MOSAIC Agents

Edge computing for robotic systems

Overview

MOSAIC Agents are ruggedized onboard computing units designed to connect robotic platforms, sensors and communication systems to the MOSAIC ecosystem. Built around NVIDIA Jetson technology, they provide a compact and deployable hardware node for edge processing and robotic integration.

Each MOSAIC Agent combines processing power with the required physical interfaces to connect payloads, vehicle systems and communications equipment in the field. This makes it easier to integrate heterogeneous robotic assets into one common operational environment.

To ensure seamless interoperability with MOSAIC Hub, MOSAIC Agents run the MOSAIC robotic interface module. This enables synchronized data exchange, coordinated mission execution and straightforward integration between the onboard edge hardware and the central Command and Control layer.

Dual form-factor

To support different operational needs, MOSAIC Agents are offered in two hardware variants. A compact airborne version is optimized for UAV integration and wide-area pre-scanning, while a larger ground vehicle version is designed for mounted deployment on UGVs or support carts for more demanding sensing, processing and communication requirements.

Edge processing

MOSAIC Agents provide onboard computing capacity for local execution of sensor-processing, perception and localization functions at the edge.

By processing data directly on the platform, they reduce reliance on continuous high-bandwidth communications and enable relevant outputs to be synchronized more efficiently with MOSAIC Hub.

Robotic Integration

MOSAIC Agents enable modular interfacing with robotic software stacks, onboard subsystems and payload drivers.

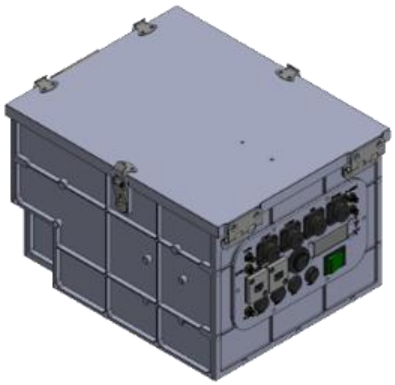
In a non-invasive setup, a MOSAIC Agent can be added to an existing UGV purely as a perception and sensing module, without taking over vehicle control. The platform continues to operate through its native control system, while the Agent captures sensor data, performs local processing and synchronizes outputs with MOSAIC Hub for visualization and decision support.

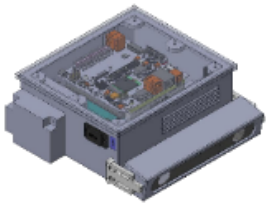
Where needed, deeper integration is also possible to support autonomous functions.

Technical specifications

- **Dimensions**: 32cm*26cm*20cm box (UGV version)
- **Interfaces**: USB, ethernet, Wi-Fi communication interfaces
- **Software**: Dockerized ROS2 with DDS & Zenoh
- **Communications**: Inter-robot and with C2; IP mil-grade mesh high throughput wireless network
- **Compute**: Intel core i9-12900H, 32GB RAM, 1TB; NVIDIA Jetson solution for UAV
- **Input power**: 36V – 10A; 12V - 3A

Form Factors





MOSAIC Agents at a glance

MOSAIC Agents are ruggedized edge computing units that connect robotic platforms, sensors and communications systems to the MOSAIC ecosystem. By combining onboard processing, payload interfacing and synchronized data exchange with MOSAIC Hub, they enable mission-relevant data to be captured, processed and shared directly from the field. Their modular architecture supports integration across different platform types and operational needs.

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Integrated multi-sensor navigation

The MOSAIC Agents support navigation based on the fusion of multiple sensor data rather than reliance on a single positioning source. The UAV version combines GNSS, vision and inertial inputs, while the ground vehicle version extends this with LiDAR to improve localization robustness in more complex environments. This fused approach improves platform awareness, navigation continuity and positioning resilience in operational conditions where GNSS may be contested.

- Waypoint navigation considering terrain and obstacle avoidance
- Multi-waypoint optimal path planning and navigation
- Navigation through predefined path, allowing user-defined conditions
- Navigate through several types of terrain (mud, grass, rocky, sand, etc..) using traversability analysis

Positioning Accuracy

- With GNSS: Centimeter(s) level absolute position accuracy using two-stage sensor fusion
- Without/degraded GNSS: 2-4% of travelled distance localization

Embedded communication

Integrated RF IP mesh communication to support field deployment and connectivity with the wider mission system. The UAV version is configured around SDR SOLO C, while the ground vehicle version supports SDR SOLO R. This communication layer enables exchange of mission data, status information and processed outputs between the edge platform and MOSAIC Hub (Command & Control).

Threat detection payload

MOSAIC Agents are designed to interface (explosive) threat detection payloads across multiple robotic platforms. Supported sensor types include, depending on the configuration, Ground Penetrating Radar (GPR), Hyperspectral and magnetometer for airborne pre-screening, as well as EMI, Raman and XRB sensors for ground-based inspection, confirmation and characterization tasks.

The Agents provide the onboard hardware and software bridge between these payloads and the MOSAIC ecosystem, supporting sensor acquisition, edge processing and synchronization with MOSAIC Hub for operator visualization and mission-level coordination.

Use cases

- ISR missions with real-time 3D terrain mapping in GPS-denied environments
- Assisted route clearance and explosive threat-aware navigation ('mine mapping') across complex off-road terrain
- Casualty evacuation from contested zones without exposing additional personnel
- (Mobile) counter-UAS / active protection missions through integration of external detectors, effectors and edge-based C2
- Persistent perimeter surveillance
- Resupply in denied or high-risk zones with little or no human interaction and speed adaptability to the terrain ensuring payload security
- Rapid terrain recognition for mission planning

Deployed MOSAIC Agents

Mountable modules – Integrated MOSAIC Agents deployed on a UGV and UAV platform, providing onboard computing, payload interfacing, communications and synchronization with MOSAIC Hub.

Sensor visualization in MOSAIC Hub – Example use case: explosives detection. Showing mission data from distributed MOSAIC Agents consolidated within MOSAIC Hub.

Communications – MOSAIC Agents can provide mesh - Software Defined Radio (SDR), satellite communications and other wireless communications integrated solutions

Join MOSAIC community

MOSAIC combines central mission control and edge-level robotic integration within one modular framework for heterogeneous robotic systems. Through MOSAIC Hub and MOSAIC Agents, it enables interoperable planning, monitoring, data exchange and mission execution across diverse platforms and payloads. Built with flexibility and STANAG-aligned interoperability in mind, MOSAIC supports scalable deployment while reducing vendor lock-in.

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