

MULTI-MISSION AUTONOMY ON THE WATER

Modular USV Catamaran Operations for Law
Enforcement and Incident Command



LAT: 38° 53' 42.1" N, LON: 77° 02' 10.8" W
HEADING: 152° SE
SPEED: 32 RTS
DEPTH: 8.5 M
BATTERY: 50%
STATUS: AUTONOMOUS PATROL
SIGNAL: STRONG

SENSOR: THERMAL/OPTICAL FUSION
TARGET ACQUISITION: ACTIVE
DISTANCE: 1500 M
ENVIRONMENT: RIVERINE/COAST
TIME: 10:45 ZOLU
MISSION: MULTI-MISSION SURVEILLANCE

MODULAR PAYLOAD

SEARCH & RESCUE

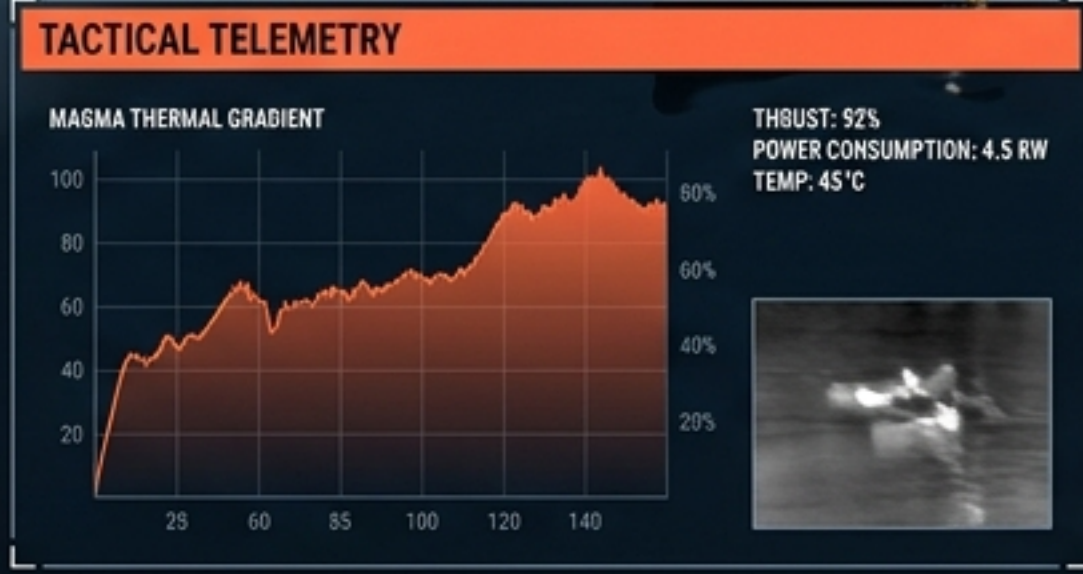
HAZMAT DETECTION

SURVEILLANCE/RECON

COMMUNICATIONS RELAY

PLUG-AND-PLAY INTEGRATION

INDEPENDENT PROSECUTION DEPARTMENT
ENVIRONMENTAL PROTECTION AGENCY
NATIONAL DEFENSE SCIENCE AND ENGINEERING
DEPARTMENT OF DEFENSE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

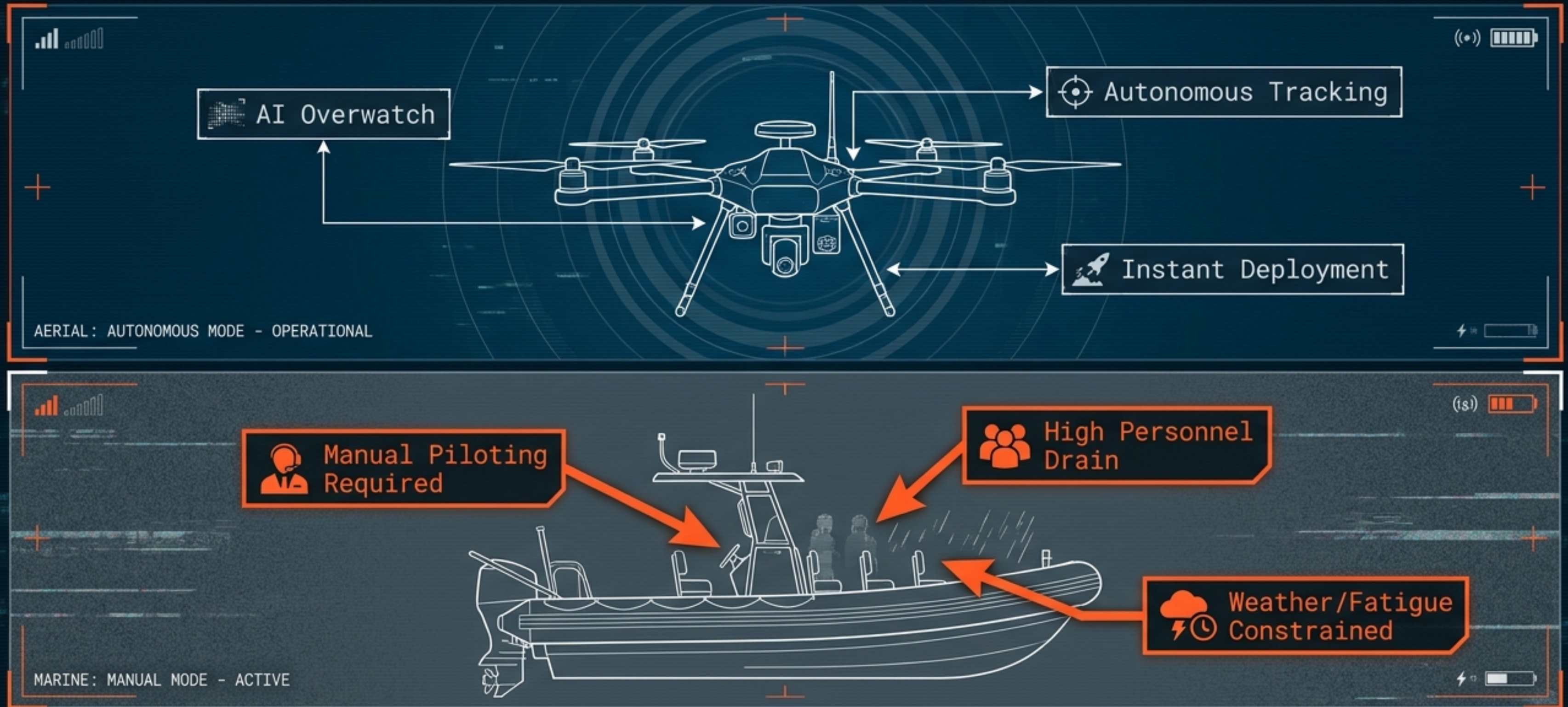


COMMAND INTERFACE

WAYPOINTS: 4/12
NEXT WP: ALPHA
ETA: 5 MIN

OPTICAL CAMERA
NEXT WP: ALPHA
ETA: 5 MIN

LAW ENFORCEMENT HAS AUTOMATED THE SKIES, BUT THE WATERWAYS REMAIN MANUAL



RIVERS, LAKES, AND FLOODED ZONES ARE CRITICAL JURISDICTIONS CURRENTLY CONSTRAINED BY HUMAN-HEAVY OPERATIONS. THE WATER REQUIRES THE SAME AUTONOMOUS PARADIGM SHIFT AS THE AIR.

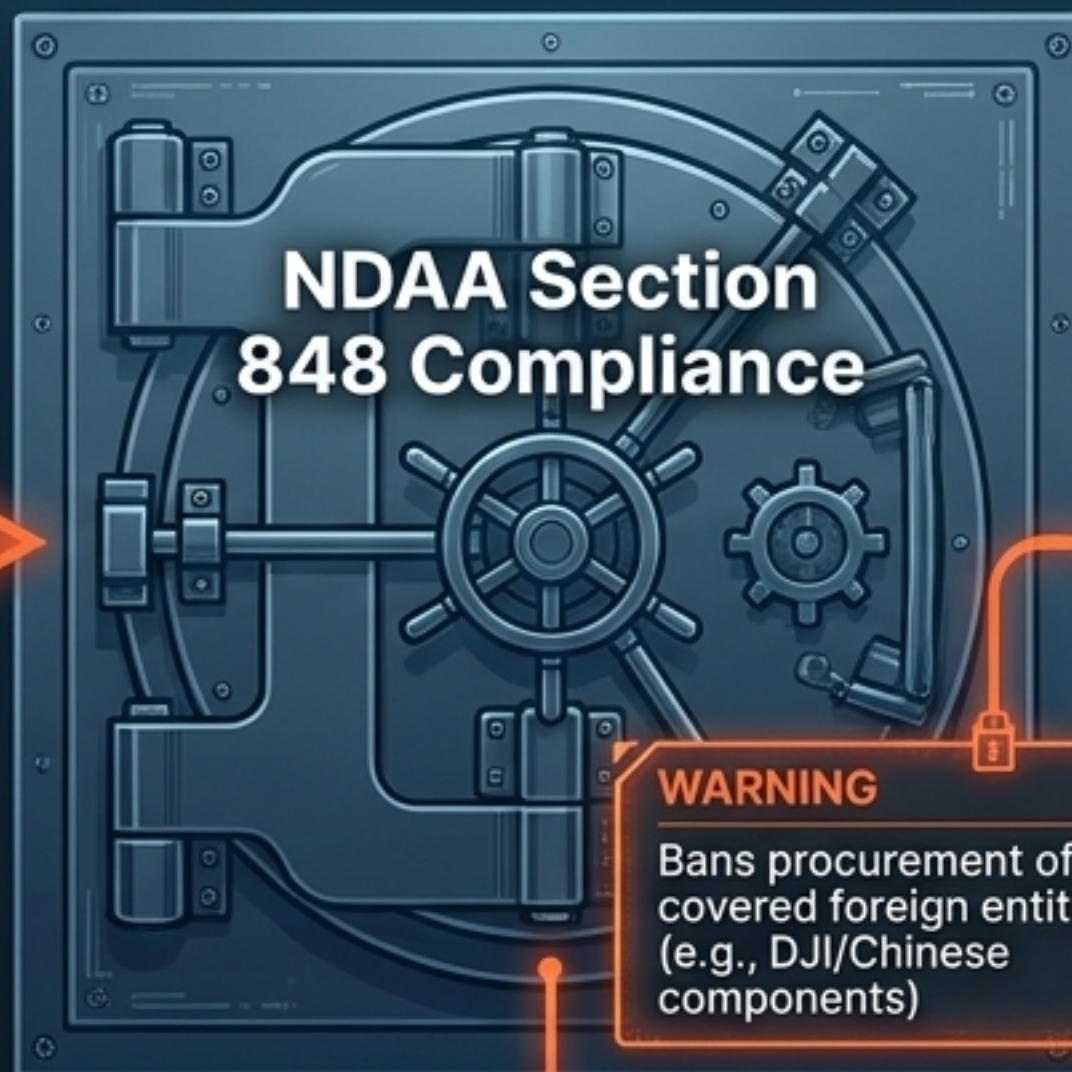
Unlocking federal grant capital requires a sovereign supply chain

STAGE 1



**Federal Grants:
FEMA, DOJ, HSGP**

STAGE 2



**NDAA Section
848 Compliance**

WARNING

Bans procurement of
covered foreign entities
(e.g., DJI/Chinese
components)

STAGE 3



**100% U.S. Sovereign
Components**

Utilizing federal grant money dictates complete avoidance of foreign-made drones. This platform is engineered from the hull up for strict NDAA compliance, making it fully eligible for DOJ and Homeland Security funding.

The Base Matrix: Defense-grade architecture engineered for the water

The Brain: ModalAI VOXL 2

DoD-trusted flight controller combined with an onboard AI companion computer for local computer vision processing.

The Code: ArduPilot / PX4

Open-source, non-proprietary flight stacks heavily vetted and trusted by the US Department of Defense.

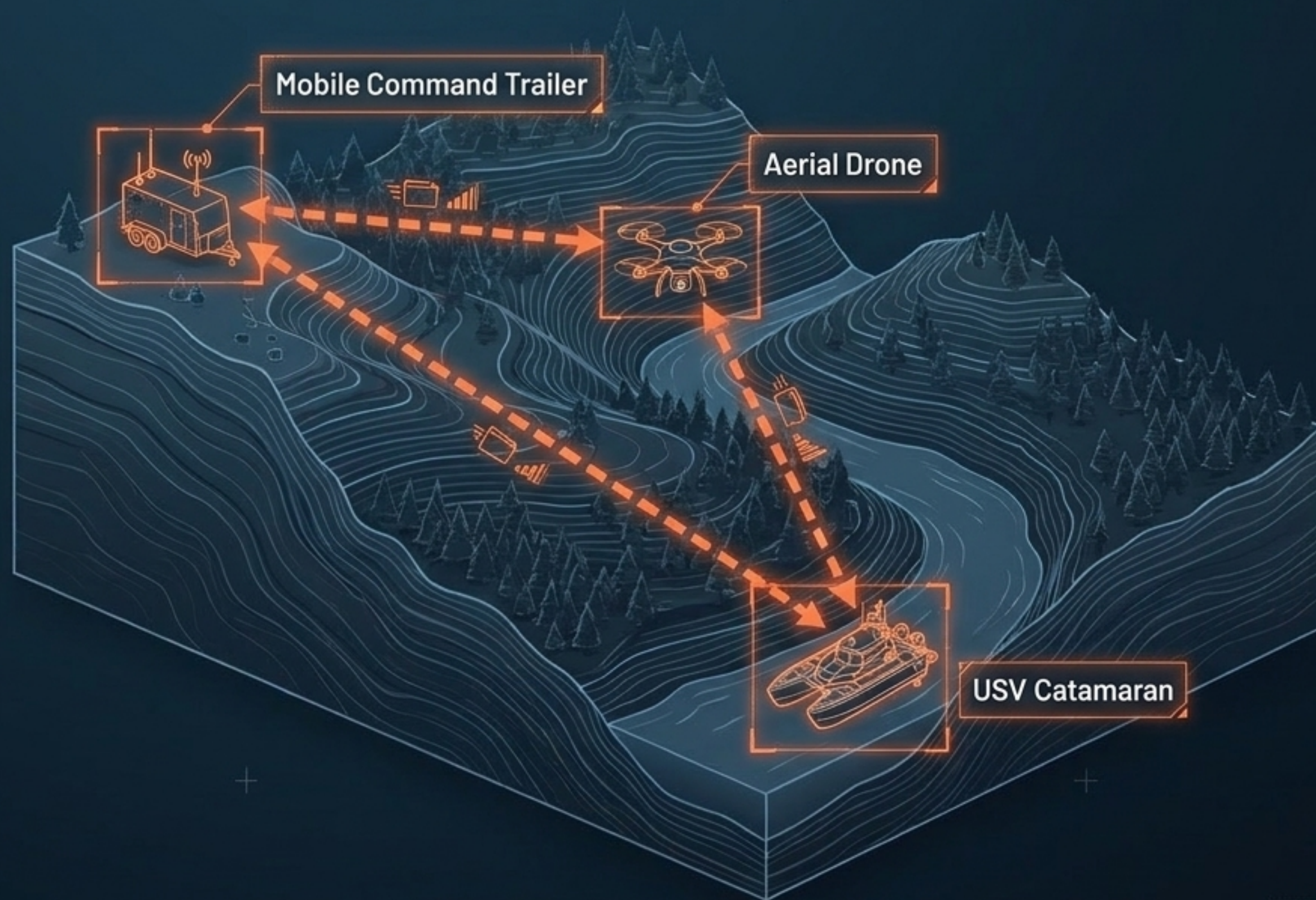
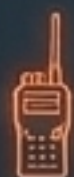
The Muscle: KDE Direct Propulsion

Industrial-grade, US-made brushless marine motors and ESCs for flawless heavy-lift reliability.

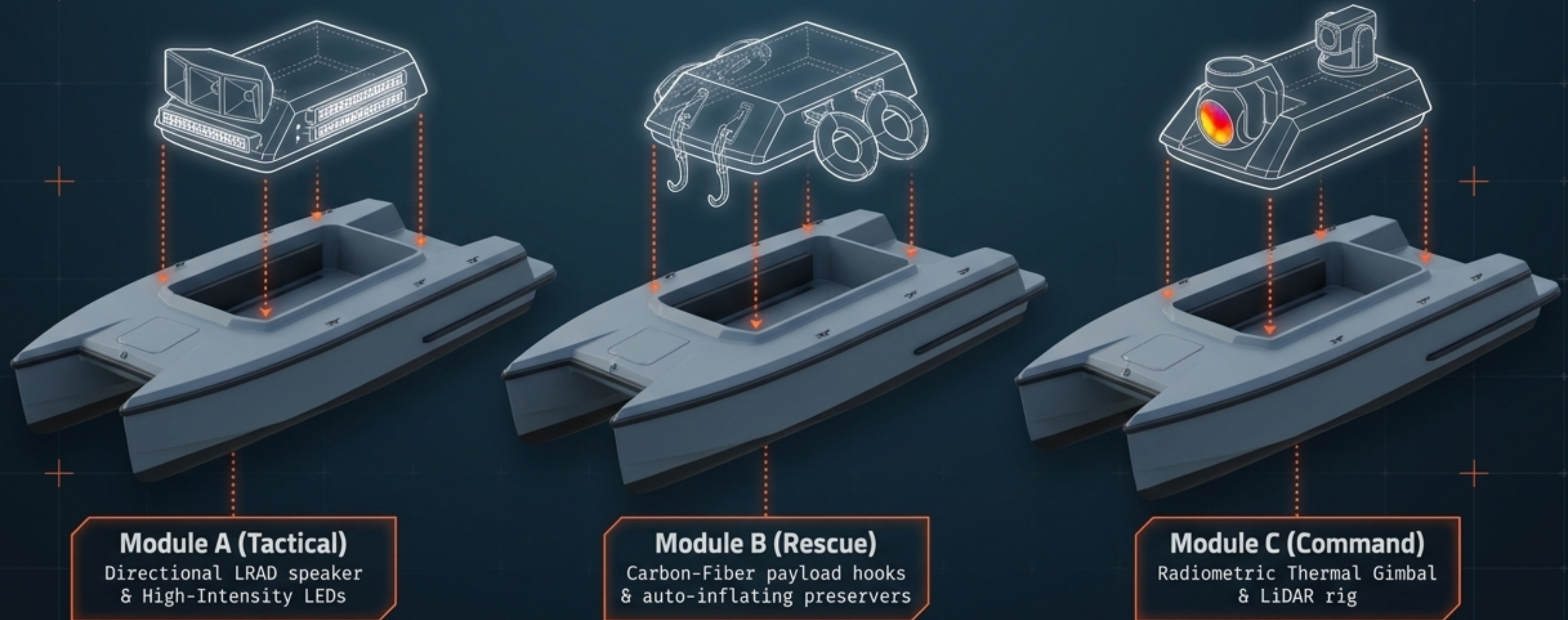
Bridging the radio gap with surface-level mesh networking

The USV acts as a floating communications relay, utilizing onboard Doodle Labs military-grade mesh radios.

It bounces the signal from ground officers on the shore up to the aerial drone, and back to command—creating an un-jammable, private LTE bubble where traditional comms fail.



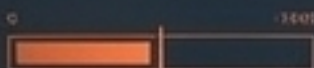
One autonomous matrix, interchangeable mission modules



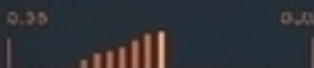
Core Principle: You are not purchasing a static patrol boat. You are investing in a modular matrix that physically adapts to changing mission profiles in under five minutes.

Autonomous suspect tracking via spatial edge computing

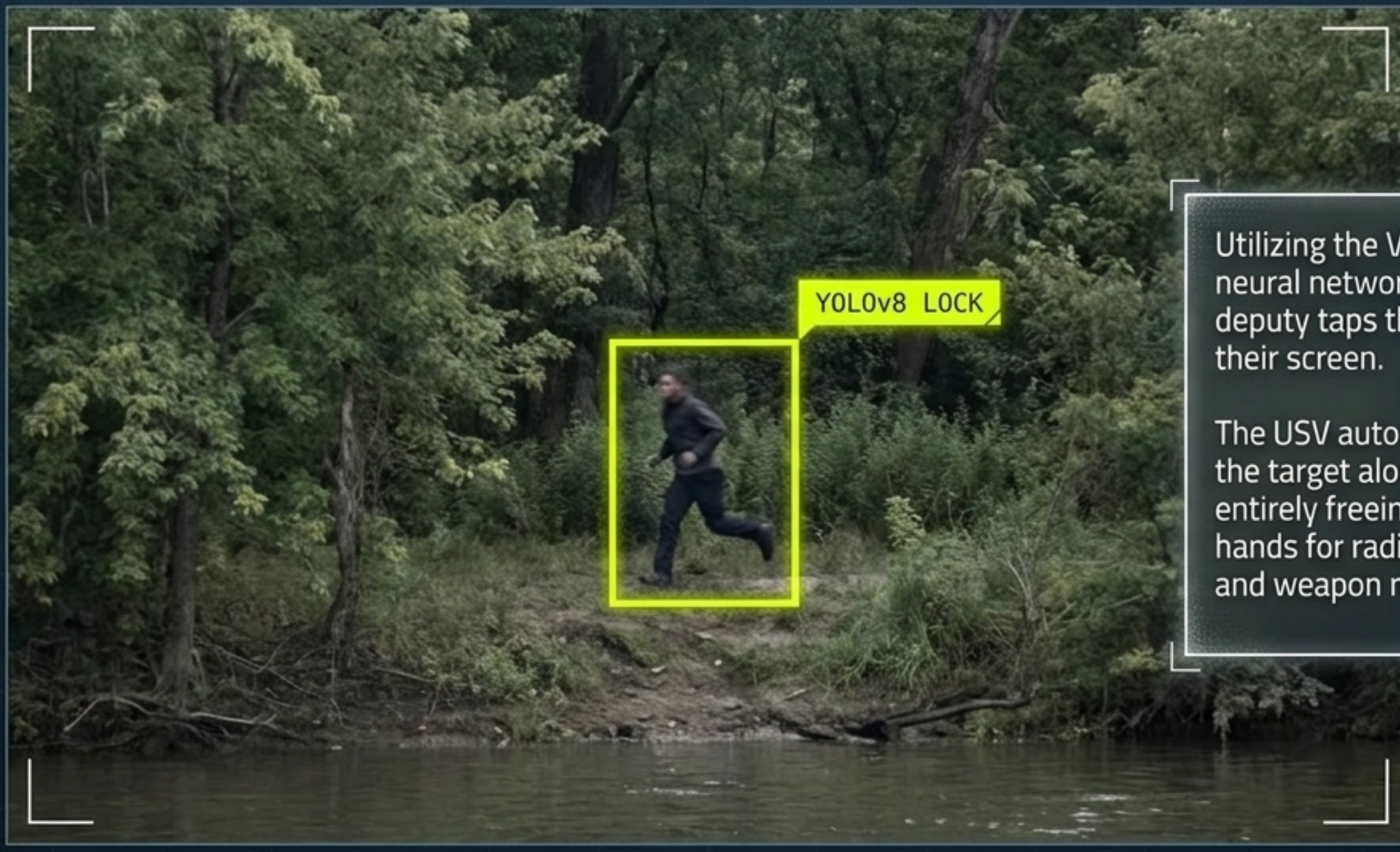
TARGET SPEED:
12 KNOTS



HEADING:
PARALLEL



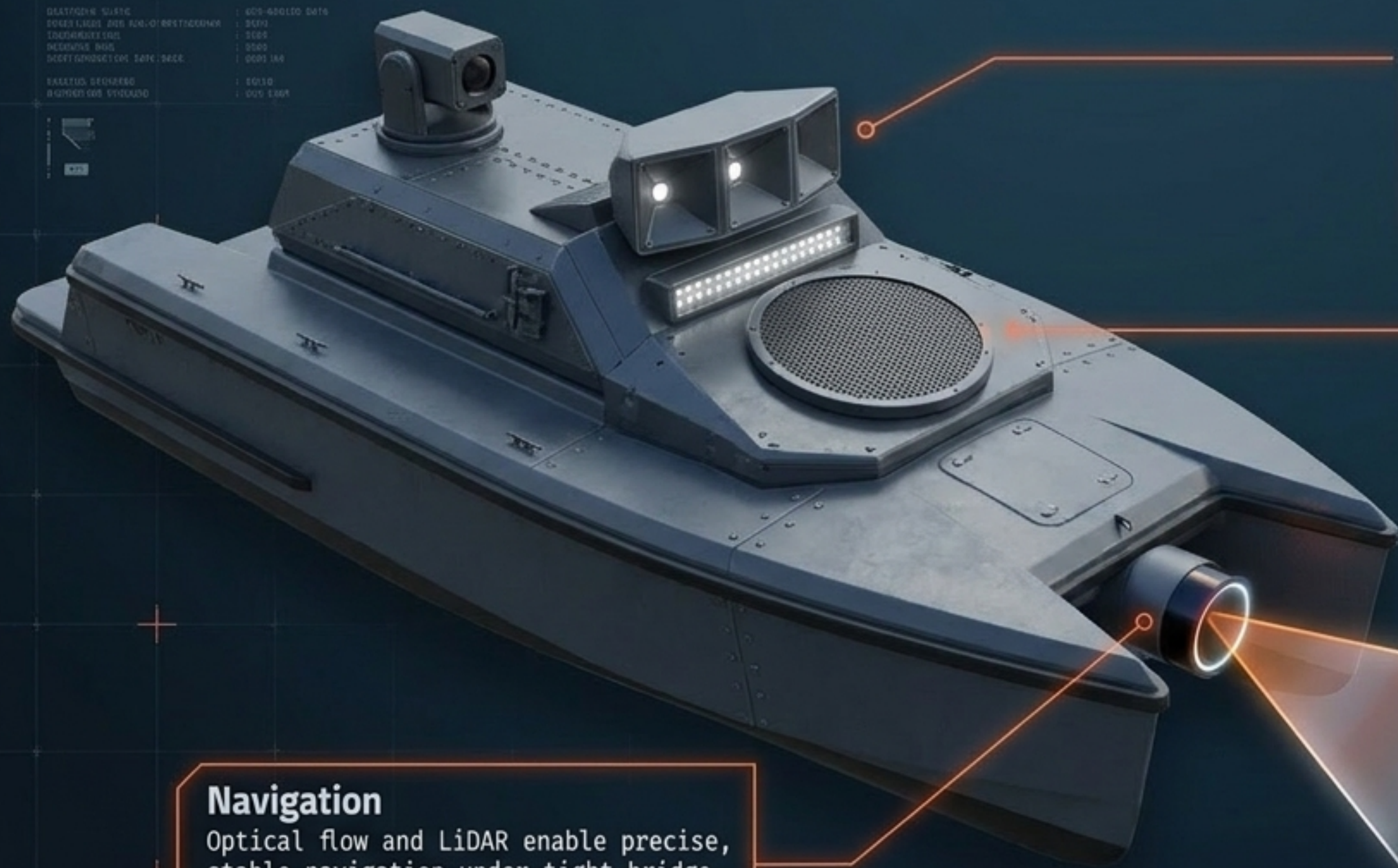
AUTONOMY:
ACTIVE



Utilizing the VOXL 2 onboard neural network, a single marine deputy taps the suspect on their screen.

The USV autonomously parallels the target along the waterway, entirely freeing the officer's hands for radio communications and weapon manipulation.

Zero-contact sensory interdiction in GPS-denied environments



Optical Disruption

High-intensity, pulse-modulated LED array (Spatial disorientation / Vertigo induction).

GPS-DENIED

Acoustic Hailing

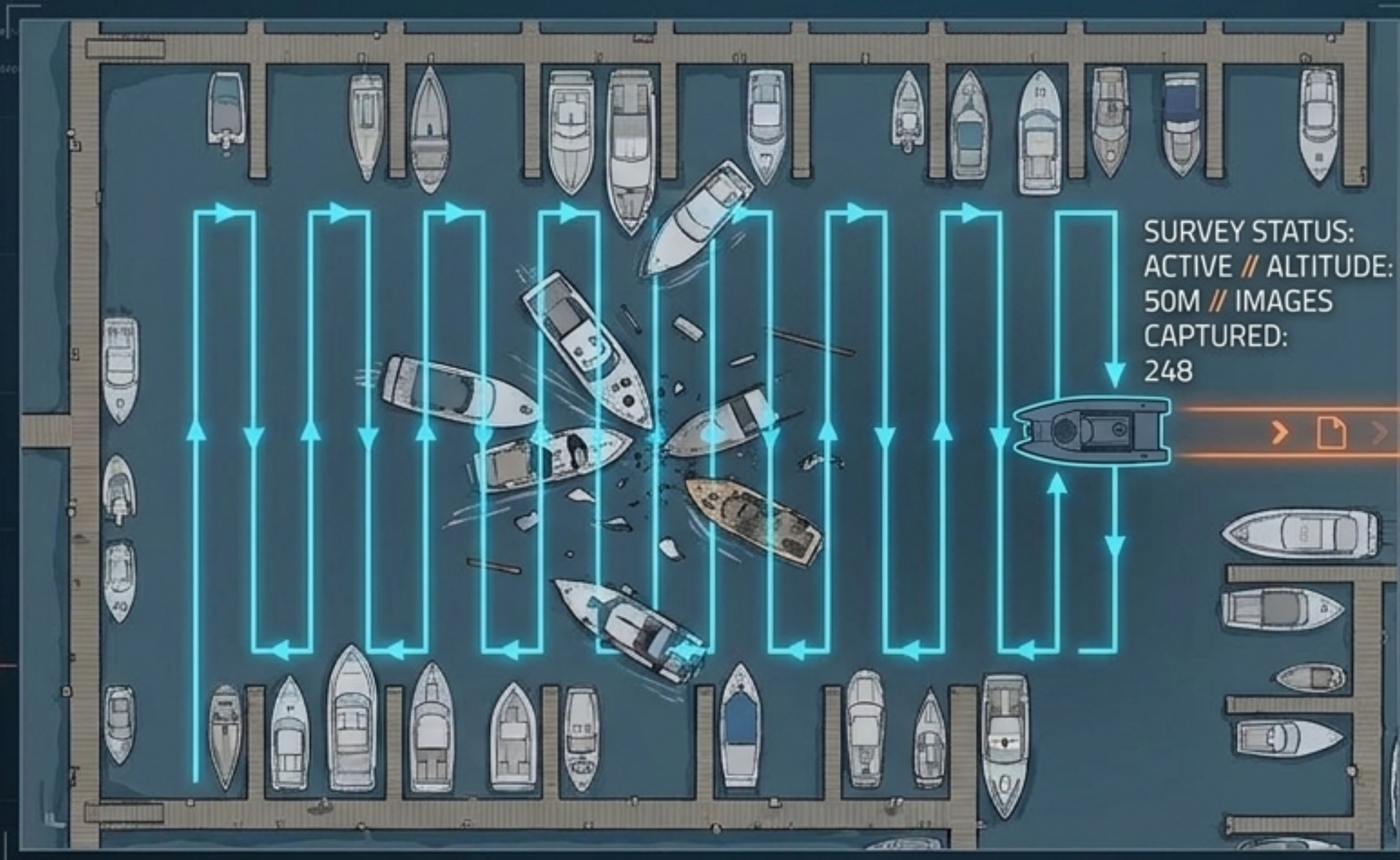
Directional LRAD for 120+ decibel dispersal orders and secure two-way negotiation.

Navigation

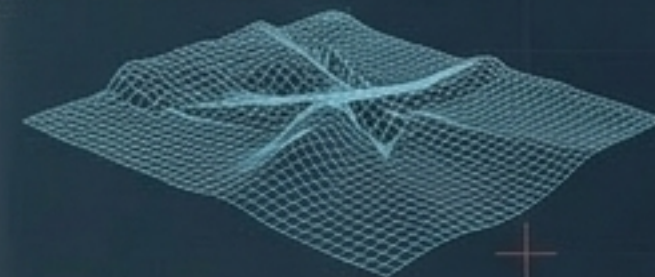
Optical flow and LiDAR enable precise, stable navigation under tight bridge pylons or covered marina docks where traditional GPS fails.



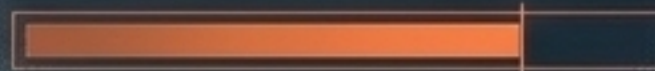
Rapid accident scene photogrammetry and grid mapping



FULLY STITCHED 3D WIREFRAME MAP



3D MODELING: 78% COMPLETE



Impact: A single button press commands the USV to map the collision, capturing hundreds of images. The local **edge-server stitches a 3D model** instantly, allowing marine investigators to clear the waterway **hours faster** than manual surveying.

AI-filtered thermal grid automation for Search and Rescue

DETECTING HUMAN
SIGNATURES IN THE DARK
USV NET
SEARCHING FOR
HUMAN SIGNATURES
IN THE DARK
USV NET



100% 100%

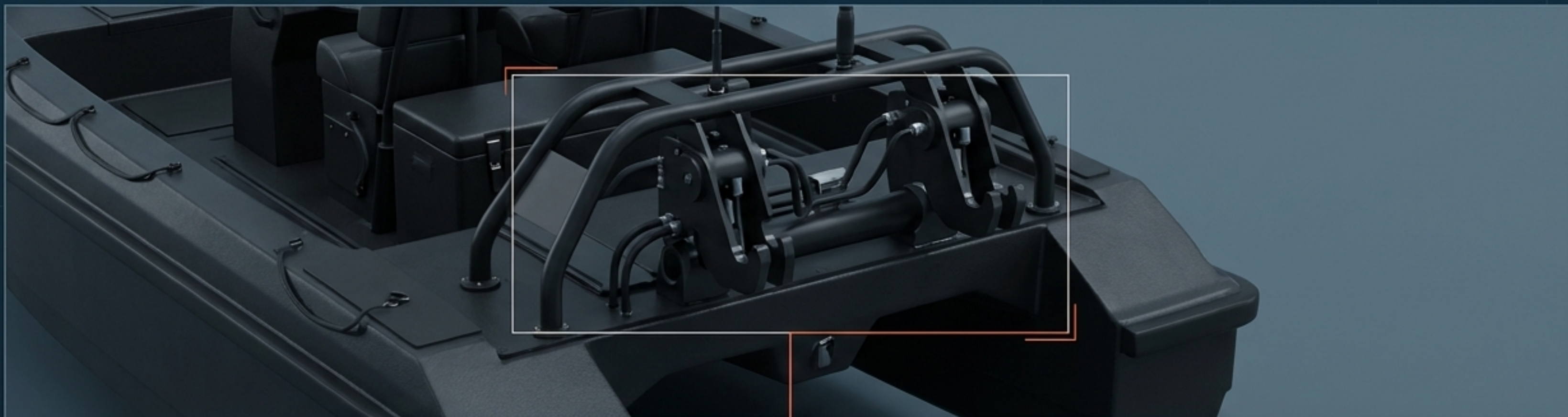


TEMP MATCH: 98.4 F
PROFILE: HUMAN
WILDLIFE_FILTER: ACTIVE

Operational Edge: The USV sails an automated search grid while the onboard AI scans the radiometric feed exclusively for human heat signatures. Command is instantly alerted upon a positive match, removing the fatigue of staring at a thermal screen for hours.



Rapid-deploy life-saving payload delivery



Auto-inflating life preserver

For drowning victims in hazardous rapids.



Automated External Defibrillator (AED)

For remote shorelines or islands.



Narcan drop-kit

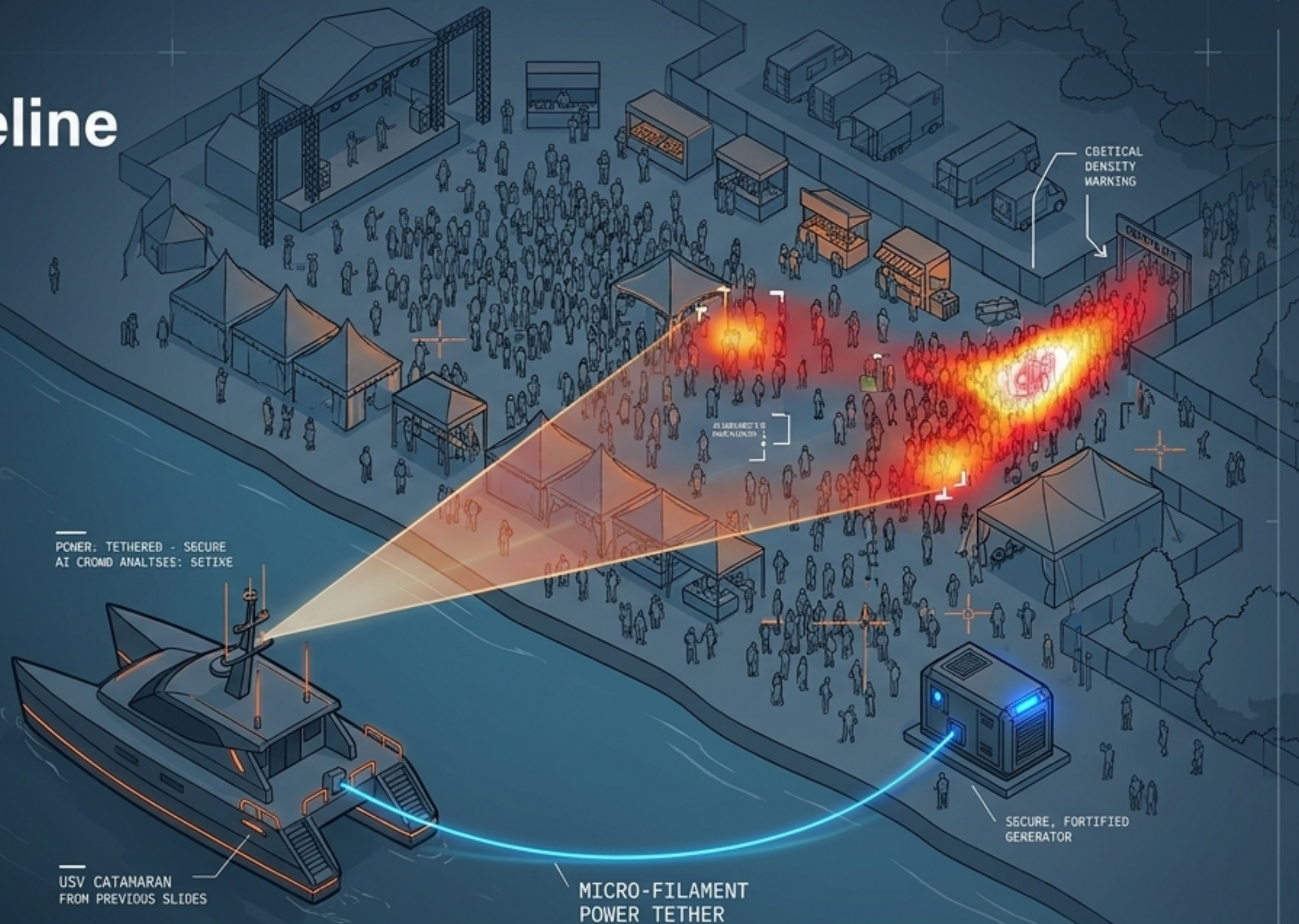
For hard-to-reach riverside encampments.



Tactical Execution: The USV can navigate toxic spills, shallow floodwaters, or Class III rapids that are too dangerous for manned dive teams, delivering critical medical interventions directly to stranded individuals.

Persistent event overwatch and shoreline crowd dynamics

Strategic Value: Instead of pulling deputies off the perimeter, the tethered USV acts as a persistent, 24/7 command overwatch station. AI actively monitors crowd crush hazards and disturbances from an unassailable vantage point on the water.



USV as a First Responder: Automated deployment docks

BATTERY STATUS: 100% (DOCK)

Step 1: The Trigger

CAD



911 WATER EMERGENCY

INCOMING CALL PRIORITY 1: DROWNING VICTIM

BATTERY STATUS: 100% (DOCK)

TIME TO TARGET: 00:02:14

Step 2: The Launch



TIME TO TARGET: 00:02:14

LAT: 38.8977° N

LAT: 38.8977° N
LON: 77.0365° W

LON: 77.0385° W

Step 3: The Response



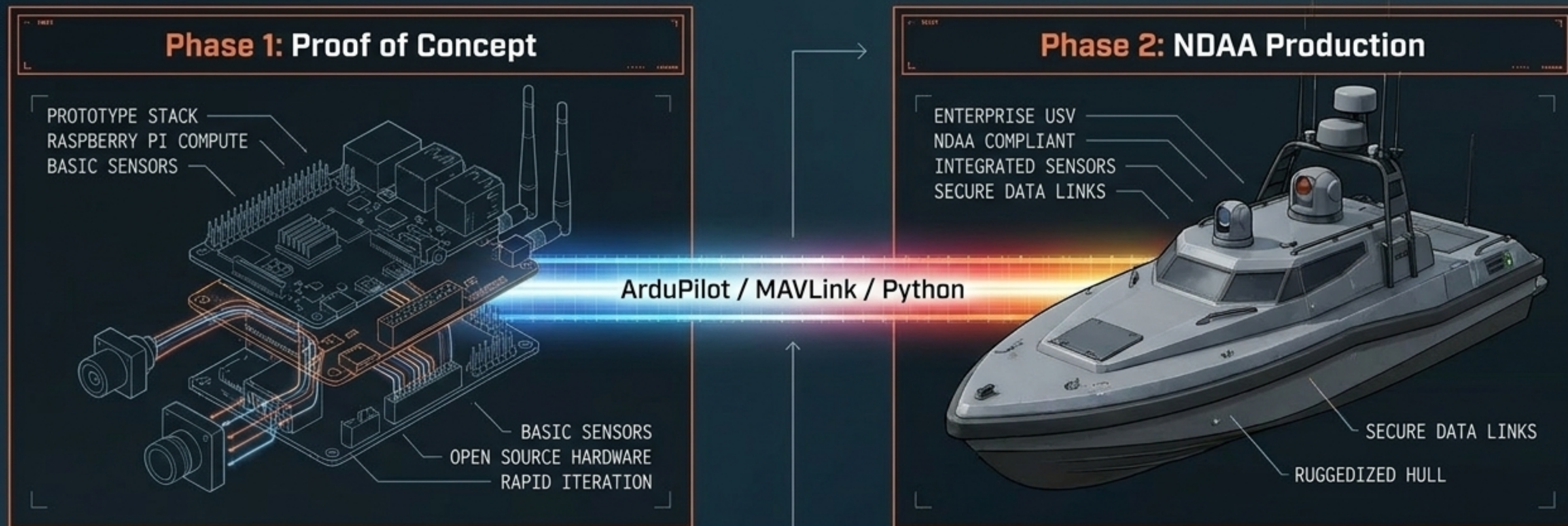
LAT: 38.8977° N
LON: 77.0385° W

USV STATUS: IN TRANSIT

USV STATUS: IN TRANSIT

The DFR Paradigm: Upon dispatch, the dock opens and the USV autonomously navigates to the GPS coordinates, USV in autonomously navigates to the GPS coordinates, arriving to provide critical live video minutes before manual marine units can mobilize or launch their trailered boats.

The Software Continuity scaling strategy



Core Philosophy: We do not build the \$15,000 production unit first. We build a highly capable Proof of Concept (PoC) to validate the software and secure departmental buy-in. Because the software stack is continuous, 90% of the AI code seamlessly migrates to the enterprise hardware.

Hardware migration: Proof of Concept vs. Production

The Budget PoC Stack (~\$600)

Brain: Raspberry Pi 4

Muscle: Holybro Pixhawk 6C

The NDAA-Compliant Stack (\$15,000+)

Brain: ModalAI VOXL 2

Muscle: mRo Pixhawk + KDE Direct Motors

IDENTICAL AUTONOMY SOFTWARE STACK

Vision: OAK-D Lite Spatial AI

Purpose: Validate AI scripts and secure grant funding.

Vision: Radiometric Thermal Gimbal + LiDAR

Purpose: Deployment-ready, federally compliant operations.

REAL TIME TELEMETRY: 01:48:4000
B00A1 90100R: 11103110
B00A1 1300: 27:00+00
D0000 100000: 00:001+0
B00100Y 0000: 00:007+0

70000000
00000000000000 1100 0.0100 4000
00000000 00110000 00~20 7000000
000
39000000~00000
4000: 100W ~100W: ~100000

REAL TELEMETRY 1344:2130
0000 0000 0000 0000
0000 0000 0000 0000

01:48:4000
TH0000: 0000 1000
0000 2000

SYSTEM STATUS: 000
01000: 000
01000: 00000000

Immediate deployment roadmap for the Sheriff's Office

Fund the PoC (Weeks 1-2)

Authorize \$1,000 for the localized software demonstration rig. Zero risk, rapid build.

Live Validation (Weeks 3-4)

Execute a controlled marine environment demo. Prove autonomous suspect tracking and thermal SAR capabilities live for command staff.

Grant Acquisition (Months 2-4)

Utilize the proven PoC data and visual evidence to formally apply for HSGP/FEMA grants, fully funding the NDAA-compliant production fleet without tapping local budgets.



Operational supremacy on the water

SYNTHESIS

True tactical advantage isn't buying a single drone; it's deploying a **modular, sovereign-compliant matrix** that unifies the air, the ground, and the water under **one autonomous command structure**.

The USV Catamaran
(Interdiction)

The Aerial Drone
(Overwatch)

Mobile Command
Center

NETWORK STATUS: **SECURE**
FLEET READINESS: **OPTIMAL**

RADIOMETRIC THERMAL SENSOR

MAGMA

IRONBOW

Initiate Phase 1 PoC.

LAT: 39.0698° N
LON: 84.1624° W

LAT: 39.8698° N
LON: 84.1624° W