Quick Start - VTOL Precision Landing Simulator

Single-page guide: run a landing, tune settings, and export results.

Overview

- Simulates precision landings for eVTOL and hybrid VTOL aircraft in confined spaces.
- Uses RTK GNSS (XY), Lidar (Z), optional vision targets (ArUco/AprilTag), and Kalman smoothing.
- Displays a 2D pad view, a lightweight 3D cone trace, core metrics, a 0-100 score, and export options.

Workflow (3 steps)

1) In the sidebar, choose a UAV and optionally a scenario preset, then click Apply Preset.

2) Click Run Playback. Watch the XY plot and 3D cone. The status shows seeking, detected, or locked.

3) Review the Landing Success Score and key metrics. Export CSV, JSON, or ZIP if needed.

Key controls (sidebar)

- UAV Model and Scenario Preset (Apply Preset).
- Sensors: RTK Fix; Use Lidar.
- Vision: backend (ArUco or AprilTag), Marker ID/Size, Camera HFOV (degrees) and resolution, Lock Threshold (pixels), Dwell (frames), Illumination, Blur, Occlusion.
- Kalman XY: q (process noise); R base (GNSS sigma).
- Environment: Wind Gust, GPS Glitch, Beacon Gain (pull to pad when locked).
- Playback: Random Seed, Steps, Frame Speed.

Auto-Tuner

- Set Trials and Seeds, then click Run.
- Review Top Results and click Apply Best Settings (writes the selected values to the sidebar).
- Run Playback again and compare the score and metrics.

Scoring (0-100)

- XY touchdown error (goal <= 0.20 m).
- Vertical speed at touchdown (goal <= 0.5 m/s).
- Cone violation rate (stay within the allowed radius).
- Lock stability in the final 30 percent of the approach.

Export

- CSV: per-frame trace (x_raw, y_raw, x_kf, y_kf, z_agl, detected, locked, px_est).
- JSON: app version, run UUID/time, UAV specs, all parameters, metrics, and a small trace preview.
- ZIP: bundle with trace.csv, runlog.json, and settings_only.json.