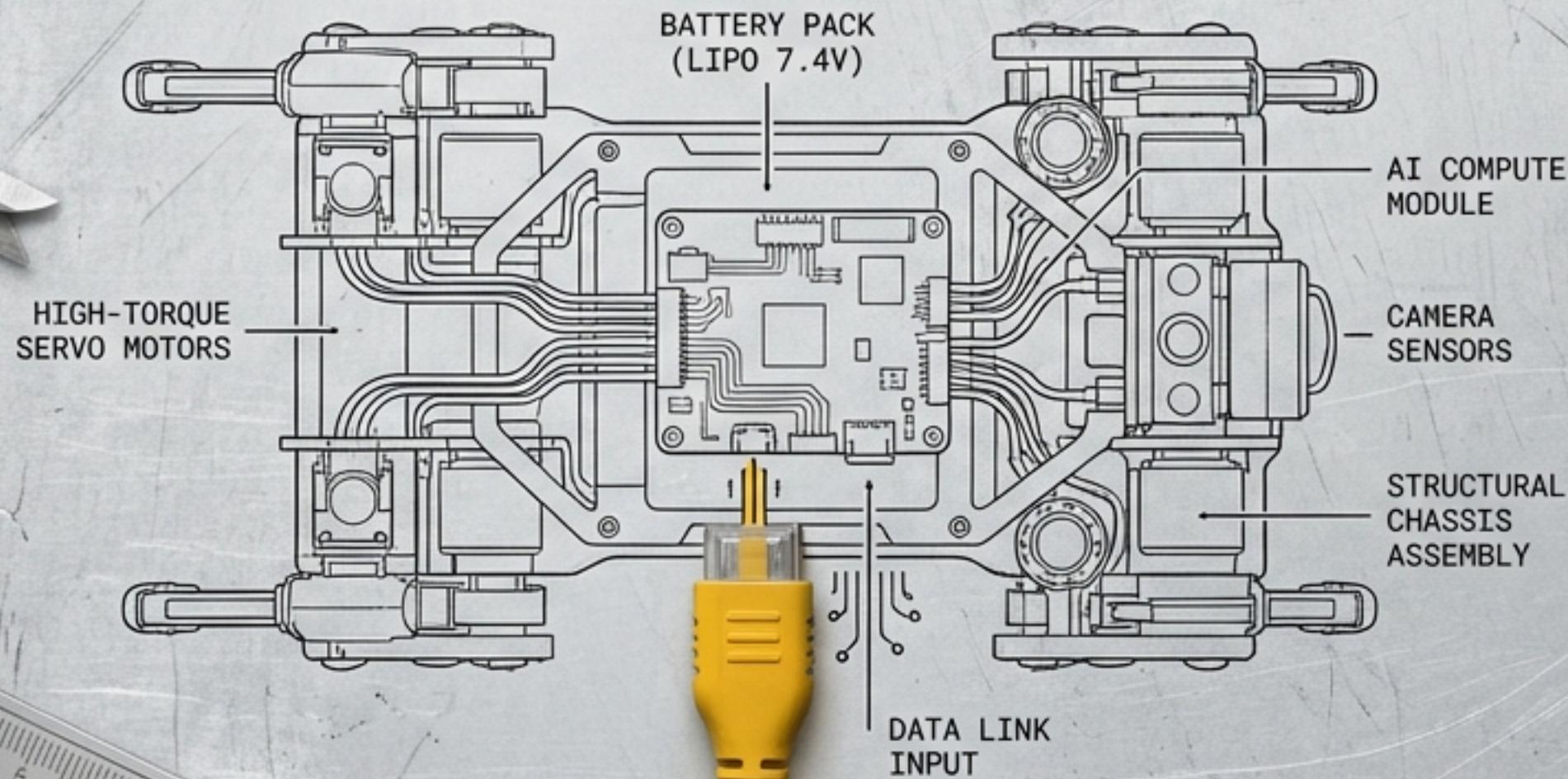


PROJECT AETHER

AUTONOMOUS EDGE-TRACKING HYBRID
ENTITY & RECONNAISSANCE



SYSTEM CLASS:
DISTRIBUTED AI ROBOTICS
// HIVE MIND ARCHITECTURE

PRIMARY AGENT:
PETOI BITTLE X (QUADRUPED)

COMPUTE CORE:
**JETSON ORIN NANO +
RASPBERRY PI CLUSTER**

STATUS:
**PHASE 2 INTEGRATION
[ACTIVE]**

**CONFIDENTIAL //
ENGINEERING BRIEF**

MISSION PROFILE // OPERATIONAL CONTEXT

VISUAL RECONNAISSANCE

Mapping hazardous zones (rubble, gas leaks, collapsed structures) using Visual SLAM without GPS reliance.



SIGNAL INTELLIGENCE (SIGINT)

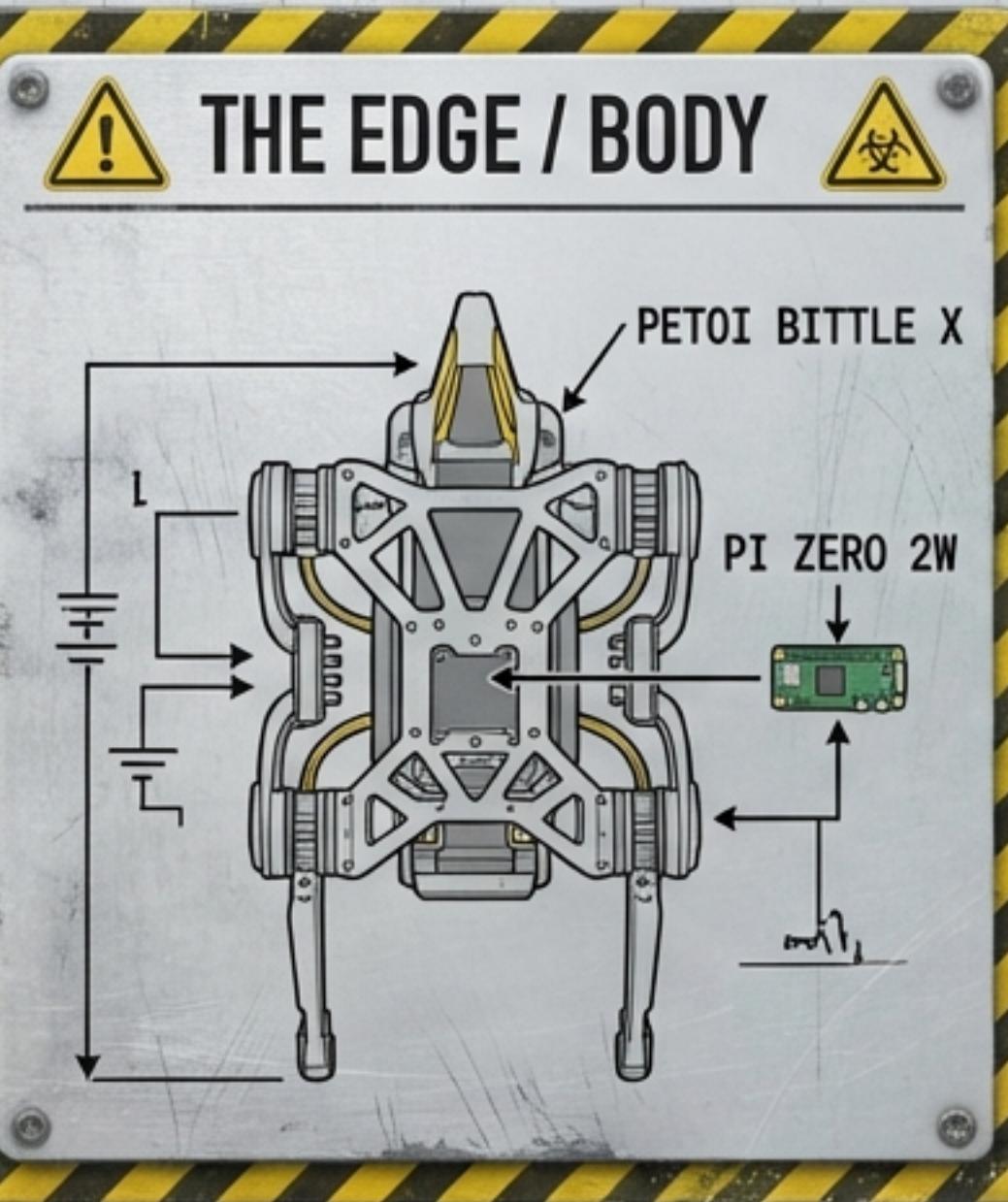
'Fox Hunting' Operations: Autonomous RF signal triangulation to locate emergency beacons or interference sources.

EDGE TRACKING

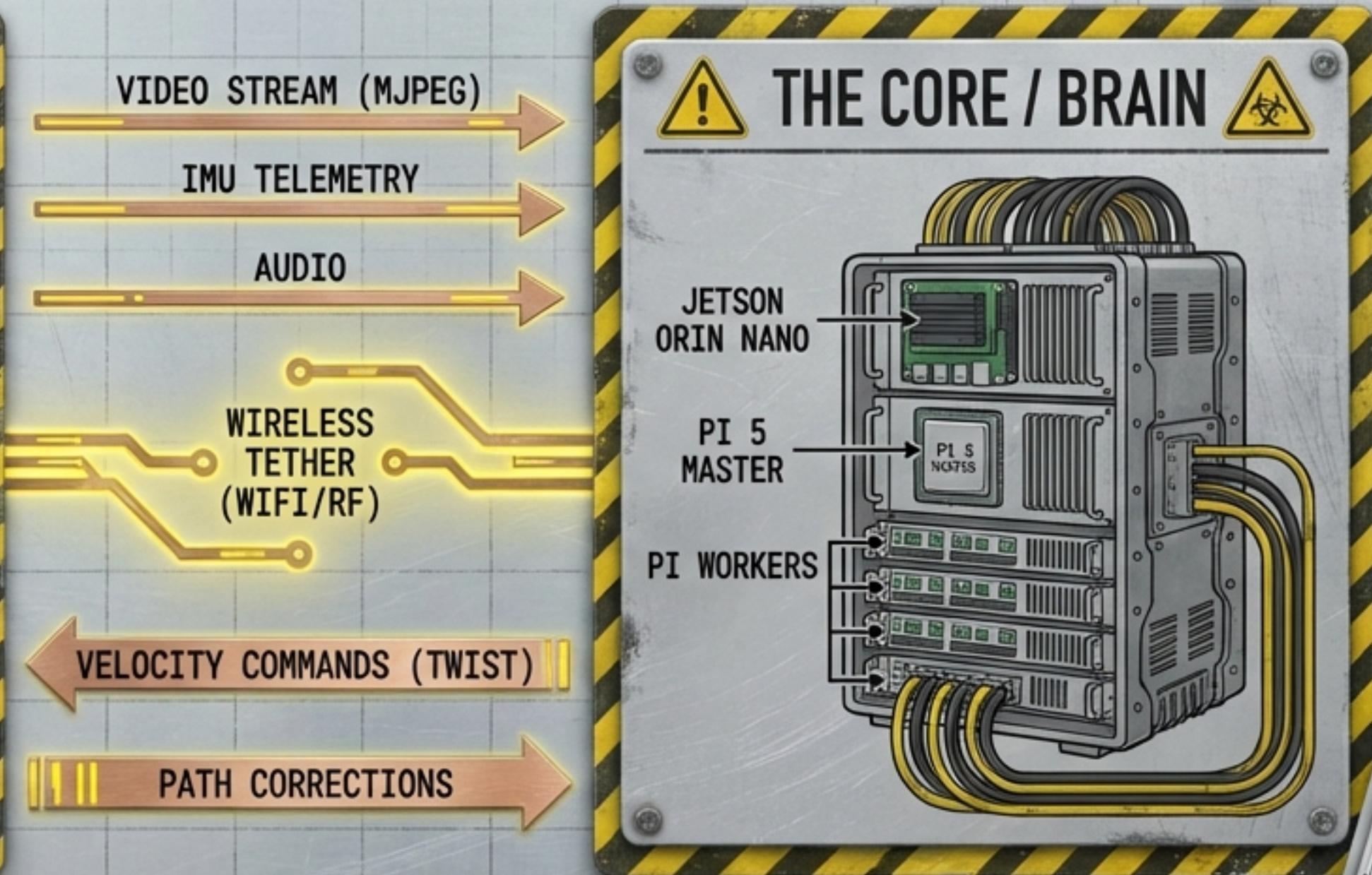
Real-time identification of specific entities (Survivors, Keys, Medical Kits) using YOLOv8 inference.

TARGET ZONES: DISASTER AFTERMATH // INDUSTRIAL PIPELINES // POWER SUBSTATIONS

SYSTEM ARCHITECTURE // THE HIVE MIND



LOW LATENCY // HIGH MOBILITY

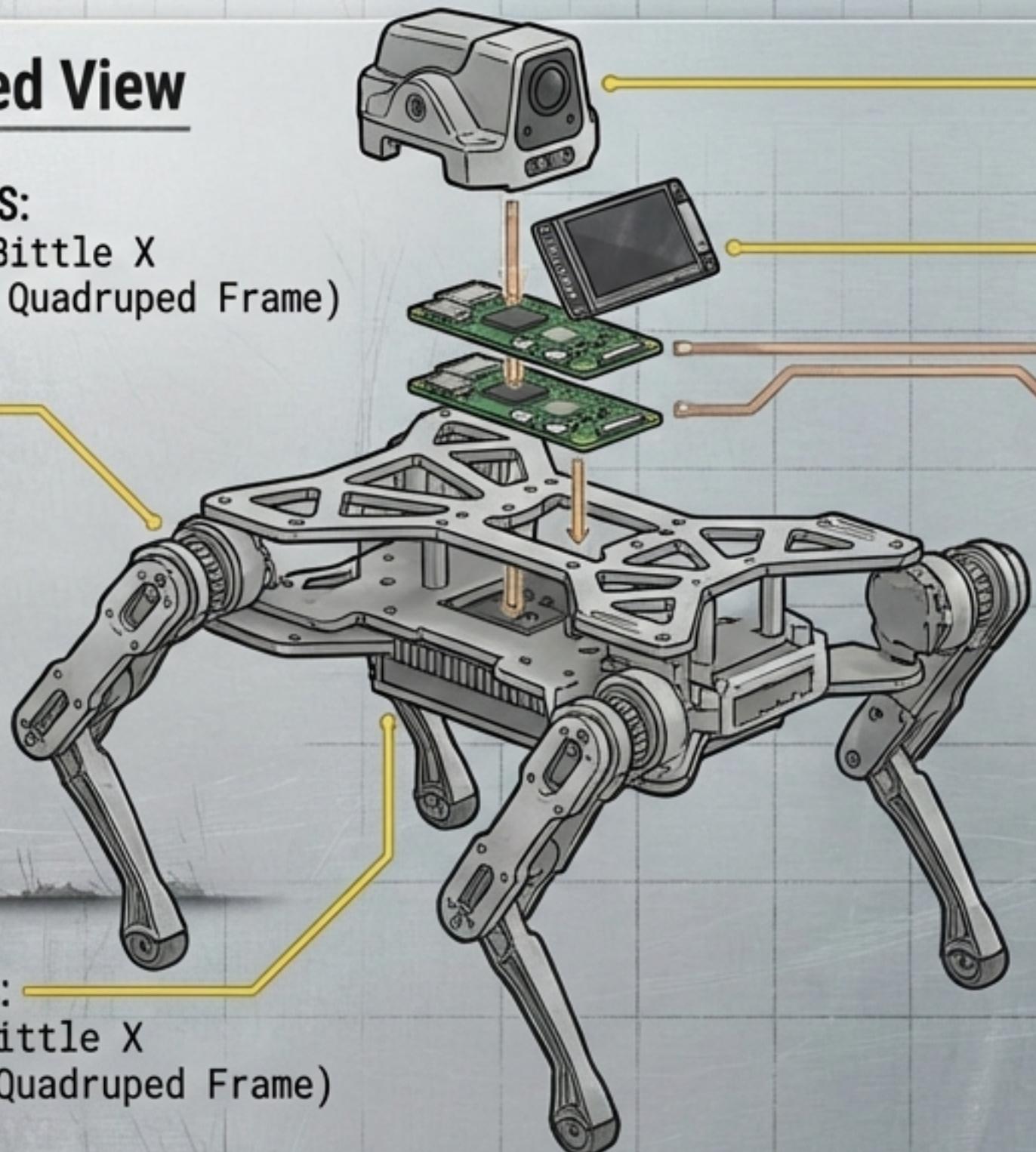


HEAVY INFERENCE // PATH PLANNING // ORCHESTRATION

HARDWARE SPECIFICATION // MOBILE AGENT (SCOUT)

Exploded View

① CHASSIS:
Petoil Bittle X
(Agile Quadruped Frame)



④ SENSORS: Camera (Visual Data) /
IMU (Inertial Data)

③ STATUS DISPLAY: Lilygo T-Display
(States: Patrol / Target Found)

② BRIDGE COMPUTE:
Pi Zero 2W (x2) -
- ROS2 (Inertia/ MJPEG Stream)

① CHASSIS:
Petoil Bittle X
(Agile Quadruped Frame)

⚠ ENGINEERING NOTE: ⚠
WEIGHT SENSITIVITY.

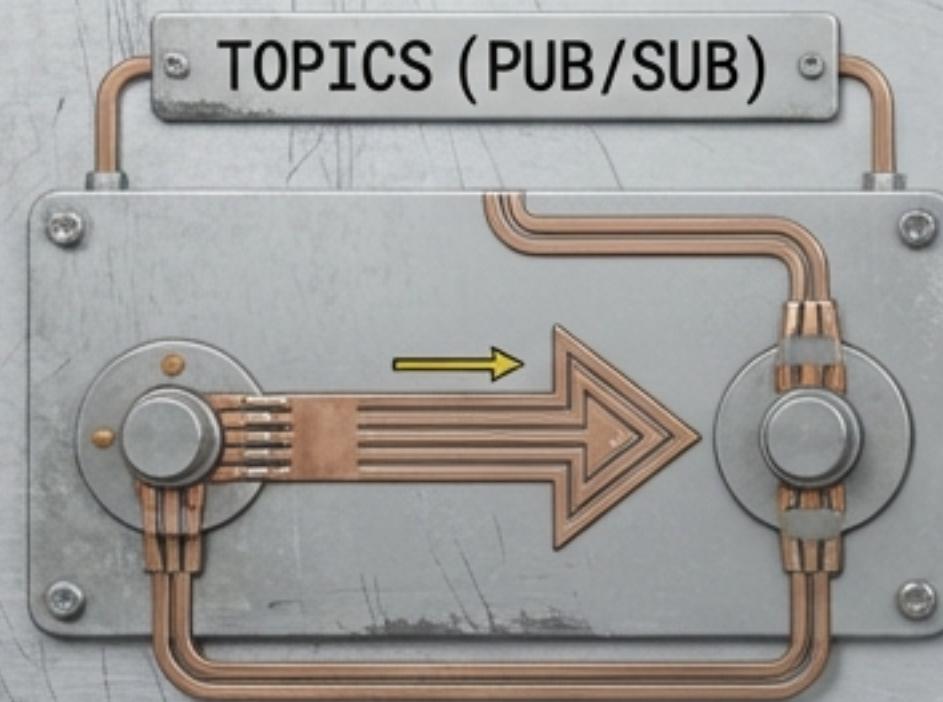
Heavy LIDAR disrupts gait
center of gravity. Visual
SLAM preferred for this
chassis configuration.

HARDWARE SPECIFICATION // BASE STATION CLUSTER



INTERCONNECTIVITY // ROS2 ARCHITECTURE

BACKBONE: DATA DISTRIBUTION SERVICE (DDS)



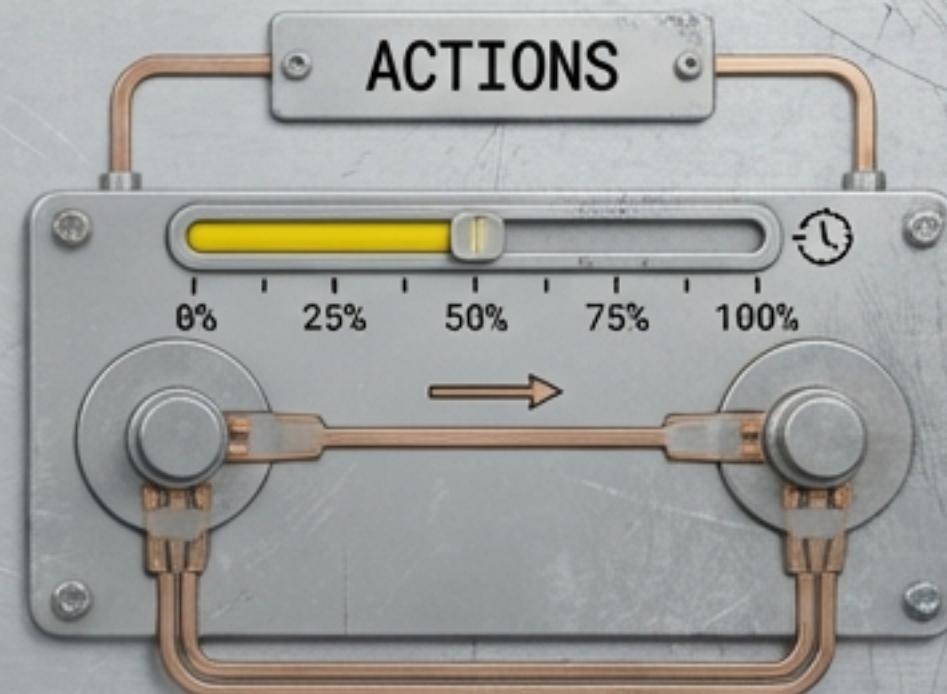
Asynchronous Streaming.

Example: Camera Node publishes "Image" -> Analysis Node subscribes.



Request/Response.

Example: Client requests "Turn 45 deg" -> Server confirms completion.



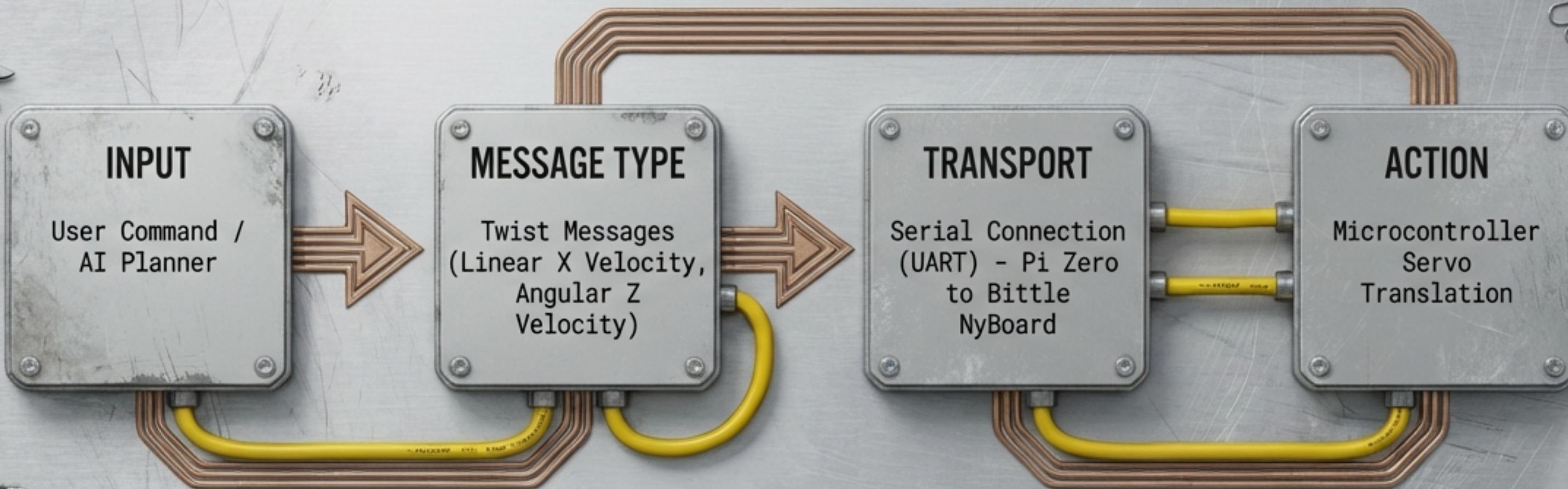
Long-running goals with feedback.

Example: "Navigate to Coordinate X,Y" (Continuous distance updates).

SOFTWARE STACK // DISTRIBUTED COMPUTATION



TELEOPERATION // MOTION CONTROL



TECHNICAL NOTE

- STABILITY CONTROL:** Internal Gyro/Accelerometer maintains balance during gait execution (OpenCat Firmware).
- LATENCY MANAGEMENT:** Custom driver required for real-time serial communication.

PERCEPTION // VISUAL SLAM

FEATURE EXTRACTION

Identifying high-contrast corners and edges in video feed.

FACTOR GRAPHS

Mathematical optimization of Position Nodes (X_1, X_2) and Landmarks.

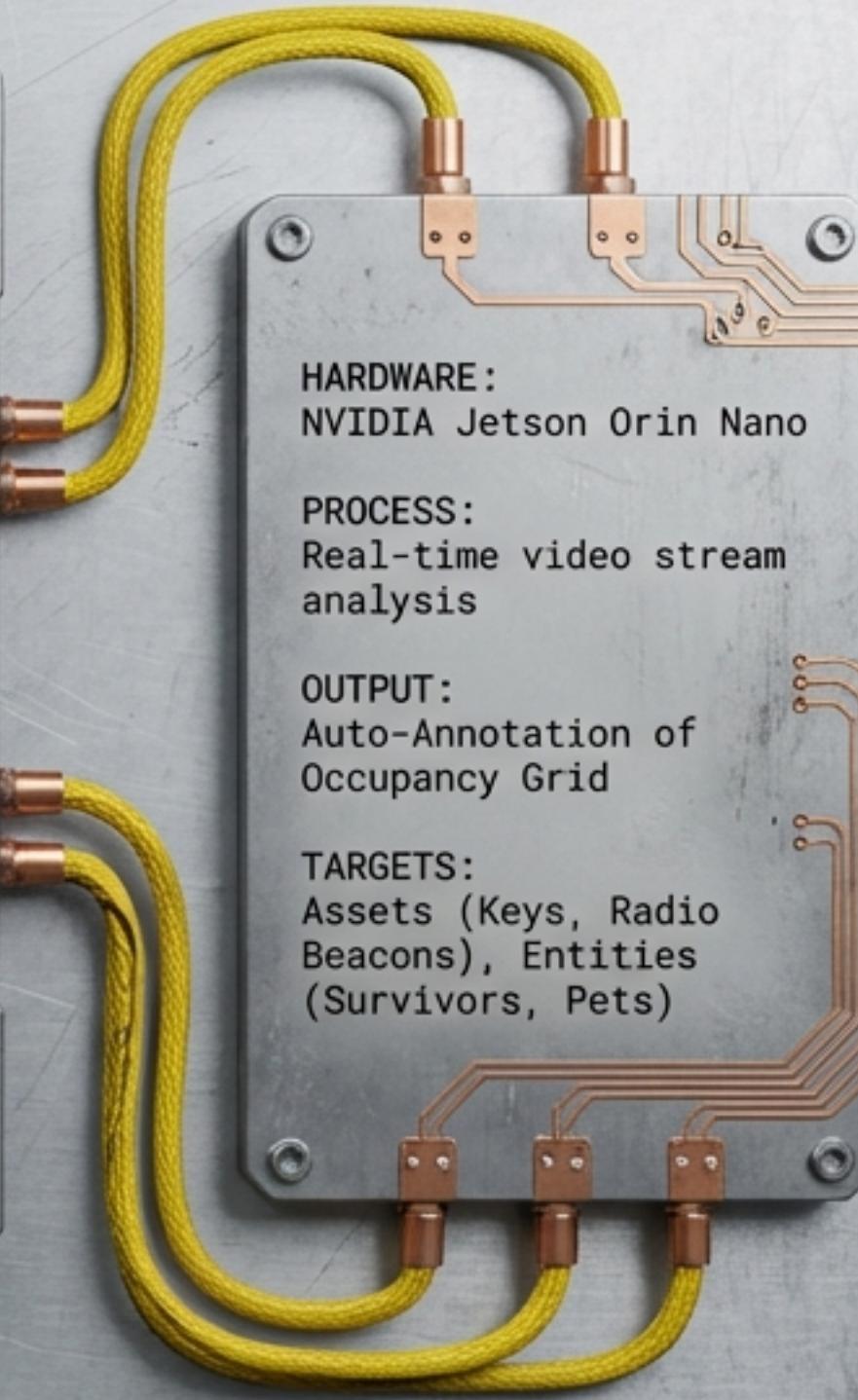
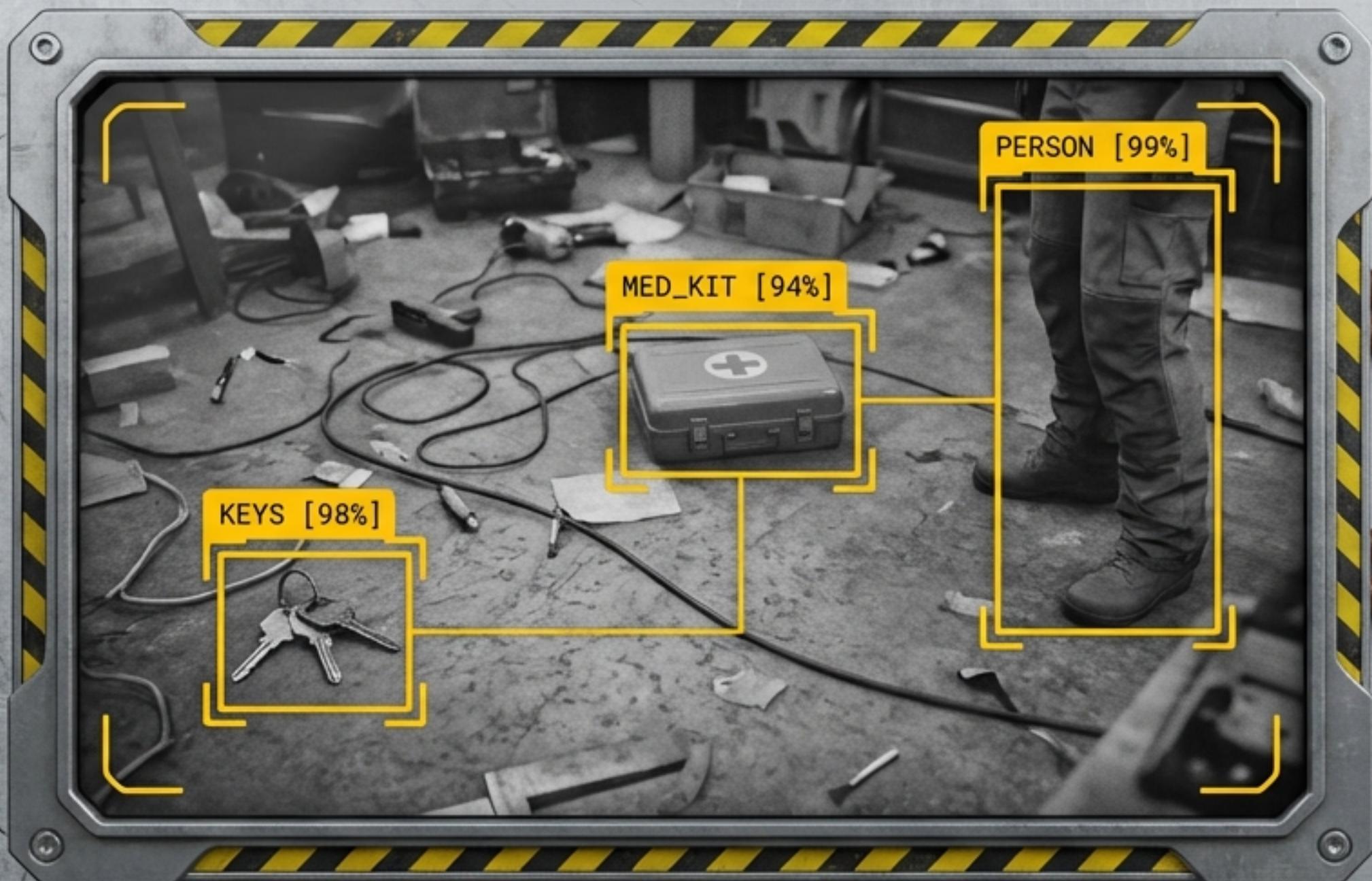
LOOP CLOSURE

Recognition of previously visited coordinates to correct drift error.

GPS STATUS: UNAVAILABLE / DENIED

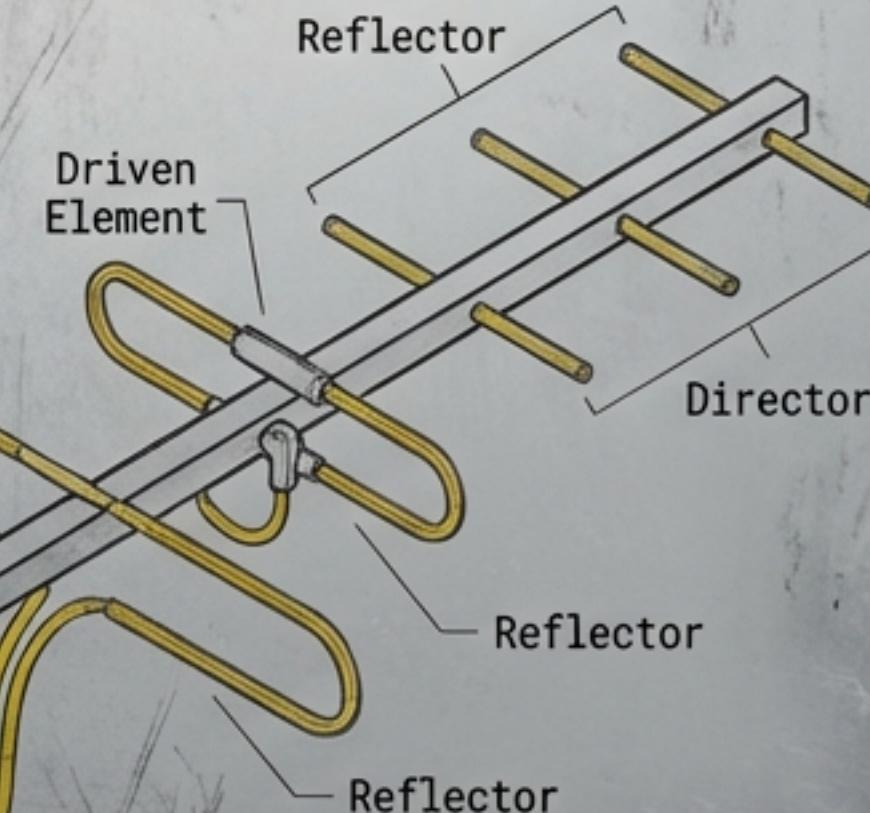
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

OBJECT RECOGNITION // YOLOv8 INFERENCE



SIGNAL INTELLIGENCE // FOX HUNTING

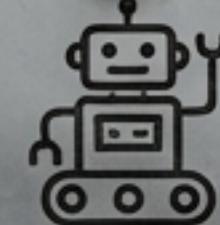
YAGI ANTENNA



GRADIENT ASCENT



RSSI
Intensity
Tracking



Gradient Ascent

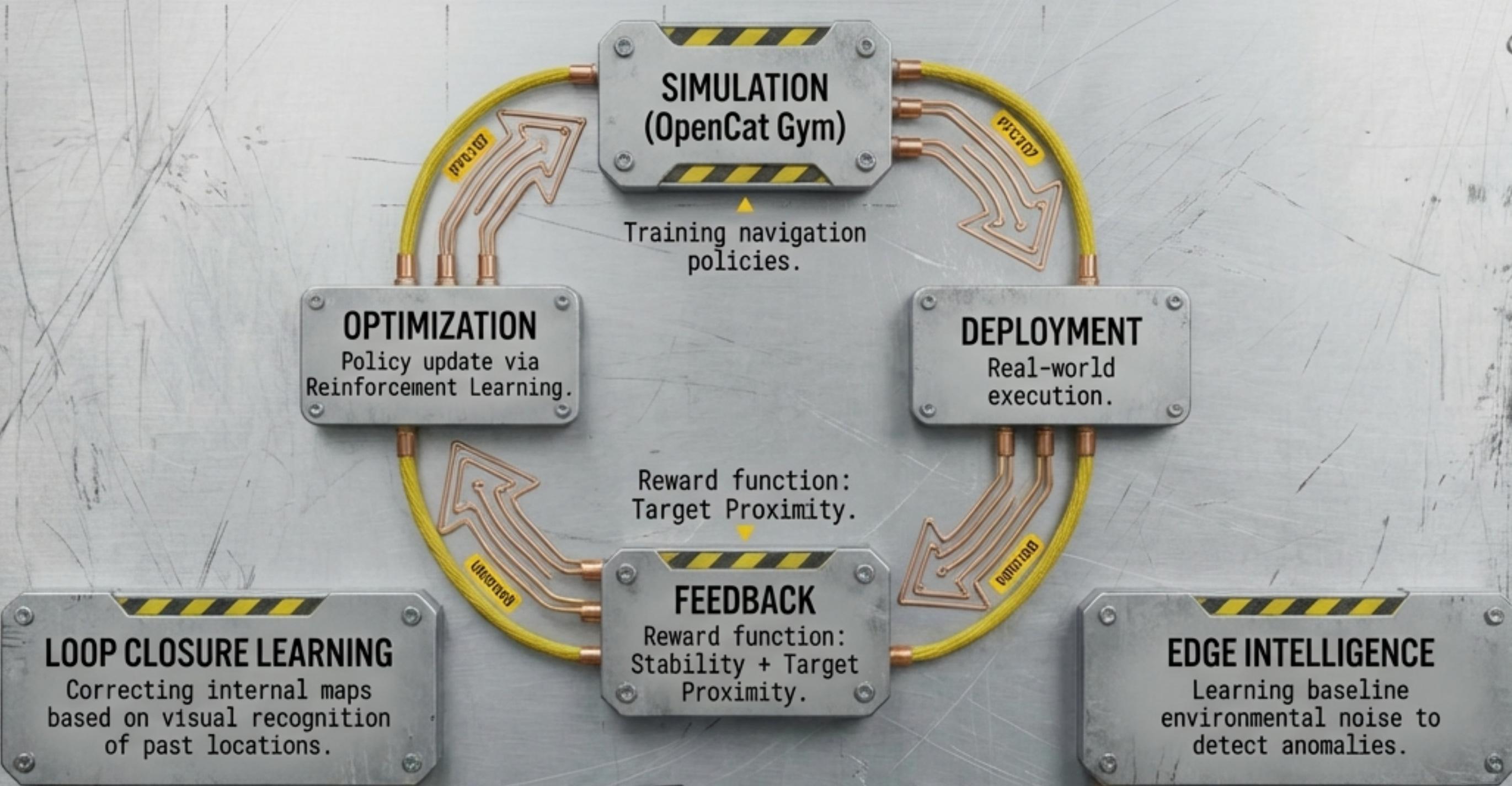
HARDWARE INTEGRATION (DIN Condensed)

- Fox Hunt 2m Radio
- 2.4GHz PCB Yagi Antenna

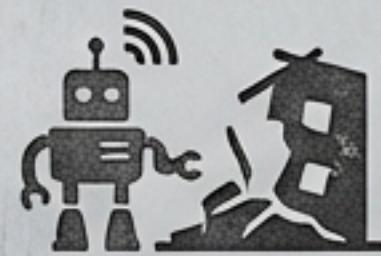
INTERACTION METHOD (DIN Condensed)

- Multimodal Trigger:
User command "Find the radio signal"
-> Processed by Whisper/LLM
-> Initiates Hunt Node

ADAPTIVE COGNITION // SELF-LEARNING

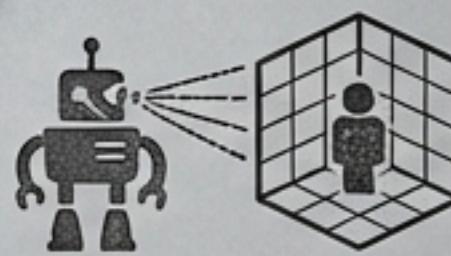


FIELD DEPLOYMENT // USE CASES OPERATIONAL SCENARIOS



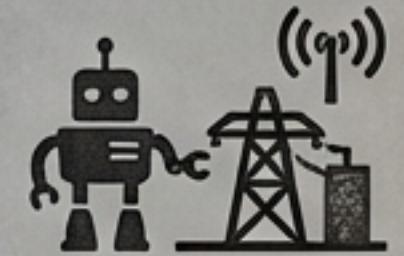
SEARCH & RESCUE

Navigating collapsed structures.
Detecting survivors via Visual/Thermal.
Locating mobile phone signals.



HAZARDOUS MAPPING

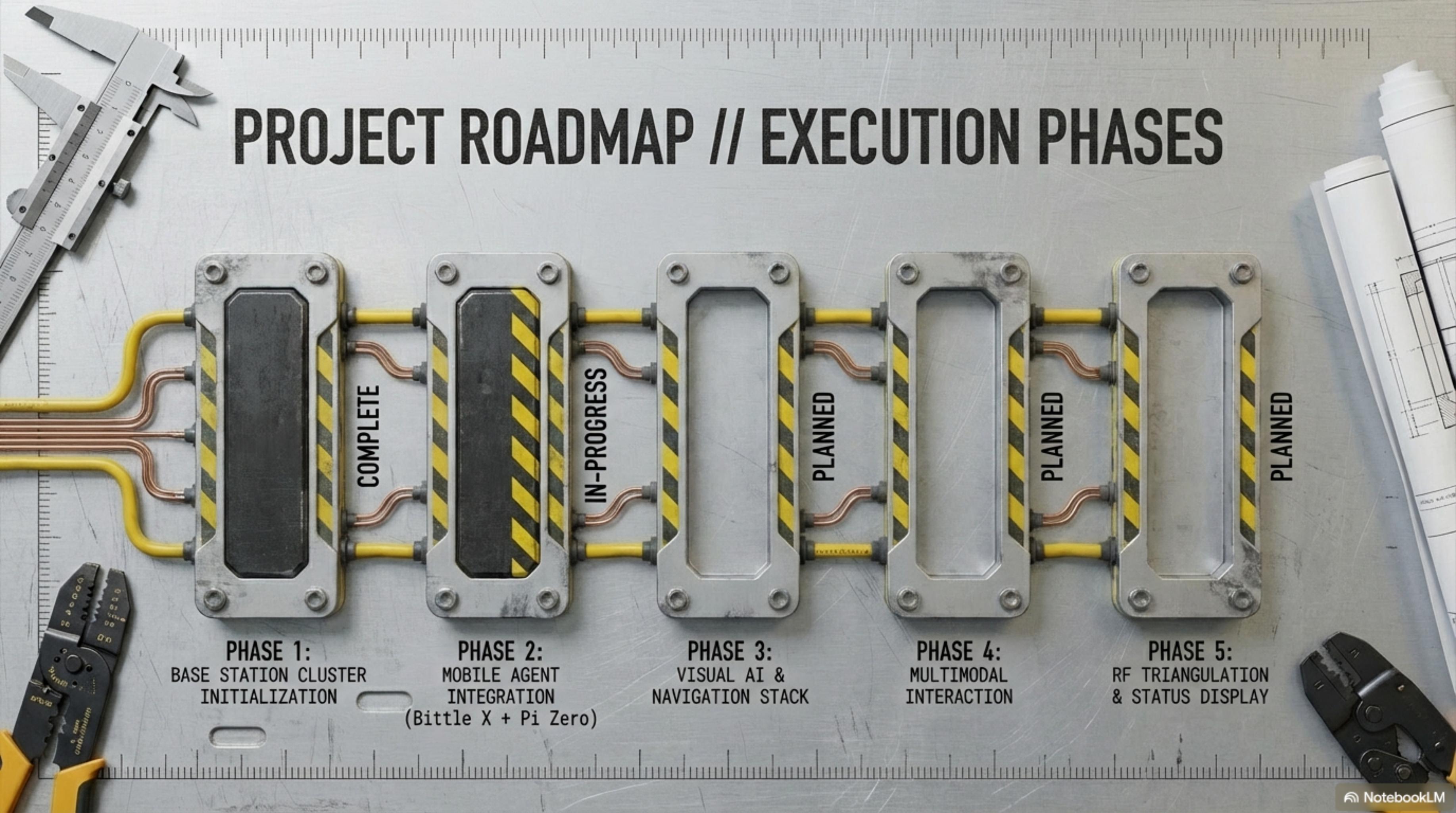
Creating 3D occupancy grids of gas-leaking factories.
Entry: Forbidden for humans.
GPS: Denied.



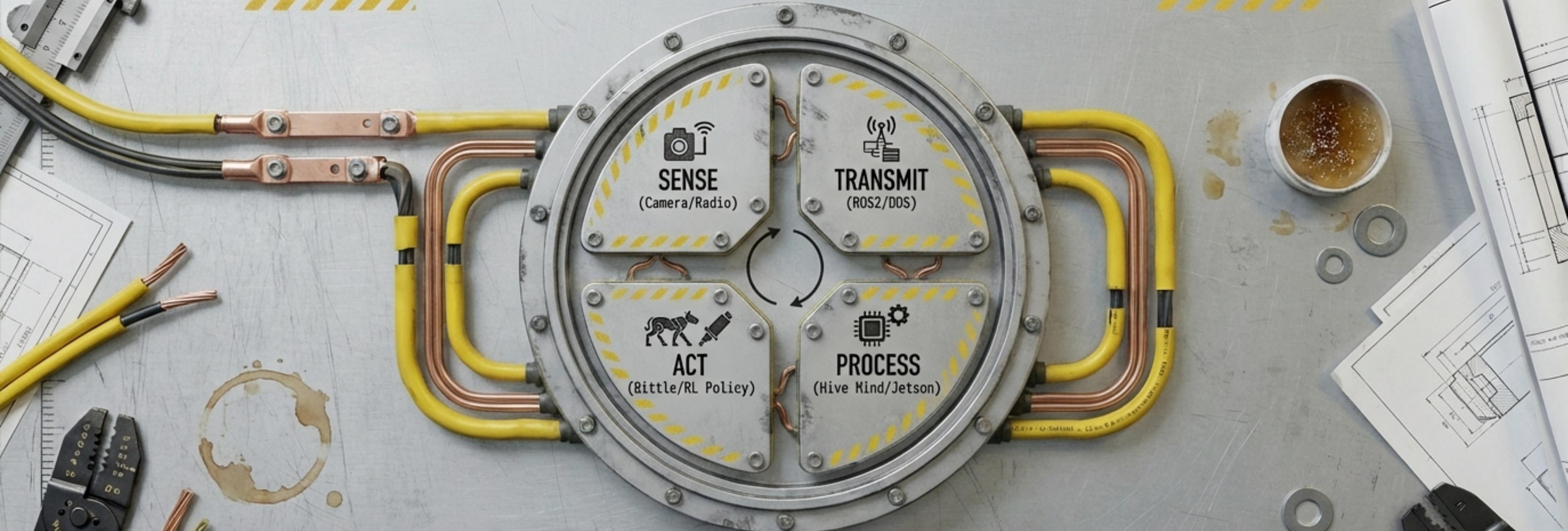
INFRASTRUCTURE SENTRY

Autonomous patrol of power substations.
Detection of RF interference and thermal anomalies.

PROJECT ROADMAP // EXECUTION PHASES



SYSTEM STATUS // OPERATIONAL READINESS



DISTRIBUTED INTELLIGENCE. RUGGEDIZED AUTONOMY. PROJECT AETHER.