



HERMES

Use Cases & Specifications

Rev. 2024.08.05

Zero Fossil Fuels

Highly Adaptable

Long Range Flight

Hydrogen Compatible

This use case and specification brochure provides a structured framework for exploring how the Hermes M2 eVTOL Fixed Wing Hybrid Drone can be deployed for a variety of unique mission sets, highlighting its capabilities, operational processes, benefits, and future opportunities. Specific operational parameters, regulatory requirements, and integrations may vary and should be carefully considered before implementation. Any references to specific use processes, benefits, or impacts are hypothetical and subject to feasibility studies, local regulations, and logistical considerations. Potential users and stakeholders are advised to consult Avari Aerospace.

Our Core Values



Innovation



Responsibility



Integrity



Accessibility



Equality



Accountability

We are committed to advancing unmanned aerial systems with cutting-edge technology across defense, public safety, agriculture, and environmental monitoring. Prioritizing sustainability, our drones minimize carbon footprint, preserve ecosystems, enhance search and rescue, and connect global communities for a safer, connected world.

Our Process

Our journey began by drawing from the ideas and experiences of our team to revolutionize the use case of drones. Undertaking a meticulous and iterative R&D process our engineers and operators utilized new breakthroughs in advanced manufacturing to establish and optimize the next generation of long range and long endurance mid-sized drones.

We leveraged the latest in Carbon Fiber and advanced 3D printing methods to create our first prototype. Through these processes, we were able to bring all additive production in house, from SLA and FDM printing, to custom carbon fiber panels, sandwich panels, and filament winding, cutting costs and reducing lead times. All of these processes come together to create accurate and precise components ensuring a seamless end user experience and superior vehicle performance.

As the drones took shape during production, they became more than just the manufacturing processes and materials used to create them, but a testament to the level of quality and performance expected from American made. And as each unit comes off the assembly line it is inspected and tested to rigorous safety, quality, and reliability standards to ensure this expectation is met.

Today, our drones soar through the skies, powered by thoughtful design, advanced manufacturing, and modern technological breakthroughs - embodying our unwavering commitment to safety, quality, and sustainability, all made possible right here in America.



2019 - Partnered

We partnered with our energy provider with the goal of tackling drone delivery.

2020 - STTR P1

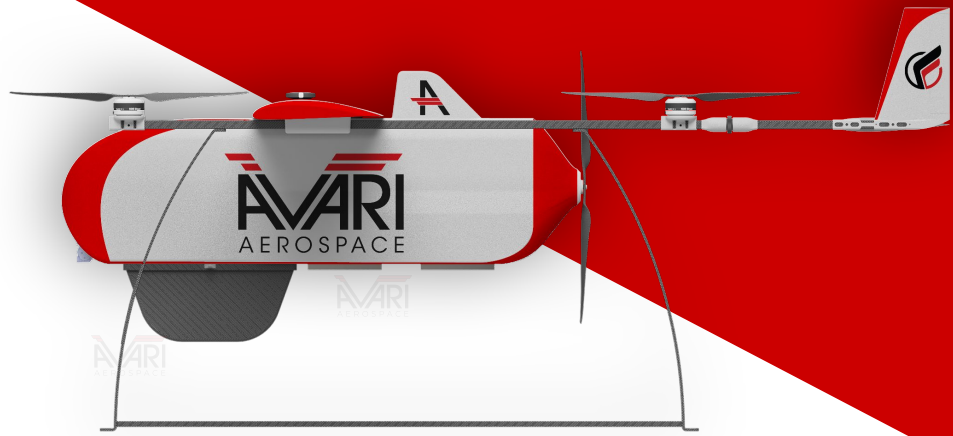
We subcontracted to our partner with the USAF to complete our design and feasibility study.

2021 - STTR P2

We subcontracted to our partner with the USAF to build and integrate the first system prototype of the Hermes M1.

2023 - AMARII

We subcontracted to our partner with the US Army to build and fly the integrated Hermes M2 powered by LH2.



This drone represents a pinnacle of American innovation and engineering. Its cutting-edge design, powered by hydrogen technology, offers unmatched operational endurance and efficiency, reinforcing our leadership in unmanned aerial systems.

HERMES M2

The Hermes M2 by Avari Aerospace is a 70 lb* max takeoff weight Vertical Take-off and Landing (VTOL) Fixed Wing hybrid drone powered by battery or battery hydrogen hybrid technology designed for the professional operator to conduct long-range, long-endurance missions without the need for take-off or landing infrastructure.

Internal Payload System For Sensitive Cargo

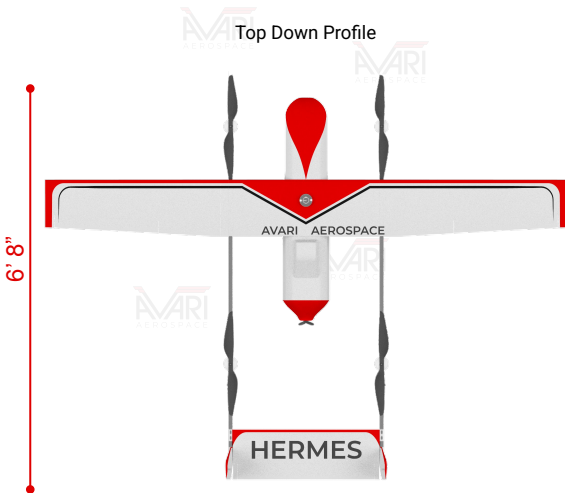
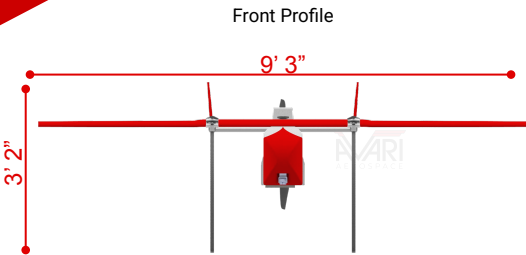
On-Board Computer ready for customized sensor installations

Optional External Cargo Box (20lbs total payload supported)

EO/IR Camera, RTK, Precision Landing Sensors, and Night Lights

The Hermes’ extended range and payload provide critical support in diverse operational environments.

- 01 Battery Only
9h | 500mi
- 02 H2 Hybrid
16h | 900mi
- 03 LH2 Hybrid
36h | 2040mi



SPECIFICATIONS

Item		Specifications		Data Link	
Storage Dimensions	4.25 x 2.29 x 1.83 ft *2	Frequency	915 MHz, cellular, 2.4 & 5.8 GHz Wifi		
Deployed Dimensions	9.38 x 6.89 x 3.28 ft (Base) / 9.88 x 7.39 x 3.53 ft (HL)	Radio Range	40 miles (large range possible with mesh network) & cellular where coverage		
Air Vehicle Weight (w/o fuel system)	28.45 lbs (Base)	Performance	Encrypted, dynamic power, frequency hopping		
Batteries	LiPo 12S 44.4 V	Positioning Accuracy	3D FIX: 1.5 m / Optional RTK: 0.01 m		
NEOEx EXTEND™ System <i>(optional)</i>	Liquid Hydrogen Fuel Cell 12S 44.4 V	Flight Modes	Auto, Copter (Loiter), Plane (Circle, Glide, Fly-by-Wire)		
Payload			Route and user selectable waypoint actions		
Max Payload Weight	20 lbs (Base)		Automatic Return		
Replaceable	Yes		Lost Link		
External Payload Volume	10 L (Expandable)	Navigation	GNSS Navigation		
Performance			Vision Based Navigation for GPS-denied and presion landing		
Endurance SLF 60 mph (Base Bat/LH2, HV Bat/LH2)	9.1/36.8 hrs, 13.4/40.1 hrs	Mission Data	AES 256 encrypted video, snapshots, and metadata		
Max Speed	100 mph (Base) / 120 mph (HV)		USB & Web interface for mission data AES 256		
Absolute Ceiling	10,000 ft MSL		STANAG 4586 Compliant*		
Service Ceiling	6,000 ft AGL to avoid icing		ATAK Compatible*		
Environment		Deployment Time	10 - 15 minutes depending on mission / payload type		
Temperature	-10°F to 140°F		(*Requires ISR / Swarm Upgrade)		
Wind	25 knots / gust 30 knots		Equipment described herein may be subject to US Export regulations and may require a license prior to export. Diversion contrary to US law is prohibited. Imagery for illustration purposes only. Pricing and Specifications are subject to change without notice.		
Precipitation	(50.8 mm) 2 in / hr				

Use Cases & Specifications

HERMES COMMAND CENTER

Introducing the Hermes Command Center. Avari Aerospace's ground control station designed for seamless operation with our flagship Hermes drone. Built for endurance missions our GCS uses battery for up to **4** hours of mission activity and comes with solar power backup to extend mission operations.

Crafted with robust materials and engineered for rugged conditions, this GCS is equipped to handle the demands of field operations with ease. Its ergonomic design and intuitive interface provide operators with efficient command and control capabilities, facilitating precise navigation and mission execution.

- ✓ **High-Resolution display for real-time telemetry and video streaming**
- ✓ **Ergonomic controls for enhanced operator comfort during extended missions**
- ✓ **Comprehensive connectivity options for seamless communication with the drone and external systems**

Powered by an open-source system, the ground control station offers flexibility and customization options, empowering users to integrate third-party software and adapt workflows to specific mission requirements. This compatibility enhances operational efficiency and supports seamless data exchange and analysis.

Key features include a high-resolution display for real-time telemetry and video streaming, ergonomic controls for enhanced operator comfort during extended missions, and comprehensive connectivity options for seamless communication with the Hermes drone and external systems.

Whether deployed in military, emergency response, or industrial applications, the Hermes Command Center sets a new standard in reliability and versatility. Experience superior performance and mission success with Avari Aerospace's advanced technology at your command.



COMMAND CENTER SPECIFICATIONS

Item	Specifications
General	
Storage Dimensions	21.20" x 16.00" x 10.60"
Deployed Dimensions	21.20" x 16.00" x 26"
Kit Weight	35.8 lbs
Battery Life	4 hrs
Charging Voltage	120 V AC @ 360 W or 11-30 V DC @ 110 W
Operating Temp Range	0 - 40 C
IP Rating Closed	67
Connectivity / Interfaces	
Telemetry	915 Mhz , 2.4 & 5.8 GhZ, Cellular
Peripherals	RC controller, Keyboard, Trackpad
External Connectors	Micro & Standard SD, USB
Charging	IEC 13 or XT60
Display	
Size	21.5 in
Resolution	FHD 1080p
Refresh Rate	75 Hz
Viewing Angle	178 degrees
Integrated Computer	
Storage	1 TB
Memory	8GB DDR 5
CPU	6-core Arm® Cortex®-A78AE
GPU	1024-core NVIDIA Ampere

Advanced Behaviors & Integrations Available.

Full Featured Open Source Operating System

- Point-and-click waypoint/fence/rally point entry, using Google Maps/Bing/Open street maps/Custom WMS
- Select mission commands from drop-down menus
- Download and analyze mission log files
- Configure autopilot settings for your vehicle
- Interface with a PC flight simulator to create a full software-in-the-loop (SITL) UAV simulator
- Run SITL simulation of many frames types for all ArduPilot vehicles

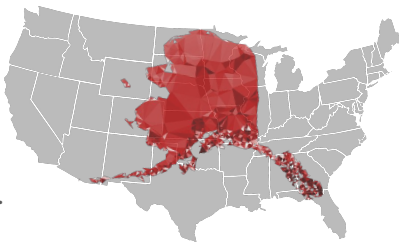


Use Case: Drone Delivery & Logistics

Drone delivery accelerates delivery times, contributes to cost savings, and expands the reach of businesses; ultimately improving overall customer satisfaction.

Scenario 1: Urban Distributor Shipping To Remote Villages

A distributor based in a bustling city, specializing in high-demand products (*electronics to perishable goods*) receives an order from a customer located in a remote village nestled deep in the mountains, far from traditional shipping networks.



Challenge:

Transporting goods to remote villages often presents logistical challenges due to inaccessible terrain, limited road infrastructure, and lengthy travel times.

Solution:

Rather than pay for expensive bush plane or courier services the distributor opts to ship the order via the Hermes from the local drone logistics drop-off and it arrives same day at the villages designated mail pick-up ready for customer pick-up within 15 minutes of arrival.

Conclusion:

By leveraging our hybrid drone technology, the urban distributor successfully fulfills orders to remote villages, expanding their market reach and elevating customer satisfaction.

Scenario 2: Expanding Shipping Operations To A New Geography

A shipping provider currently utilizes small drones for efficient single-parcel deliveries within city limits and they've built a reputation for fast and reliable delivery. Now, they aim to expand their operations to the next city over, beyond the range of their existing delivery drones.

Challenge:

Expanding to a new city makes maintaining the efficiency and speed achieved within city limits challenging because the current fleet is limited in range and payload capacity, making it impractical for long-distance deliveries.

Solution:

Rather than pay for slow city-to-city courier / trucking services the shipping provider decides to integrate the Hermes into their fleet for intercity operations.

Conclusion:

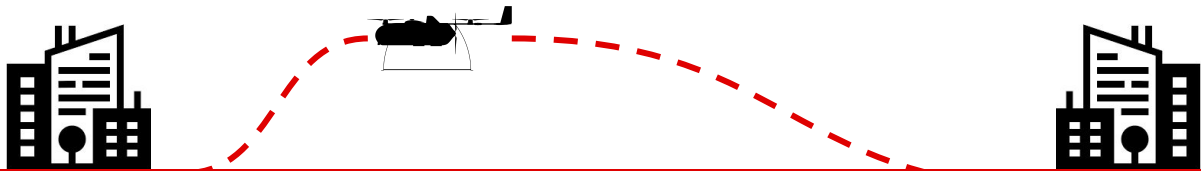
By integrating long-range delivery drones into their logistics strategy, the shipping provider successfully extends their operational footprint to the neighboring city. Reinforcing their reputation for efficient, customer-centric delivery services across broader geographic regions.

Revolutionize Delivery With The Hermes

Welcome to the future of logistics with our cutting-edge vertical take-off and landing fixed wing hybrid drone. Get your fleet set to redefine efficiency and reliability in delivery operations.

Key Features:

- **Hybrid Technology:** Combines the efficiency of fixed-wing flight with the versatility of VTOL capability.
- **Long Range:** Fly up to 1000* miles away and back on a single charge.
*Range varies based on power configuration 500 mi. battery / 900 mi. H₂ / 2040 mi. LH₂
- **Payload Capacity:** Deliver up to 20lbs of cargo per flight.
- **Autonomous Operations:** Streamlined for autonomous take-off, flight, and landing.



Supporting Your Operations:

We understand that seamless integration and reliable performance are crucial for your logistics operations. That's why we offer comprehensive support tailored to your needs:

- **Flight Plan Assessments:** Our team provides expert guidance in optimizing flight routes and planning missions for maximum efficiency and compliance.
- **Training Programs:** Comprehensive training programs ensure your staff are proficient in operating and maintaining our drones safely and effectively.
- **Maintenance Packages:** Scheduled maintenance and support packages are available to keep your fleet in peak condition, minimizing downtime and maximizing operational uptime.

Why Choose Us?

- **Reliability:** Built on robust engineering and tested for performance in real-world conditions.
- **Efficiency:** Streamline your logistics with faster delivery times and reduced operational costs.
- **Environmental Impact:** Reduce carbon footprint compared to traditional delivery methods.
- **Scalability:** Scale your operations effortlessly with our fleet of reliable drones.

Transform your logistics capabilities with Avari Aerospace. Contact us today to learn more about how our advanced hybrid drones can elevate your delivery operations to new heights.

Use Case: Wildfire Management

Long endurance drones enhance firefighter safety, improve response times and efficiency saving money, and offer operational flexibility for hard to reach areas.



The frequency and intensity of wildfire events are escalating, placing unprecedented strain on existing firefighting resources and challenging the capacity of response teams. As wildfires grow more severe and widespread, the demand for innovative solutions to support and enhance firefighting efforts becomes ever more critical.

Enhance Wildfire Monitoring With The Hermes

Our solution addresses key operational challenges faced by wildfire response teams, including real-time monitoring of fire behavior, rapid assessment of burnover events, and expedited delivery of essential supplies to frontline personnel. By integrating advanced sensors and real-time data transmission capabilities, our drone enhances situational awareness, improves response times, and enhances overall safety for firefighting crews.

- **Extend Flight Duration:** Up to 36 hours of continuous flight, ensuring prolonged aerial surveillance and monitoring without the need for frequent recharging or refueling.
- **Quickly Resupply:** Capable of delivering up to 20lbs of critical equipment or medical supplies directly to firefighters and emergency responders in remote and inaccessible areas.
- **Reduce Footprint:** Operating entirely without fossil fuels, our drone minimizes environmental impact while maximizing operational efficiency.

Key Impact Areas

- **Early Detection and Response** | Wildfires often start in remote or inaccessible areas, making early detection challenging. The Hermes can be deployed quickly to survey large and remote areas with its high-resolution EO/IR camera enabling early detection of hazardous conditions, smoke, or fire outbreaks, allowing rapid response efforts before extensive spreading.
- **Monitoring Fire Behavior** | Once a wildfire is detected, monitoring its behavior and progression is crucial for effective firefighting strategies. The Hermes' continuous monitoring capability provides real-time visual and thermal imagery. This data helps firefighters analyze fire dynamics, track its movement, and identify hotspots, aiding in strategic deployment of firefighting resources and evacuation efforts.
- **Access to Remote and Hazardous Terrain** | Terrain features such as rugged mountains, dense forests, or steep slopes often hinder ground-based firefighting operations. With the Hermes vertical take-off and landing capabilities, firefighters can access and maneuver challenging terrains where traditional crews may face difficulties to deliver supplies, assess fire spread in inaccessible areas, and provide critical information without risking the safety of ground crews.

Contributing to efforts in preserving natural ecosystems and reducing carbon footprints associated with traditional aerial support methods through our commitment to sustainability.

Why Choose Us?

- **Real-Time Monitoring:** The drones are deployed to monitor wildfire activity continuously using high-resolution cameras, infrared sensors, and live data transmission. This enables early detection of new fires and real-time assessment of fire behavior.
- **Burnover Event Response:** During active firefighting operations, the drones provide critical aerial surveillance to monitor burnover events. They relay real-time updates to incident commanders, helping them assess risks to personnel and adjust tactics accordingly.
- **Payload Delivery:** Equipped with payload compartments, the drones are capable of transporting essential equipment (such as fire retardants, tools) and medical supplies (first aid kits, medications) directly to firefighters on the ground.
- **Emergency Response:** In situations where immediate medical attention is required, the drones can swiftly deliver medical supplies to injured firefighters, potentially reducing response times and improving outcomes.
- **Post-Event Assessment:** After the wildfire is contained, the drones continue to assist with post-event assessments, providing aerial surveys to identify hotspots, assess damage, and support rehabilitation efforts.

Use Case: Shoreline Surveying

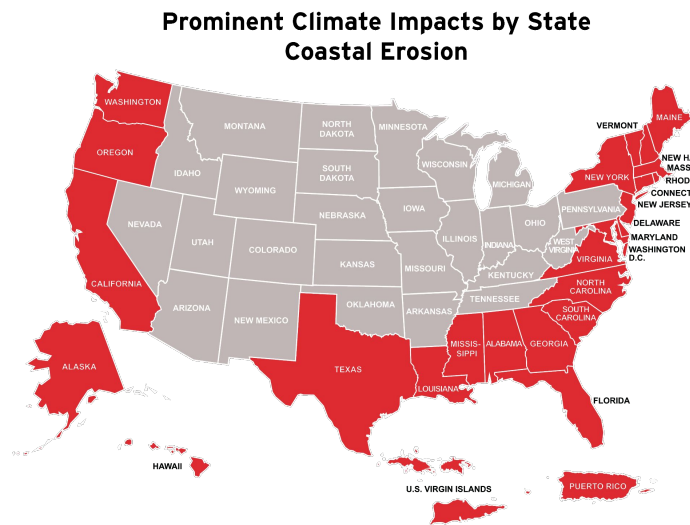
Long range drones offer unparalleled efficiency, providing high-resolution aerial imagery and precise data collection for comprehensive shoreline erosion surveys.



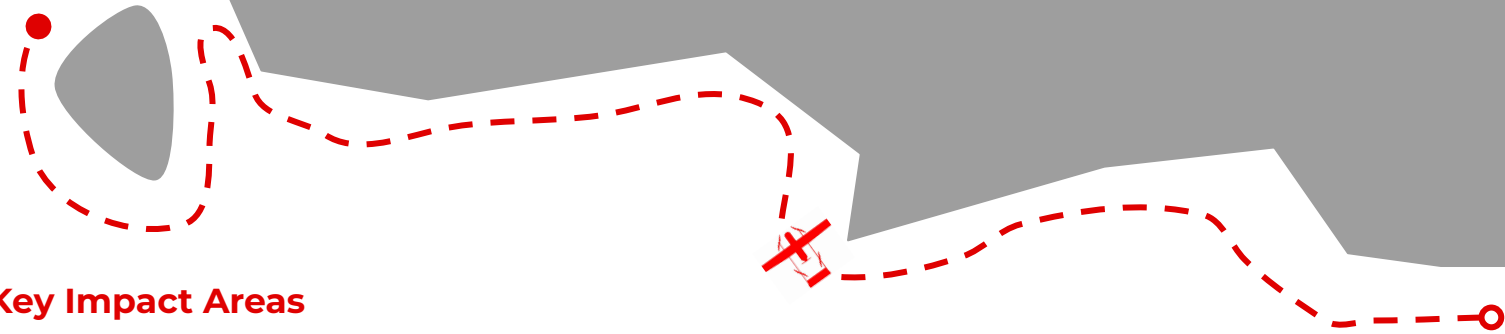
Photo Credit: U.S. Climate Resilience Toolkit - Drew Point Coastal Erosion, along Alaska's northern coast.

Transform How We Manage Shoreline Erosion

Fighting shoreline erosion with drones presents a proactive and technologically advanced approach to safeguarding coastal environments. Equipped with advanced sensors and capable of extensive flight ranges, drones provide crucial data for monitoring erosion dynamics in real-time. This information enables early detection of erosion hotspots, precise mapping of coastal changes, and informed decision-making for implementing targeted conservation and restoration measures. By leveraging drone technology, we empower environmental agencies and coastal communities to adopt proactive strategies that mitigate erosion impacts and preserve our valuable shorelines for future generations.



In the U.S. alone, shoreline erosion contributes to roughly \$500 million in coastal property loss.



Key Impact Areas

- **Limited Accessibility:** Traditional monitoring methods struggle with accessing remote or hard-to-reach coastal areas, making comprehensive surveys challenging. Our drone enables thorough inspections of distant and inaccessible shorelines without the logistical constraints of ground-based surveys.
- **Timely Data Acquisition:** Rapid changes in shoreline dynamics require frequent and timely data updates. Our drone offers continuous flight capabilities, allowing for frequent surveys and real-time data collection.
- **High Resolution Imaging:** Effective shoreline erosion monitoring demands high-resolution aerial imagery and precise data collection. Equipped with advanced sensors and imaging technology, our drone captures detailed visuals and topographical data* with exceptional clarity. This enables accurate assessment of erosion patterns, identification of vulnerable areas, and evaluation of mitigation efforts.
- **Cost Efficiency:** Traditional aerial surveys often incur high operational costs and logistical complexities. By eliminating the need for expensive manned aircraft and optimizing flight efficiency, our drone reduces operational expenses while increasing survey coverage and data accuracy. This cost-effectiveness enhances the feasibility of regular and extensive shoreline monitoring, supporting long-term environmental management objectives.
- **Environmental Sustainability:** Addressing shoreline erosion while minimizing environmental impact is paramount. Our drone operates without fossil fuels, significantly reducing carbon emissions and environmental footprint compared to conventional surveying methods. This commitment to sustainability aligns with global efforts to preserve coastal ecosystems and promote climate-resilient practices.

*(Topographical data requires add'l sensors not included in base system)

Our commitment to environmental stewardship underscores our dedication to preserving natural habitats and minimizing the carbon footprint associated with traditional surveying methods.

Our solution aims to empower coastal management agencies, environmental organizations, and researchers with actionable insights derived from detailed aerial surveys. By facilitating early detection of erosion hotspots, monitoring coastal dynamics, and supporting informed decision-making, our drone contributes to sustainable coastal resilience and proactive mitigation strategies.

Use Case: Defense - Expeditionary

Long endurance drones offer enhanced logistical support, extended operational reach, rapid deployment capabilities, real-time situational awareness, and mission adaptability..

Key Impact Areas

- **Logistical Challenges:** Expeditionary operations often face logistical complexities in delivering supplies, equipment, and medical aid to remote or inaccessible locations. Our drone's capability to carry up to 20 lbs of payload over distances of up to 2040 miles alleviates logistical constraints, enabling efficient and timely delivery of critical resources directly to expeditionary teams in the field.
- **Accessibility and Reach:** Traditional methods of transport may struggle to access remote, rugged, or hazardous terrains, limiting the reach and effectiveness of expeditionary missions. Our drone's ability to operate autonomously and cover vast distances expands accessibility to remote areas, enhancing the ability to conduct reconnaissance, surveillance, and support operations in challenging environments.
- **Speed and Efficiency:** Time-sensitive missions require rapid deployment and response capabilities. Our drone offers swift delivery of supplies and equipment without the delays associated with ground transportation or reliance on traditional aerial support. This capability enhances operational tempo, facilitating quick setup, resupply, and reinforcement of expeditionary forces.
- **Situational Awareness:** Effective decision-making in expeditionary operations relies on accurate and real-time situational awareness. Equipped with advanced sensors, imaging technology, and real-time data transmission capabilities, our drone provides commanders with crucial intelligence on terrain conditions, environmental hazards, and potential threats, enhancing overall mission safety and effectiveness.
- **Adaptability and Versatility:** Expeditionary operations demand adaptability to unforeseen circumstances and dynamic operational environments. Our drone's modular design and payload flexibility enable it to support a wide range of missions, from supply delivery and reconnaissance to medical evacuation and communications relay, thereby enhancing mission versatility and operational agility.
- **Environmental Sustainability:** Minimizing environmental impact is essential in expeditionary operations. Our drone operates without fossil fuels, significantly reducing carbon emissions and noise pollution compared to traditional aircraft, while also supporting sustainability initiatives in environmentally sensitive areas.

Empowering expeditionary forces to operate more effectively and safely in diverse and challenging environments.

Use Case: Defense - Maritime

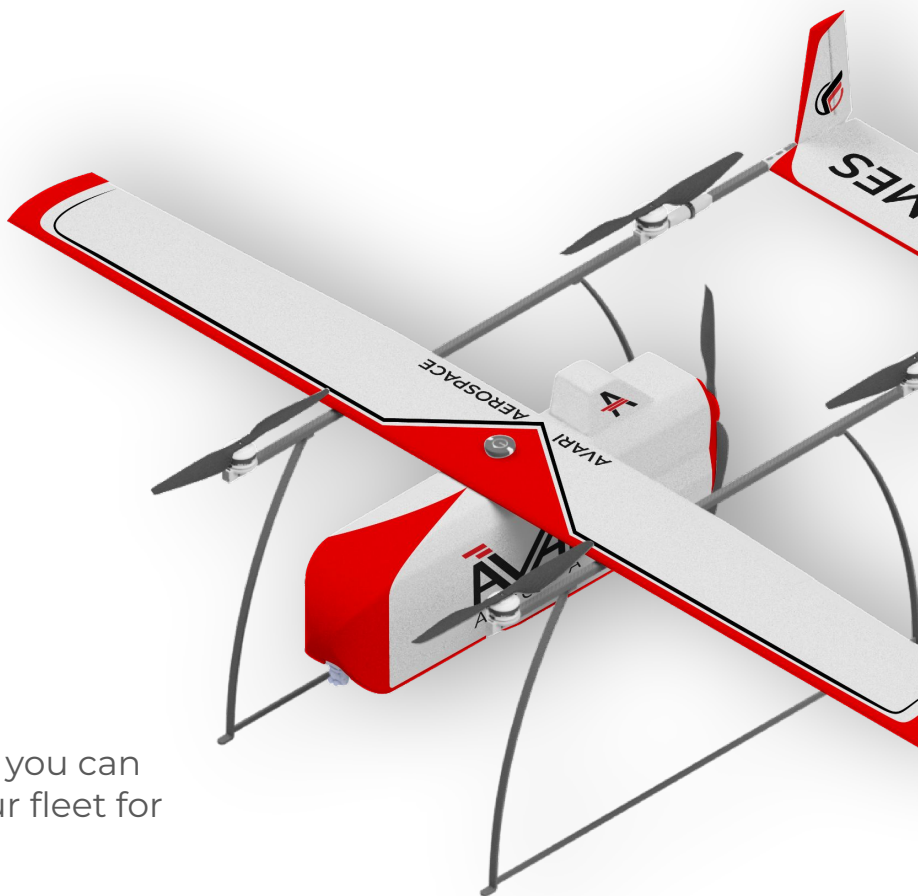
Long endurance drones offer enhanced surveillance, SAR support, logistical efficiency, communication reliability, environmental monitoring, and stealth operations.

Key Impact Areas

- **Surveillance and Reconnaissance:** Traditional naval vessels often face limitations in surveillance capabilities, especially over large maritime areas. Our drone can provide extended aerial surveillance with advanced sensors and imaging technology, enhancing situational awareness for naval commanders regarding potential threats, maritime traffic, and environmental conditions.
- **Search and Rescue (SAR):** Responding swiftly to distress calls and conducting SAR missions in maritime emergencies can be challenging due to limited visibility and rough sea conditions. Our drone can support SAR operations by providing aerial reconnaissance, identifying survivors or hazards, and guiding rescue efforts, thereby enhancing mission efficiency and improving outcomes.

"Imagine a rapid response to a man overboard incident at sea deploying a swarm of Hermes M2 drones equipped with sensors and collaborative autonomy; they sweep vast ocean areas swiftly, providing real-time data for precise location detection increasing the odds of successful rescue."
- **Logistical Support:** Naval operations require efficient logistical support for resupplying ships with provisions, spare parts, and equipment. Our drone's payload capacity and long-range capabilities enable it to transport essential supplies between ships or from shore to vessel, reducing dependency on traditional supply ships and enhancing operational flexibility.
- **Communication Relay:** Maintaining reliable communication networks across naval fleets, especially in remote or offshore areas, is crucial for command and control. Our drone can serve as a communication relay node, extending network coverage and ensuring seamless connectivity between ships, aircraft, and command centers.
- **Environmental Monitoring:** Monitoring environmental conditions, such as pollution, oil spills, or marine wildlife activity, is essential for maritime conservation efforts. Our drone equipped with environmental sensors can conduct regular patrols and surveys, providing valuable data for environmental assessment and response planning.
- **Stealth and Covert Operations:** For covert missions or surveillance operations requiring stealth, our drone's low acoustic signature and small size enhance its suitability for discreet operations without compromising operational security.

Bolster maritime capabilities, improve mission outcomes, and maintain strategic superiority in maritime environments.



Interested?

Reach out to us today to see how you can integrate the Hermes M2 into your fleet for your unique use case.



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