

MOHAMMED BAJHAW

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Professional Summary

Mechatronics Engineering Graduate with hands-on project experience in robotics, autonomous systems, and embedded artificial intelligence. A fast learner with a strong ability to rapidly adapt to new technologies and turn them into practical robotic prototypes. Focuses on integrating ROS 2, SLAM, sensor fusion, and computer vision solutions into NVIDIA Jetson, Raspberry Pi, and simulation environments. Develops autonomous navigation, obstacle avoidance, and robot control systems using C++, Python, MATLAB/Simulink, and Gazebo. Builds reliable, field-oriented prototypes with LiDAR, RGB/thermal cameras, and Edge AI.

Technical Skills

Autonomous and Electric Mobility: ROS 1 / ROS 2, SLAM, Navigation, Obstacle Avoidance, Path Planning, PID Control, TurtleBot3, Unitree Go2 Robot, DJI Drones.

Embedded Systems and Development: Nvidia Jetson (AGX Orin, NX, TX2), Raspberry Pi 5, Pixhawk, STM32, ESP32, CAN-Bus, LoRa, IoT, Sensor Integration, Linux, Prototyping, Electronic Circuit Board Maintenance.

Artificial Intelligence and Computer Vision: Sensor Fusion (Thermal + RGB), EKF (Extended Kalman Filter), Edge AI, Edge Computing, yolov11, OpenCV, Local LLMs, SLAM Calibration, 3D LiDAR, Raspberry Pi Camera, PyTorch.

Engineering Tools: MATLAB/Simulink, SolidWorks, Gazebo, Rviz, Proteus, CAD/CAM for CNC, Inkscape, JSCut, Cura, G-code.

Programming and Development: C++, Python, Git, GitHub, VS Code, Jupyter Notebook, Google Colab.

Education

Firat University, Elazig, Turkey | Bachelor's Degree in Mechatronics Engineering

2021 – 2026

Publications

- **PV-STAM: Velocity-Aware Attention for Mapless Deep Reinforcement Learning Navigation in Dynamic Environments** Applied Sciences 2026, 16(18), 9083 (MDPI) | A peer-reviewed and published research paper delivering obstacle-motion awareness from single-frame 2D LiDAR, validated in simulation and on a TurtleBot3.
- **Drift-Resilient Indoor 3D Mapping in GPS-Denied Environments Using RKO-LIO with Velodyne–Pixhawk Integration in ROS 2** ICHORA 2026 (IEEE Conference) | A peer-reviewed and published research paper delivering high-precision 3D mapping and localization in GPS-denied indoor environments through Velodyne LiDAR and Pixhawk integration in ROS 2.
- **MSR-SLAM: A Multi-Stage Map-Refinement Framework for Reliable LiDAR–Inertial SLAM in GPS-Denied Environments** Applied Sciences 2026 | A peer-reviewed and published research paper introducing a multi-stage refinement pipeline that improves the reliability of LiDAR-inertial SLAM in GPS-denied environments.

Professional Experience

Volunteer Researcher | RAI Laboratory, Firat University

09/2025 – 08/2026

- Conducted research on autonomous disaster management using heterogeneous robots as part of the TÜBİTAK 1001 project.
- Tested SLAM algorithms in GPS-denied environments; managed drone navigation, control, and comprehensive data-collection processes.
- Designed 3D CAD models for sensor mounting and provided technical support for publishing academic papers.

Robotics Research Intern | RAI Laboratory, Firat University

07/2025 – 09/2025

- Focused on the hardware and software integration of the DJI Matrice 350 RTK flight platform with NVIDIA Jetson Orin NX.
- Conducted simulation and field testing of SLAM algorithms using Velodyne LiDAR and RealSense cameras.

Projects

Advanced Robotics Research (TÜBİTAK 1001) – Project Contributor

09/2025 – 08/2026

- Integrated the DJI Matrice 350 RTK drone with the NVIDIA Jetson Orin NX controller via the DJI Payload SDK.
- Performed high-precision 3D mapping and SLAM using LiDAR and Intel RealSense cameras in GPS-denied environments.
- Helped build a dataset of over 20,000 high-quality, disaster-scenario images used to train advanced AI models for detecting disaster victims.

Autonomous Medical Search and Rescue Robot Platform (TÜBİTAK 2209)

02/2026 – 08/2026

- Developed a multimodal rescue robot featuring Cognitive Override and Wake-on-Suspect capabilities on the Jetson TX2 platform to optimize battery life.
- Applied advanced sensor fusion (thermal/RGB cameras) and a bio-radar system to detect vital signs of victims trapped under rubble.
- Deployed a yolov11 victim-detection model on the Jetson TX2 as an FP16 TensorRT engine (17 ms/frame), with thermal-blob gating to suppress false positives.
- Integrated environmental hazard-detection hardware and used LoRa telemetry for long-range data transmission.
- Integrated offline local voice AI (LLM/TTS) to provide medical first-aid guidance before human rescuers arrive.

5-Axis Robotic Arm Modeling and Control

01/2026

- Designed the mechanical structure of a 3-axis robotic arm using SolidWorks CAD software.
- Performed kinematic analysis and applied PID control algorithms to achieve precise movements.
- The system's control logic was validated through MATLAB and Simulink simulations before fabrication. GitHub: github.com/MohammedBajhaw/Robotic-Arm-SolidWorks-Matlab

OA-Drone – Autonomous Cave Exploration and Obstacle Avoidance System (ROS 2)

11/2025

- Developed a ROS 2 Humble, Ignition Gazebo Fortress, and Iris quadrotor-based simulation system for autonomous exploration in GPS-denied caves, tunnels, and mining environments.
- Processed 3D LiDAR data with OctoMap to create a 3D map of the environment; performed collision-free route planning in voxel space using a D* Lite-based planner.
- Integrated frontier-based exploration, safe target selection, look-ahead path tracking, altitude control, stuck/collision detection, and avoidance maneuvers with ROS 2 nodes. GitHub: github.com/MohammedBajhaw/drone-navigation

Other Projects

- **Smart Coffee Brewing Automation:** Used Raspberry Pi and Python (OOP) to automate mechanical processes and relay- and PWM-based servo controls; integrated an LCD interface and remote SSH management. — 06/2025
- **High-Precision CNC Conversion:** Converted an existing 3D printer into a desktop CNC router with stepper motor calibration, spindle control, and G-code processing capabilities. — 03/2025

Certifications and Training

Coursera: Introduction to Automotive Embedded Systems (Colorado Boulder)

Commercial Unmanned Aerial Vehicle Pilot License (UAV-1)

DeepLearning.AI: Advanced Learning Algorithms | Supervised Machine Learning

Udemy: ROS II (Localization, Navigasyon, SLAM)

Drone-Based Terrain Survey and Mapping Training (Elazig, Turkey, 2025)

Languages

Arabic (Native), Turkish (C1), English (B2)