minneapolis, Minnesota

B.S. in Electrical and Computer Engineering

Addis Ababa University

May 2020

Addis Ababa, Ethiopia

RESEARCH EXPERIENCE

Robotic Autonomy, Vision and Reinforcement Learning

2022-2024

- Currently designing multi-agent systems with Large Language Models (LLMs) to enhance collaborative decision-making and task allocation in dynamic environments.
- Built and deployed Multi-Agent Reinforcement Learning (MARL) models, leveraging computer vision and deep learning techniques to enhance decision-making in autonomous systems.
- Led a team working on Multi-Agent robot systems, implementing MARL for 10 robots in a test environment, improving coordination and task efficiency through automated learning
- Conducted research on Kinovo Gen3 7DoF robots for histotripsy research, focusing on robotic precision, buoyancy compensation, with ROS 2
- Implemented Open AI's clip-based Vision-Language Model navigation for autonomous robots, improving path planning and scene understanding through the application of computer vision and deep learning algorithms
- Integrated and optimized sensor fusion algorithms for IMUs, depth sensors, and stereo cameras, enabling real-time pose estimation and tracking.
- Developed ORB-SLAM 3-based navigation for the Boston Dynamics Spot robot for real-time mapping and trajectory planning in indoor environments
- Implemented a deep learning-based visual odometry method inspired by joint depth-pose learning without PoseNet, enhancing motion estimation for outdoor environment and validating it on custom collected data
- Applied Real-Time Kinematic (RTK) positioning to correct errors in satellite navigation (GNSS) systems for precise localization.
- **Tools Used:** *pytorch, Ros 2, Ros 1, Spot Robot, Turtlebots3, Kinova Robot, Stereo Camera, SLAM, sensor fusion, pose regression*

Drill Fault Detection and Autonomy

2023-2024

- Worked with a team at **NASA Ames Research Center** to analyze and understand drill data for fault detection and mitigation to enhance mission-critical operations in extreme environments
- Mentored and advised masters student on on project planning and development of software for drill fault detection using time-frequency and percussive frequency features
- **Tools Used:** *NumPy, Python, C, C++*

Federated Learning	2023-2024
<ul style="list-style-type: none"> Developed a distributed system for federated learning to predict traffic flow, achieving a 10% reduction in prediction error over existing state of the art baselines Designed and optimized APIs for scalable communication between clients in a federated learning framework, ensuring robust data pipelines and efficient integration of ML models Tools Used: <i>pytorch, Flwr.ai, Wandbi, Performance Measurement System (PeMS) Data Source, Graph Clustering</i> 	

PROFESSIONAL EXPERIENCE

NASA L'Space Mission Concept Academy	Sep 2024 – Present
<i>Lunar Exploration Mission - Workforce Preparation</i>	<i>Team Role: Electrical Engineer</i>
<ul style="list-style-type: none"> Virtual NASA workforce preparation academy dedicated to teaching space mission concept formulation through science, engineering, programmatic, and teaming skills Demonstrated knowledge by following the NASA mission life cycle up to the Preliminary Design Review for a robotic space mission Led the development of the Electrical Power subsystem, focusing on power requirements and efficiency for mission success Performed trade studies on subsystem architectures to determine optimal solutions meeting mission constraints for mass, power, cost, and schedule Completed CAD design of the Electrical subsystem using Siemens NX, ensuring compatibility with interfaces across other subsystems 	

Lead QA, Safaricom	Jan 2022 – Aug 2022
<i>Sales and Distribution (S&D) and PreTups System Integration</i>	
<ul style="list-style-type: none"> Led a team of developers, managing the integration of Sales and Distribution (S&D) and Nokia's PreTups systems, for seamless platform interoperability Integrated the S&D system with enterprise systems such as ERP, CRM, and E-Top Up, optimizing end-to-end business processes for increased operational efficiency Trained and onboarded over 100 users on the first deployment of the S&D system, enhancing user adoption and system usability 	

University of Auckland, Empathic Computing Lab	Apr 2021 – Dec 2021
<i>Research Intern</i>	<i>Auckland, New Zealand</i>
<ul style="list-style-type: none"> Applied deep learning models for emotion recognition using physiological data (PPG, EEG), and implemented a real-time deep learning model using PyTorch for emotion recognition, improving model prediction accuracy by 15% over the baseline Contributed to the development of APIs and database integration for time-series data analysis, ensuring seamless data pipelines for ML model training and deployment 	

University of Michigan	Jul 2019 – Aug 2020
<i>Undergraduate Research Assistant</i>	
<ul style="list-style-type: none"> Analyzed bottlenecks in Reinforcement Learning, focusing on key aspects like execution time, cache hit rate, CPU core usage, and overall memory usage Performed comparative performance analysis of different Reinforcement Learning algorithms, examining their efficiency on various CPU architectures using multiple frameworks and libraries 	

PUBLICATIONS	CHECK OUT MY GOOGLE SCHOLAR PROFILE
International Workshop on Autonomous Agents and Multi-Agent Systems for Space Applications (MASSpace)	2024
Understanding Drill Data for Autonomous Application	
IEEE IROS International Conference on Intelligent Robots and Systems	2023
Autonomy and Dignity for Elderly Using Socially Assistive Technologies	
ACM IUI 27th International Conference on Intelligent User Interfaces	2022
Emotion recognition in conversations using brain and physiological signals	