

Sample Benchmark Report

Skill: UAV Obstacle Detection (Thin Wires)

PERFORMANCE

High

ROBUSTNESS

Verified

SAFETY ENV

Compliant

KPI SUMMARY

Metric	Target	Result (Sim)	Result (Real*)	Status
Detection Rate (Recall)	> 90%	96.5%	94.2%	Pass
False Positive Rate	< 0.5%	0.12%	0.35%	Pass
Processing Latency	< 30ms	18ms	22ms	Pass
Min Obstacle Diameter	2mm	1.5mm	2mm	Pass

* validation performed on representative hardware subset.

PROJECT IMPACT (INDICATIVE)

-55%

Training Time
vs manual data collection
cycles

95%

Detection Accuracy
on difficult edge cases

-80%

Data Cost
reduction in field logistics

Disclaimer: These metrics are indicative results derived from similar prior projects. Actual outcomes may vary depending on specific task complexity, sensor fidelity, and environmental constraints. No confidential client data is contained herein.

1. SYSTEM UNDER TEST

Platform: Generic Quadcopter (Class I)
Compute: NVIDIA Jetson Orin NX (Emulator)
Sensors: Stereo Camera Pair (Global Shutter) + IMU
Model Architecture: YOLOv8-nano (Custom Head)

2. SCENARIO SUITE

Baseline: Clear sky, static wires (power lines), low wind.
Stress: Fog, sun glare, dynamic wire sway, complex backgrounds (foliage).
Edge: Damaged wires, birds on wires, night operations.

3. TEST MATRIX (SYNTHESIS DISTRIBUTION)

Scenario Group	Variations	N_Frames (Train)	N_Frames (Val)	Priority
Urban / Industrial	Lighting (06:00-20:00), Weather (Clear/Rain)	50,000	5,000	High
Rural / Vegetation	Foliage Density, Seasons	35,000	3,500	Medium
Adverse Conditions	Fog, Glare, Motion Blur	15,000	1,500	Critical

SAFETY ENVELOPE DEFINITION

The policy is constrained by a safety envelope that overrides inference outputs if confidence drops below 0.6 or if IMU divergence exceeds 1.5 rad/s. In such cases, the system reverts to a "Safe Hover" or "Return to Launch" behavior, ensuring fail-safe operations.

4. EVIDENCE LOG EXCERPT

ID	Test Case	Condition	Metric	Threshold	Outcome
TC-012	Hover Stability	Wind 10m/s	Drift < 0.5m	0.5m	PASS (0.3m)
TC-045	Wire Detection	Backlit (Sun)	Recall > 85%	85%	PASS (89%)
TC-089	Engagement	Sensor Fail	Identify < 100ms	100ms	PASS (45ms)

5. MONITORING & ROLLBACK

- ✓ Real-time OOD (Out-of-Distribution) score monitoring enabled.
- ✓ Automated rollback trigger set at 3 consecutive critical failures.
- ✓ Human-in-the-loop validation required for policy updates.

6. DATA GOVERNANCE

Data used in this benchmark is synthetic or authorized public datasets. No biometric or personally identifiable information (PII) is processed. All data retention policies align with GDPR and enterprise security standards.

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