

Mergen Ulziibayar

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EDUCATION

New York University, Tandon School of Engineering

New York, NY

B.S. in Mechanical Engineering; Expected May 2027

Aug 2023 – Present

Relevant coursework: Machine Design, Mechanics of Materials, Fluid Mechanics, Thermodynamics, Measurement Systems, Automatic Controls

SKILLS

CAD / CAE: SolidWorks, Onshape, CadQuery, CalculiX, gmsh, static and modal FEA, tolerance stack-up, GD&T, DFM

Programming: Python (NumPy, SciPy, Matplotlib), C++, MATLAB, ROS 2, Git, GitHub Actions CI

Analysis & Controls: system identification, LQR / MPC / EKF, Monte Carlo, hand-calc vs. FEA reconciliation, test protocols

Fabrication & Lab: FDM printing, laser cutting, fixtures, TIG fit-up, soldering, Arduino / ESP32, oscilloscope, DMM

EXPERIENCE

NYU CUSP IgNYte Lab

New York, NY

Undergraduate Research Assistant, Urban Environmental Sensing

Dec 2025 – Present, Part-time

- Designed, 3D-printed, and field-deployed **four revisions** of an outdoor air-quality sensor enclosure, integrating gas and particulate sensors, ESP32, GPS, and solar/LiPo power around airflow, rain-path, and service-access constraints.
- Screened a 140 mph wind load with hand calculations and FEA (FoS $\approx$ 5.5); diagnosed a 2.1 V ESP32 brownout and restored 4.1–4.3 V operation by rerouting power.
- Audited field logs to isolate a provisional 22-day unattended window at **95.7% upload success** with no recorded brownouts; built a first-order heat-balance model predicting a 19.4 °C solar rise for the dark box vs. 3.0 °C for a passive shield ([GitHub](#)).

NYU Formula SAE

New York, NY

Suspension & Steering Manufacturing Member

Feb 2026 – Present

- Designed **three FDM-printed tube fit-up fixtures** and prepared 32 waterjet-cut steel tabs for suspension and steering fabrication, holding tube and tab geometry through cutting, fit-up, and TIG tack preparation.

NYU RoboMaster UltraViolet

New York, NY

Design Engineer, Gimbal Sub-Team

Feb 2026 – Present

- Packaged a 78.0 mm launcher wheel and gimbal hardware around a **20.5 mm feed path** in CAD; added M3 retention after a 500 RPM prototype review showed a press fit alone was insufficient.

PROJECTS

Autonomous Racing Systems (F1TENTH) | Python, ROS 2, CalculiX, gmsh, CadQuery | [GitHub](#)

- Redesigned a 6061-T6 LiDAR mast whose 174.7 Hz first bending mode failed a 200 Hz requirement; hand calculation put the new geometry at 330.1 Hz and mesh-converged modal FEA confirmed **285.5 Hz** (three meshes, <1.5% change).
- Identified bicycle-model cornering stiffnesses from simulated telemetry with bounded nonlinear least squares, verified on a held-out replay segment; compared pure pursuit, LQR, constrained MPC, and an EKF, and built a ROS 2 bag-to-telemetry bridge with CI regression captures.

Multicopter Recovery Dynamics | Python, 6-DoF simulation, Monte Carlo, CadQuery | [GitHub](#)

- Locked a **135.7 g** sub-250 g airframe BOM (T/W 3.59) by screening motors, ESC, and battery against a 36.8 A four-motor peak, which rejected the 450 mAh pack.
- Monte Carlo release-recovery sweep found **4.0% recovery** at as-toleranced CG under placeholder torque; a four-motor mixer model with a revised controller predicted 300/300, setting a ≤ 0.5 mm thrust-line offset requirement and a preregistered propulsion-bench gate before any build.

Soft-Actuator Recalibration Study | Python, NumPy, SciPy, research manuscript | [GitHub](#)

- Built pneumatic, fatigue, and sensing simulators and a 2,000-trace dataset split by actuator identity; pressure-volume loop area tracked compliance drift at $r = 0.885$ (actuator-cluster CI 0.853–0.950) on six held-out actuators.
- P-V-triggered recalibration met the pose-error budget with **two calibration events vs. five** for always-on; the manuscript reports a negative lead-time result and a coupling null result alongside the headline.

V-Aid Climbing Tactile Pin Array | SolidWorks, FDM printing, laser cutting, Arduino | [Portfolio](#)

- Owned pin, guide, and clamp design for a **12×12** servo-driven tactile route display; four printed prototypes took early ~60% pin-rise failure to smooth locking across 14 route patterns. Won a **\$2,000 NYU Prototyping Fund** award.

Adaptive Gripper (in progress) | SolidWorks, FDM printing, physical testing | [GitHub](#)

- Manually actuated two-finger gripper with interchangeable rigid and compliant fingers on one printed body; comparison preregistered as 60 interleaved pickup trials over three objects with 27/30 overall and 8/10 per-object acceptance targets and a 100-cycle durability check.

Other public repositories: [MechAudit](#) (Python CLI and CI benchmark that recomputes and audits LLM-generated mechanical-engineering calculations); [Nomad](#) (Next.js research-mapping app over OpenAlex); [segmented-shroud-aeromechanics](#) and [uav-failsafe-composition](#) (measurement-first research designs with provenance tooling); [informal-road-mapping](#) (Sentinel-2 disturbance screening, synthetic-tested).