

Kareem Abu Salah

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Education

Duke University, Pratt School of Engineering

Durham, NC

B.S. Mechanical Engineering, A.B. Computer Science, Cultural Anthropology Minor

Expected May 2028

- **GPA: 3.56** | Coursework: Machine Learning, Data Structures & Algorithms (Java), Mechanics of Solids, Circuits & Electronics, Linear Algebra, Probability, Remote Sensing

Work Experience

Embedded & Mechanical Co-op | FaunaLabs (*whale-tag biologging startup*)

Mar 2026–Present

- Qualified the tag enclosure to 20 MPa (2 km), fleet proof pass plus 1,000+ seal fatigue cycles on representative units, zero leaks.
- Held 97% valid-data uptime across the 30-tag fleet by splitting sampling and logging into prioritized FreeRTOS tasks and fixing a Cortex-M7 D-cache/DMA race with a non-cacheable MPU region (dropped frames –90%).
- Designed a galvanic timed-release link that frees the tag within ± 2 hr of its target time.
- Slashed device onboarding 80% (15 to 3 min) with mutual-TLS AWS IoT provisioning, scaling the fleet hands-off.

Test & Battery Engineering Intern | Jordan Int'l Air Cargo & Defense

May–Aug 2025

- Integrated airframe, power, and avionics on 15 fixed-wing UAVs and checked each out to flight-ready.
- Cut Li-ion qualification 40% by automating pack discharge on a custom stand, replacing manual meter-watching.
- Diagnosed 30+ Li-ion failures (e.g., a weak spot-weld raising resistance), cutting downstream scrap 15% via QA fixes.

Drone Lab Intern | HTU AeroSquad

May 2024–Jul 2024

- Cut peak-to-peak gyro oscillation 30% across 26 FPV builds by tuning P and D gains per airframe.
- Replaced ad hoc safety training for 20+ new members with a department-wide SOP I authored.

Project Experience

Founder & Hardware/Firmware Lead | Plantogachi

May 2026–Present

- Built an ESP32-S3 puck that streams soil, light, temperature, and humidity over TLS to a phone app's pixel-art pet.
- Designed a tool-free snap-fit enclosure (2 mm uniform walls); BOM \$32 at prototype volume, \$11 quoted at bulk.
- Tuned the sense-and-sleep duty cycle to a measured 3-week battery run on one charge.
- Identified plant species from one photo at 86% accuracy via PlantNet, paired with a Gemini Vision health check.

Undergraduate Researcher | Duke Cyber-Physical Systems Lab

Mar 2026–Present

- Caught a buck-converter loop instability before layout by simulating 5/12/19 V power rails in LTspice.
- Ran 30+ test flights on three Aurelia X-600 hexacopters as the lab's only trained operator.
- Cut propeller-guard drag 36% in Ansys Fluent by reprofiling the cross-section.
- Time-synced radar, lidar, and depth across three robot platforms over ROS 2 into a dataset the lab's fusion research runs on.

Structures Subsystem Lead | Duke Solar Sail Spacecraft (*Earth Cup, 1 of 50 to STEP 2*)

Mar 2026–Present

- Chose a round M40J tube over a stiffer square for manufacturability and buckling margin, 25% under mass budget.
- Predicted the frame's first bending mode at 27.6 Hz, hand-checked within 4.3%, clearing the 20 Hz floor.
- Selected the node-bond adhesive against ASTM E595 outgassing limits, then defined an 8-cycle TVAC plan.

Structures & Flight-Computer Engineer | Duke SEDS

Sep 2025–Present

- Packed the full avionics stack into a 9-part, jigsaw-keyed chassis that closes on 8 fasteners.
- Sealed the BMP390 barometric sensor in a vented cavity so it reads ambient air while the electronics bay stays isolated.
- Analyzed the chassis to $2\times$ margin against the 9 g launch spec, carrying over unchanged to a future rideshare launch.
- Logged a 28 km GPS altitude profile, delivered to Duke's Nicholas School.

Repass-Rodgers Scholar | Duke University Marine Lab

Dec 2025–Present

- Won a \$5,500 grant (1 of 4 selected) to test whether low-cost sensors can match expensive oceanographic gear.
- Designing MAPPER (reef-mapping drone) and SWARM, a 5-boat mesh tolerant to single-boat loss.

Designer | McRocket

Feb 2026

- Stacked $\pm 0.002''$ tolerances worst-case into a $0.250''/0.254''$ snap-fit, measuring $0.004''$ on the prototype.
- Priced a 6-part ABS toy under \$0.36/unit against the course's \$0.50 cap by eliminating every mold side-action.

Technical Skills

Mechanical & CAD: SolidWorks, Onshape, GD&T, DFM/DFA, FEA (Ansys), CFRP wet layup

Electronics & Firmware: Altium, KiCad, LTspice, STM32, ESP32, Arduino, C/C++, FreeRTOS, JTAG, CAN bus, mbedTLS, AWS IoT, PX4/ArduPilot, MAVLink, Betaflight, oscilloscope, logic analyzer

Software & ML: Python, MATLAB, ROS 2, OpenCV, scikit-learn, Git, Linux

Manufacturing: CNC mill & lathe (G-code), 3D printing (FDM), soldering, laser cutting

Certifications: Pratt Student Shop Safety Certified, FAA Part 107 Remote Pilot Certificate

Awards: 1st Place Overall, FIRST Robotics Competition – Levant Regional (2024)