SKYDEV – VIRTUAL ENVIRONMENT FOR DRONE DEVELOPMENT & TESTING

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INTRODUCTION/PROBLEM

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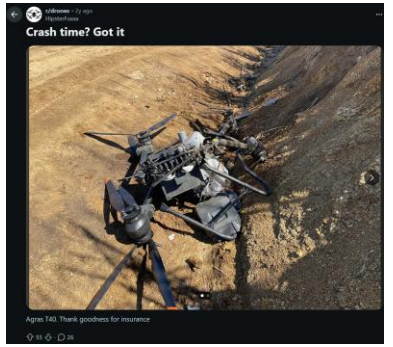
$110K-$250K	12-18 Months	Data Bottleneck	Safety Risks
Upfront cost for prototyping and test cycles, with frequent HW losses from crashes	Typical physical validation timeline, constrained by weather, airfield access, and pilot availability	Real-World aerial data collection is slow, expensive and legally complex – especially for edge cases	Testing GPS off, sensor failure, or collision avoidance in the real world is dangerous and often impossible at scale



Source: https://adigaskell.org/2016/09/28/study-explores-what-makes-drones-crash/drone-crash/
https://www.reddit.com/r/drones/comments/18f1swm/crash_time_got_it/

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A virtual environment for drone development is a key tool for the rapid, safe, and efficient development of autonomous systems. It allows control algorithms, sensors, and artificial intelligence to be tested in realistic conditions without the risk of hardware damage and without the limitations of real-world operations. By simulating a wide range of scenarios, including GNSS-denied environments and emergency situations, it significantly speeds up the development cycle and improves the quality of the final solution.

- Photorealistic environment
- Realistic/User defined physics
- Wide range of possible interfaces
- Cutting edge technology
- Drone swarms
- UAV and AMR co-simulation
- Automatization
- Synthetic data generation

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Simulation Engine

- Photorealistic environment
- Realistic/User defined physics
- SITL/HITL integration
- PX4 integration
- Easy setup
- Cutting edge technology
- Drone swarms
- Independent on Nvidia

Synthetic Data Pipeline

- Auto-generated labeled datasets
- Edge-case scenarios
- Domain randomization

Automation Layer

- Automated orchestration
- CI/CD pipeline integration
- Certification evidence generation

One platform replacing fragmented toolchains – from algorithm design to certification readiness

SKYDEV - ORCHESTRATOR

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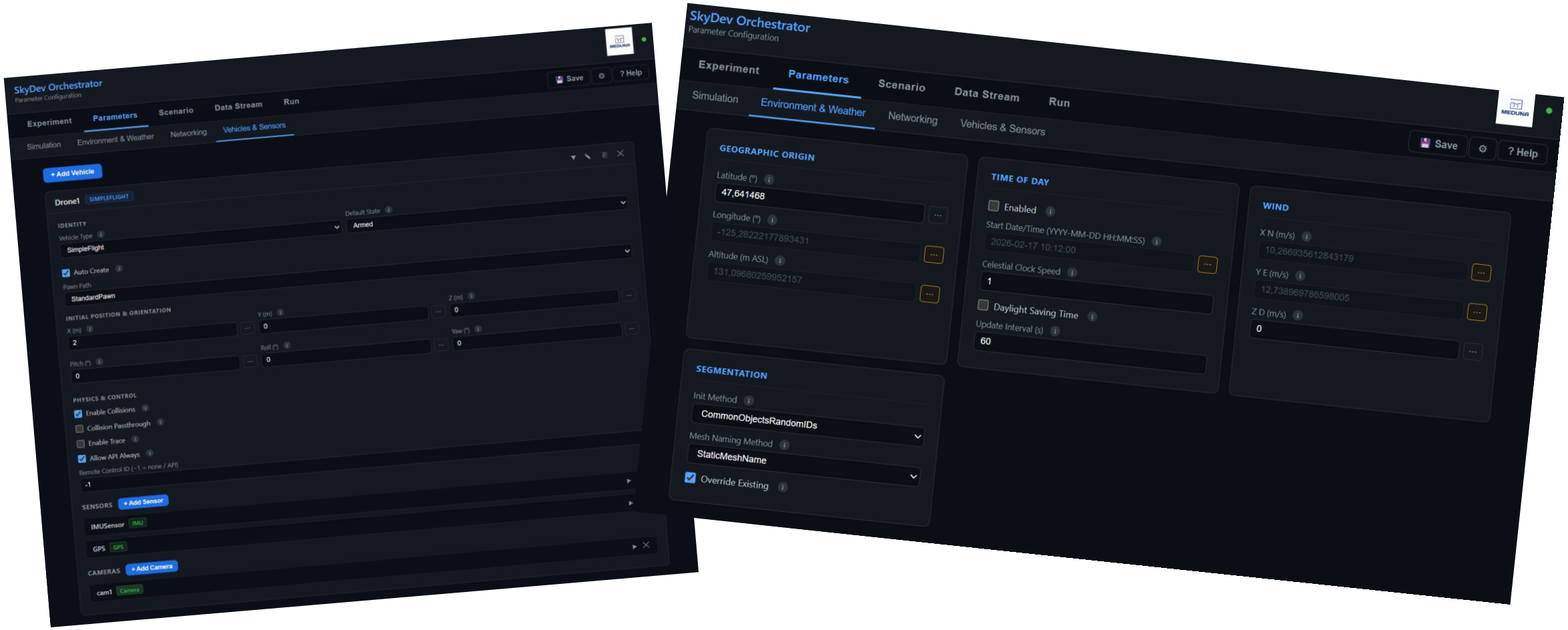
Simple way to set your goal



TIME TO MARKET COMPRESION

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Traditional approach

18 – 24 Months

With SkyDev

10 – 14 Months

Up to 40% faster

Parallel Testing/Development

Run hundreds of scenarios overnight instead of sequential physical testing

No Weather Delays

24/7 Testing regardless of external conditions, airfield availability

Instant Iteration

Change the parameters and validate in minutes, not weeks

COMPARISON TO CURRENT SOLUTIONS

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Simulator	Ease of Use	Physics Fidelity	Physics engine / physical model	GPU Needs	Cost	ROS	HiL / HiTL availability	Sensor integration capability	Key Strength	Link
SkyDev	Easy	Very High	Unreal Engine PhysX + custom physics	High	Free / Paid	✔ ✔ ✔	Yes – HiTL (PX4, MAVLink, ROS2 bridge)	Excellent (vision-focused) – RGB, depth, segmentation, IMU, GPS	Digital twins, synthetic data, Control design, HIL	http://medunatech.de
Gazebo (Ignition / Gazebo Sim)	Medium / Hard	Medium–High	ODE, Bullet, DART, Simbody (selectable)	Medium	Free	✔ ✔ ✔ ✔	Yes – HiL & HiTL (PX4, ArduPilot, ROS2)	Excellent – camera, LiDAR, radar, IMU, GPS; custom plugins	Robotics standard, ROS-first	https://gazebosim.org
Webots	Easy	Medium	ODE (custom fork)	Low–Medium	Free	✔ ✔ ✔	Partial (HiTL via ROS / external HW)	Good – cameras, LiDAR, IMU; limited custom HW realism	Fast onboarding, education	https://cyberbotics.com
CoppeliaSim	Medium	High	Bullet, ODE, Vortex, Newton, MuJoCo	Medium	Free / Paid	✔ ✔ ✔	Yes – HiTL (TCP/IP, ROS, APIs)	Very good – vision, proximity, force, custom sensors via API	Multi-physics, flexibility	https://www.coppeliarobotics.com
AirSim	Medium	Medium	Unreal Engine PhysX + custom vehicle models	High	Free	✔ ✔	Yes – HiTL (PX4, MAVLink)	Excellent (vision-focused) – RGB, depth, segmentation, IMU, GPS	AI, vision	https://github.com/microsoft/AirSim
NVIDIA Isaac Sim/IsaacGym	Hard	Very High	NVIDIA PhysX (GPU-accelerated), USD physics, , Flex	Very High	Free / Paid	✔ ✔ ✔	Yes – HiTL / limited HiL (ROS2 bridge)	Outstanding – photorealistic cameras, LiDAR, radar, RTX sensors	Digital twins, synthetic data	https://developer.nvidia.com/isaac-sim
MATLAB / Simulink (Robotics & UAV Toolboxes)	Easy / Medium	Very High	Simscape Multibody, Aerospace Blockset models	Medium–High	Paid	✔ ✔ ✔	Yes – Full HiL & HiTL (industry-grade)	Excellent (model-based) – IMU, GPS, radar, custom sensor models	Control design, HIL	https://www.mathworks.com/products/simulink.html
Unity Robotics Simulation	Easy / Medium	Medium	NVIDIA PhysX (Unity integration)	Medium–High	Free / Paid	✔ ✔ ✔	Partial (HiTL via ROS/MAVLink)	Very good (visual) – cameras, depth, semantic labels; custom scripts	Perception, ML datasets	https://unity.com/robotics
JSBSim	Hard	Very High	Custom high-fidelity 6-DoF flight dynamics (aero model)	Low	Free	Indirect	Yes – HiL & HiTL (PX4, ArduPilot)	Minimal – no native sensors (external integration only)	Flight dynamics model	https://jsbsim-team.github.io/jsbsim
FlightGear	Medium	High	JSBSim (primary), optional YASim	Medium	Free	Indirect	Yes – HiL & HiTL (PX4, ArduPilot)	Good (aviation) – GPS, IMU, air data, limited perception	UAV & aircraft aerodynamics	https://www.flightgear.org

FURTHER BENEFITS

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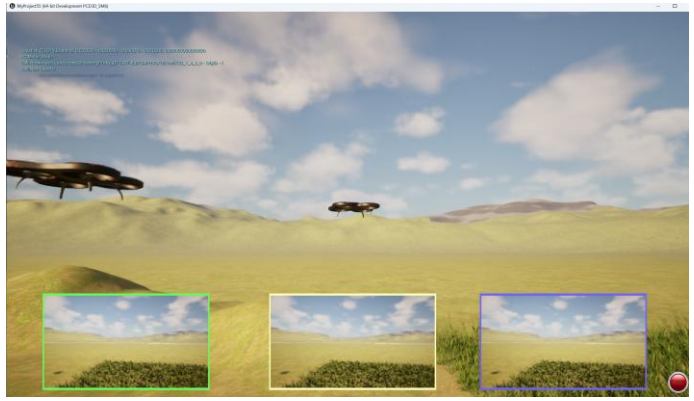
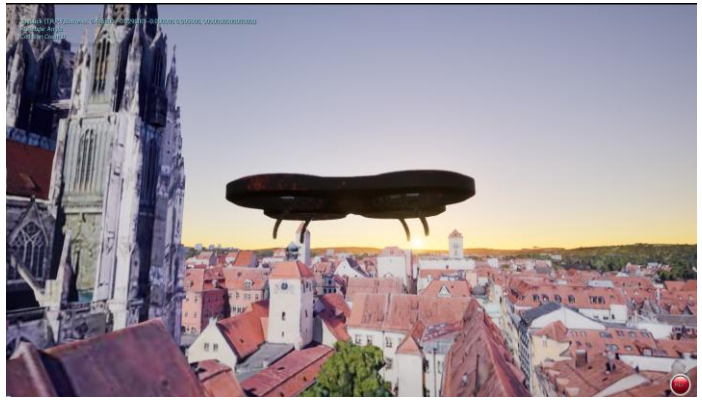
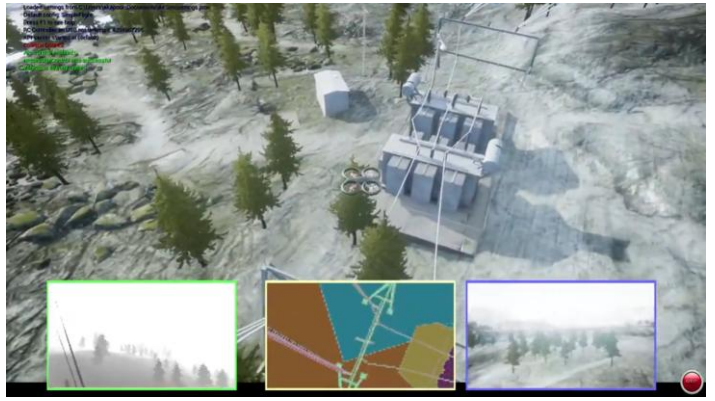
- Enables safe testing of algorithms without the risk of hardware damage
- Significantly reduces development, operating, and retesting costs
- Accelerates development through rapid iteration and automated testing
- Enables simulation of extreme and boundary scenarios that are difficult to implement in real life
- Supports the development and tuning of autonomy, navigation, and AI algorithms without dependence on weather or location
- Facilitates the integration and testing of sensors, GNSS-denied scenarios, and fault conditions
- Ensures reproducible test conditions for validation and comparison of results







COST SAVINGS TRADITIONAL vs. SKYDEV

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Cost Category	Traditional	SkyDev	Cost Savings
Physical prototyping & crashes	$300K - $600K	$150K - $350K	~45%
Flight test operation	$250K - $450K	$130K - $250K	~45%
AI training data acquisition	$200K - $500K	$60K - $180K	~67%
Data labeling and annotation	$120K - $350K	$10K - $50K	~89%
Validation engineering labor	$1200K - $1800K	$800K - $1200K	~33%
Regulatory test evidence	$150K - $300K	$100K - $200K	~33%
Savings in entire dev. phase		**~$350K - $1800K**	**~44%**

Team size: 15–25 engineers, Development cycle: 18–24 months, Autonomous or semi-autonomous UAV, Europe/US engineering salary level

STREAMS

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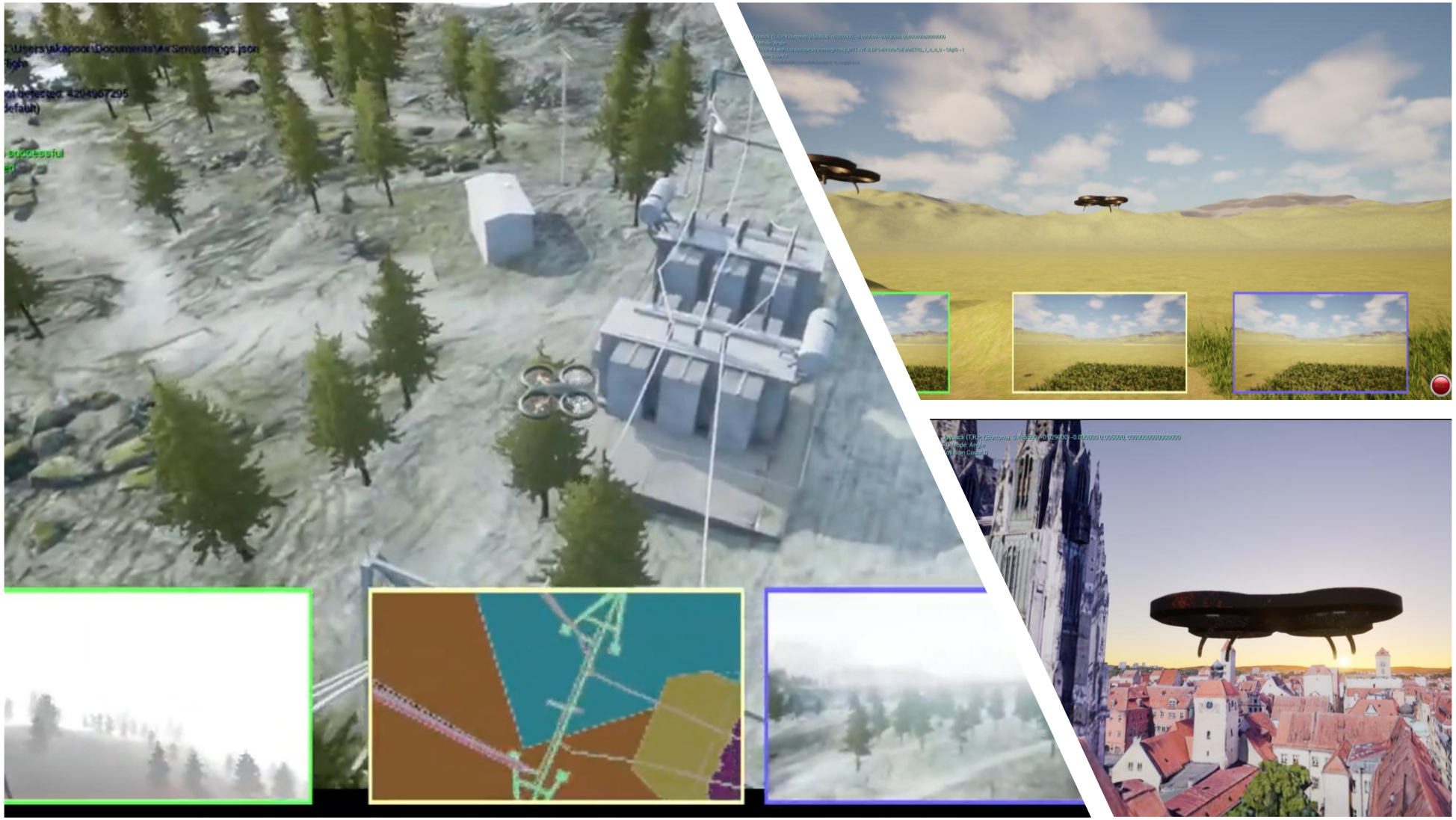

CAMERA NOISE

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TARGET GROUPS I

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- Manufacturers of drones and their components
- Developers of autonomous systems, AI, and computer vision
- Integrators of sensors, communication, and control systems
- Research and academic institutions
- Security and rescue services for scenario training
- Military and defense sector
- Operators of critical infrastructure and industrial sites
- Companies involved in inspection, mapping, and monitoring
- Telecommunications companies testing 5G/edge scenarios
- Certification, testing, and validation organizations

TARGET GROUPS II

Ideal Customer Profile (ICP)

- 60–250 employees
- 15–60 autonomy engineers
- developing AI-enabled drones
- TRL 4–7 products
- preparing certification or scaling
- feel testing cost pain strongly
- lack internal simulation infrastructure
- iterate fast
- buy external tooling

Target Group	Typical Employees (Company)	Drone Engineering Team	Market Position	Drone-Domain Turnover (Annual)	Product / Business Focus	Technical Maturity	VDE Adoption Motivation
Defense & Security Drone OEMs	200 – 10,000+	50 – 800	Tier-1 / Tier-2 defense suppliers, system integrators	$50M – $2B+	Military UAVs, ISR, swarm, tactical systems	Very High	Certification, mission simulation, risk reduction
Enterprise Drone Manufacturers (Industrial OEMs)	40 – 400	10 – 80	Industrial niche leaders, scale-ups	$5M – $150M	Inspection, agriculture, mapping, logistics	High	Reduce flight testing cost & development time
Autonomous Drone Software Companies	15 – 120	10 – 60 (mostly software)	Innovation disruptors, VC startups	$2M – $40M	Autonomy stack, perception AI, navigation	High (software-centric)	AI training, synthetic data, CI/CD testing
Drone Service Platform Companies	20 – 300	3 – 20	Operational service providers	$3M – $80M	Inspection services, delivery operations, surveying	Medium	Mission planning, operator training, optimization
Research Institutes & Aerospace Labs	5 – 150 researchers	5 – 50	Public R&D, innovation labs	€0.5M – €10M program budgets	Research, experimentation	High (research)	Experimentation, algorithm validation
Consumer Drone Manufacturers	100 – 3,000	30 – 300	Mass-market electronics companies	$100M – $3B	Camera drones, hobby UAVs	Very High	Testing automation, cost optimization

THANK YOU FOR YOUR ATTENTION

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