Technical White Paper

Skydio X10D: Small, Smart, Survivable

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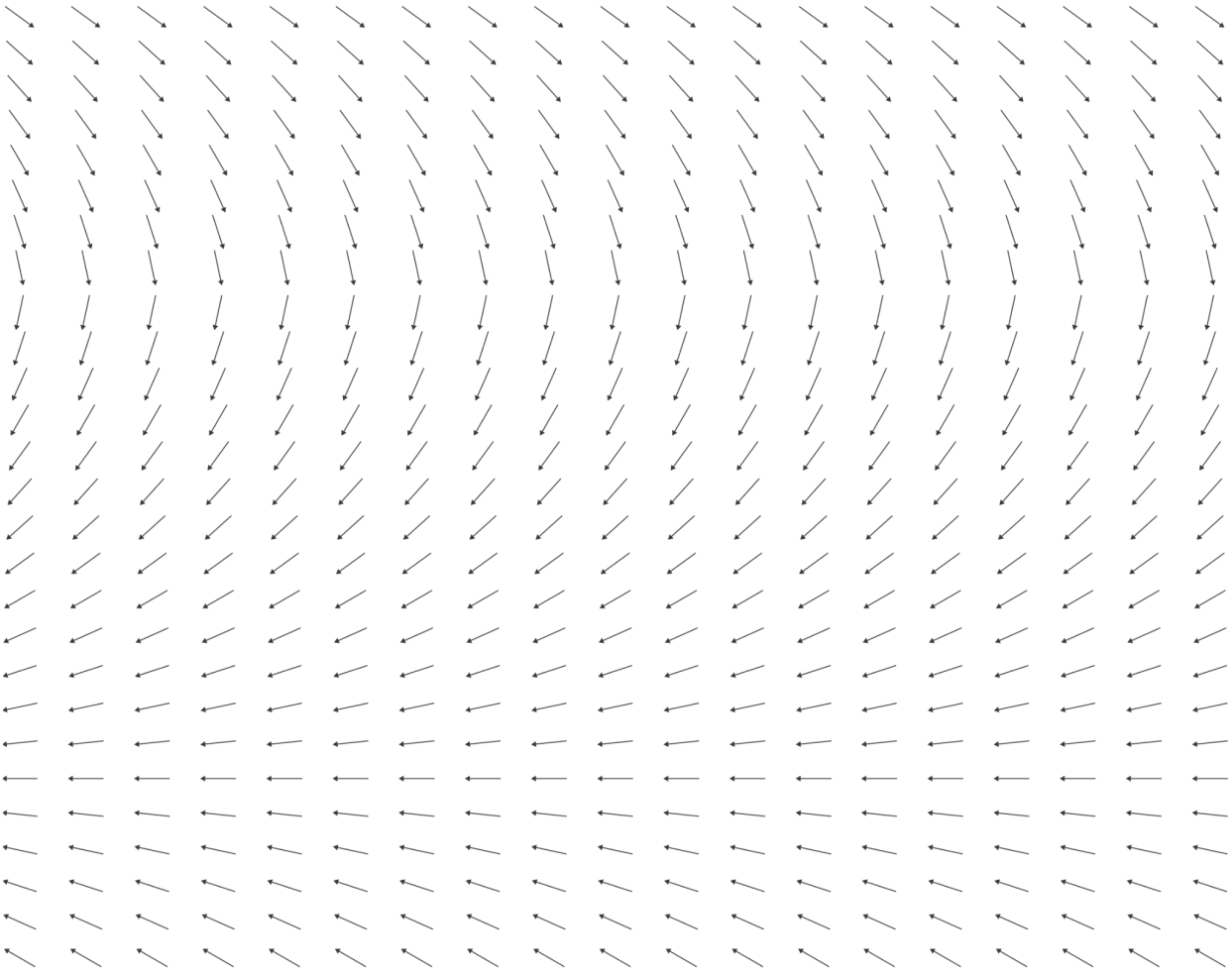

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Introduction

Skydio X10D is a powerful, intelligent sUAS with an advanced Nvidia Jetson Orin processor for fast on-board computing and custom-designed, precisely calibrated navigation. Featuring six 32 MP navigation cameras that provide the input required for sophisticated AI vision models to execute intelligent flight in complex environments.

X10D includes a best-in-class Teledyne FLIR Boson+ sensor tuned and optimized to achieve the category's highest thermal imaging quality. Capable of resolutions of 640×512 and offering increased sensitivity down to <=30 mK NEDT, X10D promises more accurate radiometric readings in the most challenging environments. A lightweight and durable magnesium and carbon fiber frame and an innovative graphite heat-spreading system ensure that X10D can withstand harsh environments to deliver vital aerial intelligence.

X10D is an open, modular platform designed to accommodate additional payload options. RAS-A compliance and open MAVLINK protocol enable third-party and government-owned flight application software, and modular connector ports allow operators to quickly upgrade attachments.

With Skydio Flight Deck, our intuitive user interface, operators can navigate with the skills of an expert pilot in complex environments with minimal training. Powerful AI-enabled processing and automated tasks help organize sensor data to simplify battlefield tasks, freeing up concentration and decision-making abilities and increasing adaptability and responsiveness.

Mission-focused Solutions

Security/Force Protection Operations

Skydio X10D enhances security and force protection operations with its small form factor, rapid deployment capability, and expansive surveillance potential.

Designed for agility and efficiency, X10D can be airborne in less than 40 seconds, enabling organic ISR for forward-deployed units to swiftly identify and assess potential threats, significantly reducing the risk of attacks in remote locations.

The ability to perform intelligence, surveillance, and reconnaissance (ISR) work in hazardous situations requires X10D to maneuver reliably in dynamic GPS and GPS-denied environments. Equipped for operation in both GPS-reliant and GPS-denied environments, the X10D utilizes Visual Inertial Odometry (VIO) and an array of sensors, including 360-degree fisheye cameras. This setup integrates multiple data inputs to deliver a reliable understanding of the drone's position and orientation, crucial for navigating complex terrains. For operation at extended range, in poor or contested signal conditions, the pilot can manually change channels in flight, or X10D will dynamically switch frequencies for optimal performance in suboptimal conditions.

This rapid response feature is essential for preemptive security measures and operational readiness. Advanced sensor capabilities allow security teams to cover larger areas more accurately, facilitating more informed decision-making and strategic assessments. X10D propeller blade design delivers a quiet flight profile while allowing for top speeds of up to 45 mph in stable air.

The thermal camera provides accurate radiometric readings and the ability to change the thermal palette for crisp contract and subject identification. Tuning highlights specific warm or cold subjects, objects, or points of interest. With Skydio X10D, units gain a critical advantage in threat detection and situational awareness, ensuring higher protection and operational success in challenging environments.

Mission Planning

X10D significantly mitigates risk to personnel and mission objectives during infiltration, actions on target, and exfiltration stages. The autonomous functionalities of X10D allow operators to concentrate on assessing threats rather than piloting. This is made possible by 2D Map Capture, which empower units to autonomously survey areas of interest and generate geospatial maps, facilitating informed decision-making throughout the mission. Precision Waypoint Mission planning aids leaders during the planning phase, enabling the incorporation of comprehensive, purposeful evaluations of target areas.

Skydio X10D includes a Microhard multiband radio that allows operators to leverage multiband radio with frequencies from 1790 to 2500 operating at 2-watt power (38 dBm), based on the operator inputs between 100 mW and 4 watts to communicate on a clean channel.

When the system encounters electromagnetic interference, Dynamic Channel Switching autonomously detects a degraded RF signal and cycles through six preset channels to ensure the mission is not interrupted. The operator remains focused on the mission and not on piloting the drone.

X10D harnesses AI to become the world's first drone with an autonomous night navigation system, able to navigate in dark environments while deftly avoiding obstacles. A first-of-its-kind infrared sensor navigation system, paired with algorithms designed for 360° Obstacle Avoidance, allows X10D to conduct complex nighttime missions.

Quiet flight motors and low-observable profiles enable operators to manage audible and visible signatures in high-threat environments. Through these advanced capabilities, Skydio X10D enhances operational efficiency, situational awareness, and strategic mission planning.

ISR and Target Acquisition

Intelligence, Surveillance, and Reconnaissance (ISR) are critical to mission success, which relies on timely, accurate, and actionable intelligence. Failure can place the mission and the lives of operators at risk. The ability to exploit the vast amount of information available in the combat environment presents obvious cognitive challenges; conversely, the vast amount of information also creates opportunities and enables better decision-making.

The Skydio autonomy system avoids obstacles, tracks objects, and maps the world around it in real-time in day and night conditions, both indoors and outdoors. Skydio X10D has the most advanced EO/IR and integrated Teledyne FLIR Boson+ sensors, delivering the highest quality thermal imaging. The X10D thermal camera can detect body heat and subtle ground hot spots left by human activity and mechanical systems and enable visibility in adverse conditions such as heavy smoke, fog, or dim light. The color EO camera includes a 50 MP wide camera and a narrow 64 MP camera that zooms from 2x to 64x with surround vision. Select a point of interest using either the thermal or color cameras, and X10D will autonomously hover in a fixed position, rotating and tilting the camera to follow a subject as it moves, enabling situational awareness, surveillance, and overwatch of a person or vehicle. In addition, onboard image optimization algorithms enhance detail in distant objects and improve clarity for easier interpretation.

Skydio X10D system enhances intelligence by offering the ability to preload DTED, MOBAC, Quantum GIS, GeoTIFF, custom QGC, and Mapbox tiles maps that can be AES-256 encrypted onboard the system. Advanced target tracking technology enables precise identification and monitoring of subjects of interest, enhancing situational awareness and strategic decision-making. X10D excels in surveillance and target acquisition, boasting capabilities seamlessly integrating with the TAK (Team Awareness Kit) network through the X10D Controller. This connection gives ground teams real-time access to the drone's live video feed and location,

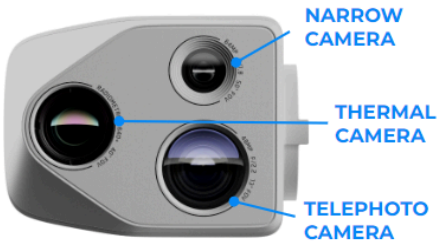
enhancing collaborative situational awareness. Orbit Point offers a dynamic aerial perspective by circling a designated point of interest, ensuring comprehensive visual coverage over areas of interest.

Track-In-Place skill allows persistent monitoring of specific objects from a distance, maintaining them in the viewfinder from a stable aerial position. Crosshair Coordinates uses Digital Terrain Elevation Data (DTED) maps to display the real-time coordinates on the fly screen of the ground-level position at the center of your crosshairs.

The addition of the external radio kit connected to the controller is designed to decouple the radio from the ground controller, allowing physical separation of the radio from the human operator, making it harder for an adversary to locate the drone pilot. The external radio kit spans multiple RF bands, providing communication resilience in RF-contested environments. This combination of autonomy and precision intelligence makes the X10D platform an essential tool for efficient and effective reconnaissance in challenging environments.

Patrol

Military units embarking on foot patrols for reconnaissance missions or perimeter security can significantly enhance their operational effectiveness and safety by utilizing X10D for aerial support. This provides them with real-time surveillance, situational awareness, and network streaming to tactical networks. AES-256 encryption ensures that media captured during flight is secure. If the X10D signal is disrupted, Dynamic Channel Switching cycles through six preset frequencies to automatically find the cleanest channel, ensuring stable and reliable flight.



VT300-Z

MODULE	RESOLUTION	DIAGONAL FIELD OF VIEW
Narrow	64MP	50°
FLIR Thermal	640x512	40°
Telephoto	48MP	13°

VT300-L

MODULE	RESOLUTION	DIAGONAL FIELD OF VIEW
Narrow	64MP	50°
FLIR Thermal	640x512	40°
1" Wide	50MP	93°
Light	Up to 2800 lumens	

Skydio X10D offers close proximity Obstacle Avoidance, allowing precision inspection during patrols to ensure no detail is overlooked. Obstacle Avoidance enables X10D to navigate challenging terrain responsively and provide up-close inspection of assets, providing critical and reliable reconnaissance without crashes. To display the real-time coordinates of the ground-level position, use Crosshair Coordinates coupled with Digital Terrain Elevation Data (DTED) maps.

The X10D is equipped with a narrow lens featuring a 4x zoom level and surround vision with a 5x zoom, generating an ultra-wide view of the environment. Its telephoto camera extends visibility to distant subjects with 32x zoom. Available thermal palettes enhance efficient environmental analysis. The thermal camera assigns each pixel a unique color or shade based on relative temperature, facilitating the identification of warm or cold people, objects, or points of interest. Adjusting the thermal palette and tuning the signal noise in your thermal image optimizes contrast for better identification, boosting confidence and decision-making. Panorama images equip units with a clear and comprehensive view of their surroundings, providing actionable information that enhances the trustworthiness of tactical decisions.

Convoy Operations

Skydio X10D enhances convoy operations through its advanced aerial capabilities, ensuring unparalleled support for vehicle patrols and critical incident management. Skydio Scout provides continuous, autonomous surveillance for moving convoys by maintaining a strategic vantage point without requiring manual drone piloting. For operation at extended range, in poor or contested signal conditions, the pilot can manually change channels during flight, or X10D will dynamically switch frequencies, ensuring that patrols are constantly monitored, enhancing safety and situational awareness.

Additionally, operators can quickly and accurately pinpoint locations of interest directly on the map or video feed, facilitating rapid response and decision-making in high-stakes scenarios. This capability improves the efficiency of convoy operations and significantly increases personnel safety by enabling proactive threat management and support. With Skydio X10D, convoys have a dynamic surveillance and operational support system that enhances mission success and personnel safety.

Operations In Urban Terrain

Skydio X10D is a transformative asset for Military Operations in Urban Terrain (MOUT), offering unmatched capabilities in navigating the complexities

of urban environments. Its ability to operate effectively in GPS-denied environments using vision navigation and Dynamic Channel Switching ensures reliable radio frequency link performance where traditional navigation systems fail, a critical advantage in dense urban settings. With an advanced autonomous Obstacle Avoidance system, unskilled pilots can complete missions as X10D autonomously navigates tightly packed cityscapes without the risk of crashes, significantly enhancing operational safety and situational awareness for ground units.

Skydio X10D is proficient in maintaining a constant perch and stare at buildings and empowers assaulting units with a comprehensive understanding of their objectives. This persistent aerial surveillance capability enables real-time insights into the dynamics around the target, including enemy movements and fortifications, allowing for more informed decision-making and tactical planning. As a result, units can approach their missions with greater confidence and precision, leading to increased success rates and minimized risks during urban operations. The X10D integration into MOUT signifies a leap forward in leveraging drone technology for complex, urban military engagements.

Night Operations

Planners of military operations have used the cover of darkness to their advantage when conducting crucial missions, providing those properly equipped with a critical tactical advantage. The challenges associated with operating at night, in low-light, or low-visibility environments, can affect a soldier's ability to understand and effectively respond to any situation. Night operations involve understanding environments, assessing situations in multiple contexts, and providing quality situational awareness. Skydio X10D addresses these challenges with tools to use in various situations unique to night operations.

Military operations planners have used the cover of darkness to their advantage when conducting crucial missions, providing a critical

tactical advantage. X10D addresses the challenges associated with flight at night or in low light and poor visibility conditions, providing bright visible or infrared 360° illumination so the X10D can see and access the autonomy system for vision and GPS navigation with obstacle avoidance with Skydio NightSense. The X10D radiometric thermal camera provides ultra-high resolution image quality and a selection of thermal palettes to highlight specific warm or cold people, objects, or points of interest for better identification, confidence, and decision-making.

Asset Inspection

Traditional methods of asset inspection often involve manual, time-consuming processes that can be both dangerous and resource-intensive. Skydio X10D addresses these challenges head-on with its advanced autonomous capabilities, allowing quicker, more accurate, and less labor-intensive inspections.

View: 3D model captured with Skydio X10D + 3D Scan

This efficiency in asset inspection directly contributes to enhanced military readiness, ensuring that equipment and infrastructure are mission-capable at all times. Designed to withstand harsh military environments, X10D is lightweight and rugged. An IP55 ingress protection rating confirms its resilience against dust and

water, making it suitable for inspections in various settings, from maritime environments to desert airfields.
Skydio X10D is equipped with an array of cutting-edge technologies, making it a formidable tool for inspection of military assets.

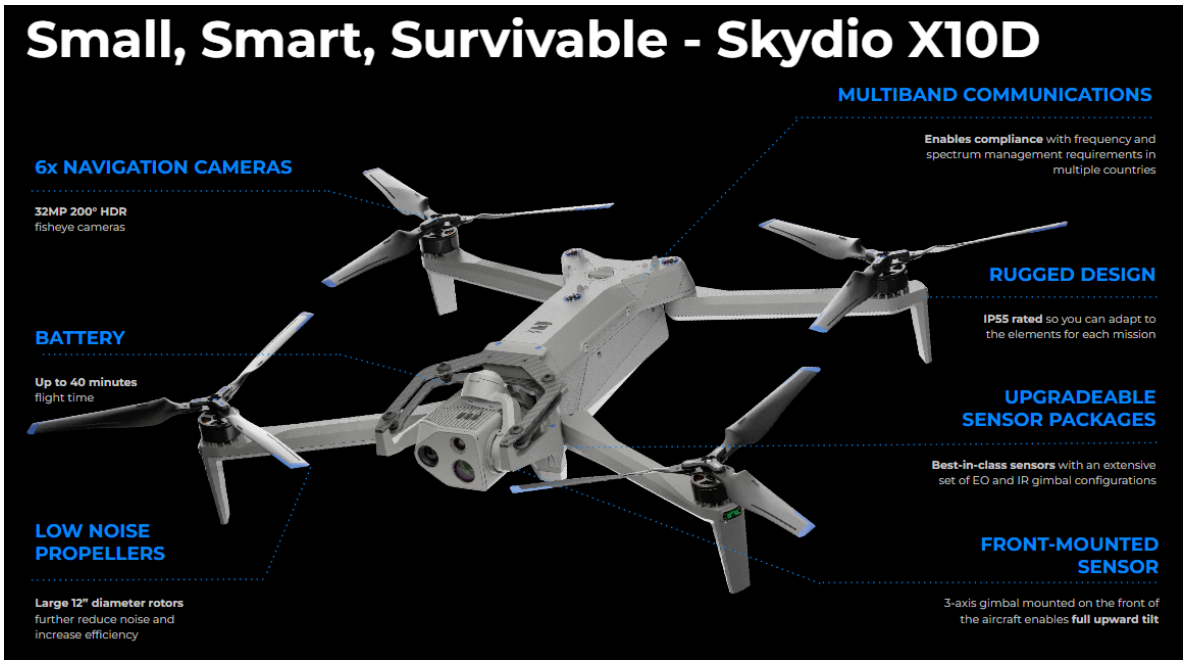
Onboard AI and advanced processing with the Nvidia Jetson Orin processor, Skydio X10D boasts significant onboard computing power, enabling real-time data processing and decision-making. This allows the drone to navigate complex environments autonomously, identify issues, and capture detailed data without human intervention. State-of-the-art cameras and imaging technology in the X10D sensor, including high-resolution and thermal imaging, provide unparalleled clarity and detail in data capture. These capabilities allow for precisely identifying structural issues, wear and tear, and other potential vulnerabilities in military assets and infrastructure. Unique to the X10D is its ability to operate autonomously in low-light conditions, thanks to its innovative night vision systems. This ensures that inspections can occur at any time, day or night, without compromising data quality or operational safety.

The deployment of Skydio X10D for military asset inspections transforms the traditional approach in several key ways:

- **Increased Safety and Efficiency:** By leveraging autonomous flight capabilities and dynamic obstacle avoidance, X10D minimizes the need for

personnel to access potentially hazardous areas, thereby reducing risk and optimizing manpower utilization.

- **Comprehensive Data and Enhanced Analysis:** The detailed imagery and data captured enable military analysts to evaluate asset conditions. This wealth of information supports predictive maintenance strategies, helping to prevent failures before they occur and extend the lifespan of critical military assets.
- **Scalability and Flexibility:** The modular design and ease of deployment make X10D a scalable solution that can be adapted to a wide range of inspection needs. Whether assessing a ship's structural integrity or surveying vast training grounds, X10D can be quickly configured to meet specific mission requirements.
- **Improved Visibility and Decision-making:** With real-time data streaming and onboard processing, X10D provides commanders and maintenance teams with immediate insights into asset conditions. This enhanced visibility supports informed decision-making, ensuring that resources are allocated efficiently and that military readiness is maintained at the highest levels.



Skydio X10D represents a paradigm shift in mission-focused solutions. Its advanced autonomous capabilities, superior imaging technology, and rugged design make it an invaluable tool for enhancing military readiness and ensuring the integrity of critical assets. As defense forces continue to embrace innovative

technologies, Skydio X10D stands out as a vital enabler of more effective, efficient, and safe military operations.

Manufacturing Facilities

Skydio employees are proud to design and manufacture NDAA-compliant sUAS and further the interests of the United States and our allies in critically important European and Middle Eastern theaters and conflicts, such as Israel and Ukraine. Skydio has shipped over 12,000 X2 and X10D systems from its California-based manufacturing plant and plans to double production output during 2024.

- Skydio Headquarters and prototype labs - 115,630 sq ft located in San Mateo, California
- Skydio Manufacturing Facility - 36,000 sq ft located in Hayward, California
- Skydio Test Lab - 26,000 sq ft located in Hayward, California
- Skydio Engineering Office - 2,000 sq ft located in Waltham, Massachusetts

Inside Look: Skydio Drone Manufacturing Process

Mission Success Team

The Skydio Mission Success Team and post-sales support model ensures cradle-to-grave service to our customers by providing OEM-certified training and superior program management. Led by a Program Manager with prior military and defense UAS experience, the team includes Field Service Representatives (FSR), Solution Engineers (SE), training, high-quality support resources, product integration support, maintenance, and repair services. Customers are assigned a Program Manager who understands the unique needs of military and law

enforcement users operating in any environment and works with our FSRs and SEs to provide immediate response and technical expertise when and where the need arises.

Global Government Customers

Skydio has decades of combined experience producing sUAS for prototype and production contracts. We leverage an established track record as the leading U.S. manufacturer of sUAS. Our proven manufacturing management processes have delivered sUAS for operational use across every branch of the military, Department of Defense, Department of State, and global customers. Skydio Global Government business supports over 400 customers domestically and internationally.

About Skydio

Our experience as the leading manufacturer of commercial autonomous drones in the United States, combined with our history of delivering both commercial and developmental hardware and software to every branch of the United States military and our allies, positions Skydio X10D as a uniquely reliable solution to provide state-of-the-art autonomous sUAS systems and support. As the world leader in autonomous flight, Skydio leverages breakthrough technologies using AI-powered navigation to produce drones that fly BVLOS with obstacle avoidance

capabilities. Founded in 2014, Skydio employs experts in AI, robotics, optical imaging systems, and autonomous vehicles from top companies, research labs, and universities worldwide.

Skydio designs, assembles, and supports its products in the United States, offering the highest supply chain and manufacturing security standards in compliance with Section 848 of the 2020 National Defense Authorization Act. Skydio leverages in-house expertise in all facets of sUAS core technology, including algorithm development, design, engineering, validation, assembly, integration, calibration, assembly, communications systems, processor, transmitter, propulsion, sensor, gimbal, and vision systems.