

Rami Kronbi

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RESEARCH PROFILE

Mechatronics engineer focused on real-time robotics and computer vision, with experience across embedded perception, sensor fusion, localization, robotic manipulation, and field-deployed C++/Python systems on NVIDIA Jetson. Research interests include aerial robotics, autonomous inspection, heterogeneous multi-robot systems, and real-time AI deployment.

EDUCATION

Bachelor of Mechatronics Engineering Aug 2021 - Apr 2025
Rafik Hariri University (RHU), Lebanon | CGPA: 4.0/4.0 | Class Valedictorian

RESEARCH & ENGINEERING EXPERIENCE

Embedded Systems & Vision Engineer Aug 2024 - Present
Oreyeon - Coimbra, Portugal (Hybrid)

Develops AI-Vision systems for airport operations and safety.

- Built and optimized a real-time semantic-segmentation pipeline for runway-damage detection, classification, and measurement; deployed PyTorch models with TensorRT on NVIDIA Jetson, increasing GPU utilization from 20% to 85% while sustaining 70 FPS.
- Redesigned Oreyeon's second-generation airport-inspection system (MDUv2) with ML, hardware, and mobile teams; selected cameras and sensors, specified the Jetson compute architecture and mounting design, and improved system accuracy from 75% to 92%.
- Developed performance-critical C++ imaging and measurement pipelines, including camera-calibration refinement, multi-camera stitching, 3D reconstruction, and automatic exposure/white-balance control; achieved 99% measurement consistency and 97% visual-alignment accuracy.
- Led on-site localization R&D at a European airport, evaluating LiDAR, INS, IMU, and GNSS technologies and integrating the selected sensor stack. Fused RTK GNSS, 2D/3D LiDAR, and AHRS data for georeferenced runway-damage mapping and implemented Kalman-based multi-object tracking.
- Developing localization and pose-estimation methods, combining visual-feature matching with RF-broadcast corrections from an in-house GNSS base station
- Investigating camera-embedded IMU data for custom pitch/roll estimation and sensor fusion.
- Building a confidential embedded computer-vision and data system for Lebanese Army airport operations.

Lab Assistant & Teaching Assistant 2022 - 2025
Rafik Hariri University (RHU), Lebanon

- Prepared and supported mechatronics laboratory experiments, guided students through practical sessions, and assisted with teaching and assessments.
- Maintained and troubleshooted laboratory equipment, hardware, and experiment setups.
- Organized RHU robotics competitions, including IEEE Micromouse, and mentored teams for WRO and other competitions, contributing to award-winning results.

Technical Mentor 2026
INJAZ Al-Arab — Company Program

- Mentored two healthcare teams from initial ideas through technical development to working prototypes exhibited at the INJAZ Al-Arab Company Program.
- Guided projects involving a melanoma-detection device and an IoT-connected elderly-care ecosystem combining a wearable bracelet, pillbox, and mobile app for health and well-being monitoring.
- Both teams received awards: Best Community Impact and Best Healthcare Innovation.

SELECTED ROBOTICS & COMPUTER VISION PROJECTS

- Landmine Detection & Extraction Robot (Lebanese Army Initiative)** 2024 - 2025
Developed ROS 2 autonomy stack for a mine-detection rover with a 6-DoF extraction arm, including sensor drivers and calibration, vision and LiDAR perception, localization and sensor fusion, satellite-map georeferencing, path planning, autonomous mission execution, rover-base communications, and test tooling; validated the integrated system with dummy mines during field tests conducted with the Lebanese Armed Forces in Mechref.
- Thermal Super-Resolution** 2025
Adapted an RGB-pretrained IMDN to single-channel thermal imagery using a thermal-specific loss, FLIR ADAS v2, and custom-curated data; achieved 34.2 dB PSNR/0.840 SSIM at $\times 2$, 31.0/0.757 at $\times 3$, and 29.6/0.713 at $\times 4$, then optimized FP16/INT8 inference to ~45 FPS on Jetson AGX Orin.
- Jetson Powered Runway-Inspection UAV (Simulation Project)** 2026 - Ongoing
Developed a runway-inspection UAV simulated prototype running a lightweight YOLOv11 FOD detector onboard at ~30 FPS; trained on online and synthetically generated data, achieved 75–80% model accuracy, and added similarity matching and false-positive filtering for in-flight tests simulating runway conditions.

- **5-inch Carbon-Fiber FPV**

Designed and integrated a 5-inch carbon-fiber UAV; configured and tuned Betaflight PID loops, flight modes, GPS features, and return-to-home behavior; evaluated GPS accuracy, RF link quality, and flight performance under GNSS jamming and IMU/GNSS integration constraints.

2026 - Ongoing

• **Omnisign**

Built a real-time Lebanese Sign Language translator trained on a 300K-image dataset, reaching 95–97% accuracy at ~45 FPS. Shipped mobile, web, and offline embedded deployments and piloted the system in two Beirut coffee shops and one church.

2025 - 2026

• **360° Spherical Stitching for Real Estate**

Built a 360° panorama pipeline with spherical projection, exposure compensation, seam optimization, a real-time viewer, and phone-IMU-assisted alignment for handheld capture.

2025

• **easyPID (Open Source — Arduino Library Manager)**

Published an Arduino Library Manager PID-control library with flexible timing, anti-windup, derivative filtering, state introspection, optional relay autotuning, and AVR-friendly resource use.

2026

• **Emotion Recognition for Children with**

Developed a real-time facial-landmark and CNN emotion-recognition pipeline on Jetson Orin Nano, reaching ~92% development accuracy after combining and cleaning image and video data from CALMED, Kaggle, and other sources; the prototype and concept were later acquired following a Gulf-region competition.

2022 - 2023
- LEADERSHIP & SERVICE
- Lead Technical Organizer

NASA Space Apps - Beirut, Lebanon

• Led technical and logistical mentoring for 250–400 participants annually across four years; developed technical bootcamps using NASA datasets, coordinated a 10- to 15-member volunteer team, and guided participants through problem selection, prototyping, competition requirements, and submission strategy.

• Mentored teams throughout the hackathon lifecycle, contributing to six NASA Global Top 10 placements across three consecutive years.

2021 - 2024

Co-founder & Operations Lead

NASNA - Crisis Support Platform - Beirut, Lebanon

• Led crisis-response operations and volunteer matching for a platform connecting displaced and war-affected people with donors, NGOs, sponsors, and volunteers.

2024 - 2026

Society Lead

Physics & Astronomy Club - Beirut, Lebanon

• Founded and led National Physics Day across four universities; expanded hands-on physics and astronomy activities through double-slit, electrical, and telescope-based experiments; and developed demonstrations for NYU Abu Dhabi astrophysics researcher Mohamad (Moe) Abbas's LAU presentations and Cosmic Dome outreach.

2021 - 2024

AWARDS & RECOGNITION

• **Nazek Hariri Academic Excellence Award**

Graduated as **class valedictorian** with a **4.0/4.0 CGPA**; awarded a 100% master's scholarship.

2025

• **Best Graduating Project —** Rafik Hariri University Engineering Jury

2025

• **NASA Space Apps Lebanon —** Distinctive Team Award

2021

• **World Robot Olympiad (WRO) Future Engineers —** National 2nd Place

2024

• **Disaster Management and Response Engineering (DARE @ LAU) —** 2nd Place

2024

CERTIFICATIONS

• Google Project Management Certification (Google)

2026

• AI Full Stack Development Expert (Forward MENA & OnRamp)

2026

• AI-Powered Full-Stack Development (Forward MENA)

2026

• Python for Everybody (Coursera)

2023

ROBOTICS & PERCEPTION

• Edge AI & Embedded Perception

• Multi-Sensor Fusion (LiDAR/IMU/INS/GNSS)

• Camera Calibration & Panoramic Stitching

• 3D Reconstruction & Measurement

• SLAM, Navigation & Localization

• Robotics Autonomy & Manipulation

• On-Device AI Optimization

TOOLS & LANGUAGES

• Languages: Arabic (Native), English (Fluent)

• Programming: Python, C++

• Vision & AI: PyTorch, OpenCV, TensorRT, CUDA

• Robotics: ROS 2, NVIDIA Jetson, LiDAR, RTK GNSS

• Systems: Linux, Git, Docker, MQTT

• Hardware: Arduino/ESP, Raspberry Pi

• Visualization: WebGL, Three.js