BRUK GEBREGZIABHER

Robotics Engineer

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EXPERIENCE

Advanced Navigation Engineer

Neura Robotics

June 2025 – Current Germany

- Autonomous Navigation system for Bimanual Mobile Robots.
- Vision Language Action Models for Bimanual Mobile Robots, from data collection to model architect
- isaaclab/isaacsim/ACT/OpenPI/SmolVLA/XVLA/Gr00t

Senior Robotics Engineer - VSLAM

Biel Glasses

Oct 2023 – May 2025 Barcelona, Spain

- Directed the creation of a Visual Simultaneous Localization and Mapping (VSLAM) system, enhancing precise navigation in complex outdoor settings. The system utilizes 6 Degrees of Freedom (6DOF) for accurate tracking.
- Developed a multi-sensor fusion strategy that combines stereo vision, IMUs, and GPS to enhance localization and mapping accuracy.
- Configured NVIDIA Jetson platforms (XAVIER and ORIN) for efficient on-device AI processing, essential for dynamic adaptation in variable environments.
- Achieved significant enhancements in the system's performance across varied and unpredictable terrains, boosting operational reliability and safety.

Robotics Engineer - Autonomy Engineer

TAVIL IND, S.A.U.

Feb 2023 – Sep 2023 Girona, Spain

- Developed comprehensive autonomy solutions for Automated Mobile Robots (forklifts)
- Integrated multiple sensing technologies including LiDAR, IMU, and odometry to create robust perception systems tailored for industrial forklifts
- Implemented Dynamic Window Approach (DWA) and Model Predictive Path Integral (MPPI) control strategies to optimize real-time path planning and obstacle avoidance
- Engineered communication protocols using CANopen.
- Collaborated with cross-functional teams to scale up robotic system deployments

Robotics Engineer - Sensor Fusion

Romb Technologies

Jul 2022 – Oct 2022 Zagreb, Croatia

- Specialized in multi-sensor fusion to significantly enhance the accuracy of the localization system for industrial forklifts, achieving sub-centimeter level noise reduction.
- Utilized a combination of LiDAR, IMU, and odometry data to develop a sophisticated sensor fusion algorithm that minimized the impact of environmental noise and sensor errors.
- This refined localization capability allowed for the implementation of more precise control algorithms, notably reducing jerk and improving the smoothness of forklift operations, leading to safer and more efficient maneuvers in industrial settings.

EDUCATION

M.Sc. **Intelligent Field Robotic Systems** (Specialization in Multi-Robot Systems and Aerial Robotics) - 8.86/10 CGPA

University of Girona & University of Zagreb

- **Coursework**: Computer Vision, Manipulation, Probabilistic Robotics, Task/Motion Planning, Machine Learning, Aerial Robotics, Multi Robot Systems.
- Thesis pre-print Multi Object Tracking for Predictive Collision Avoidance

B.Sc. **Computer Science and Engineering** - 3.93/4.0 CGPA

Mekelle Institute of Technology - Mekelle University

- **Coursework**: Embedded Systems, C, C+, Micro-controllers, Analog/Digital Electronics, OS, Algebra, Calculus I&II, Trigonometry, Matrices, numerical Methods, Probability Theory, Discrete Mathematics,

PROJECTS

VTOL Tilt-Rotor Personal Project

- Developed a VTOL (Vertical Take-Off and Landing) tilt-rotor aircraft leveraging ArduPilot and UAV components, designed to explore advanced aerial capabilities.
- ROS2-based autonomy flight stack, enhancing autonomous navigation and decision-making capabilities across various flight modes.

Multi-object Tracking and Predictive Collision Avoidance

- Utilized 2D LiDAR data to continuously track and estimate the position and velocity of nearby objects in real-time, critical for predicting potential collision paths.
- Developed a predictive model to simulate future trajectories of dynamic objects, enhancing autonomous robots' capability to execute real-time avoidance maneuvers.
- Validated the system's efficacy through industrial tests, with results showcased in an online video demo.
- Demo and Industrial tests

Autonomous Landing of a UAV on a Docking Station

- Implemented a comprehensive autonomous landing solution using Behavior Trees and Twin Delayed DDPG (TD3) for adaptive response to environmental changes.
- Structured decision flow with Behavior Trees for enhanced fault tolerance and dynamic adjustment during landing.
- Presentation with demo

Swarm Formation Control in Multi-Robot Systems

- Developed algorithms for dynamic formation control in a swarm of robots, allowing for adaptive formations based on environmental and communication cues.
- Tested and demonstrated the algorithms using the Stage simulator, showcasing advanced coordination and adaptability.
- Video demo

Internship - Task Planning

Girona Underwater Robotics Lab (CIRS)

Jun 2022 – Aug 2022 Girona, Spain

- Developed AI-driven task planning algorithms using PDDL and Behaviour trees. specifically tailored for underwater robot with dual robotic arms designed for precise underwater metal inspection tasks.
- This initiative significantly enhanced the AUV's ability to perform complex inspection tasks autonomously, contributing to safer and more effective underwater surveys.

CEO

Signal Technologies

Oct 2019 – May 2022 Mekelle, Ethiopia

- Software development startup CEO, team lead,

Computer Science Lecturer

Mekelle University

Jul 2017 – Jun 2021 Mekelle, Ethiopia

- Taught advanced courses in computer science, mentoring over 200 students and guiding 20+ projects.

Senior Software Engineer Team Lead

Swarm Cybersecurity

Apr 2019 – Apr 2021 Mekelle, Ethiopia

- PaaS development for national digital identity management system

TECHNICAL SKILLS

- **Machine Learning and Vision Algorithms:** Proficient with OWL-ViT (Open World Localization - Vision Transformer) for zero-shot text-conditioned object detection, enhancing robotic perception and interaction in dynamic environments. Skilled with YOLO for real-time object detection, CNNs for image classification, and SAM (Segment Anything Model) for detailed image segmentation.
- **SLAM Technologies:** Advanced use of RTABMAP, CARTOGRAPHER, AMCL, ISAAC-VSLAM, KISS-ICP for precise localization and mapping in dynamic environments. Proficient with techniques and optimizations for robust SLAM performance.
- **Planning:** Proficient in motion planning algorithms including RRT, PRM, Dijkstra's, A*, Theta*, MoveIt, and cuRob frameworks for dynamic environment navigation.
- **Design & Simulation:** Expertise in Gazebo, Blender with Phobos, Fusion 360 for CAD modeling, design, and simulations.
- **Programming & Software:** Proficient in C++, Python, TensorRT, nav2 frameworks for optimized robotics applications.
- **Control:** Expert in implementing control systems using MATLAB, Simulink, and ROS 1&2; skilled in PID control, Model Predictive Control (MPC), Pure Pursuit algorithms, and DWA for dynamic and precise control in robotics.

PERSONAL SKILLS

- Demonstrated leadership in technology teams, driving projects from concept to deployment.
- Proven ability to work under pressure, leading teams in fast-paced environments.
- Independent problem-solver with a proactive approach to overcoming technical challenges.

Pose EKF SLAM

- Developed an Extended Kalman Filter (EKF) based SLAM system, utilizing pose graph optimization techniques to enhance accuracy while significantly reducing computational demands.
- Implemented in a real-world environment to demonstrate the system's capability in mapping and localization with limited computational resources.
- Video demo

Autonomous Mobile Robot with Adaptive Manipulation

- Developed an adaptive motion planning system for a mobile robot equipped with a manipulator arm, enabling object pickup from the ground using a Real-Sense stereo camera.
- Integrated manipulation, SLAM, and task planning to enhance the robot's ability to navigate and interact with dynamic environments.
- Successfully deployed and tested the system in simulated environments.

Design and Implementation of Fixed Wing Unmanned Aerial Vehicle

- Implemented an autonomous control system capable of way-point navigation, automatic takeoff, and landing, using GPS and inertial navigation systems for precise positioning.

Autonomous Humanoid Robot for Soccer Cup Competition

- Designed and programmed an autonomous humanoid robot to participate in a soccer competition, focusing on robust locomotion, ball detection, and goal-scoring algorithms.
- Implemented advanced vision processing techniques to enable the robot to accurately detect and track the soccer ball and opponents in real-time.
- Developed and integrated strategic decision-making algorithms to enable the robot to autonomously navigate the field, make tactical decisions, and execute precise movements.

Meninet Platform

- PaaS(Platform as a Service) NodeJS, MongoDB, FastJS, expressJS

PUBLICATIONS

VQA-driven Event Maps for Assistive Navigation for People with Low Vision in Urban Environments

- 2025 IEEE International Conference on Robotics and Automation (ICRA)

Forecast-Driven MPC for Decentralized Multi-Robot Collision Avoidance

- International Conference on Intelligent Robotics and Control Engineering (IRCE)

Multi Object Tracking for Predictive Collision Avoidance

- preprint

REFEREES

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