

uPathWay

INTELLIGENT ROBOTICS

Autonomous ground-based inspection for utility-scale solar PV sites

Detects faults earlier, reduces manual field rounds, and turns visual and thermal findings into actionable maintenance.



GMV provides an autonomous inspection solution for ground-mounted solar PV sites, combining a rugged ground robot equipped with visual and thermal sensing and the **uPathWay®** platform for AI-based analysis, mission planning, reporting and integration with maintenance workflows.

The solution is based on a wheeled quadruped robot enabling autonomous inspection missions across the solar PV site. An optional drone layer can also be integrated to support fast wide-area thermal and visual screening.

CUSTOMER CHALLENGE

-  Utility-scale PV sites are large and repetitive to inspect. Manual rounds consume time and results can vary depending on operator availability, access conditions and inspection consistency.
-  Defects may be detected late if they only become visible through production loss or alarms. Operators need earlier evidence of hotspots, module damage, connector/junction-box issues and vegetation-related risks.
-  Inspection data is often fragmented across photos, thermal images, spreadsheets and maintenance tools. Operators need geolocated evidence that can be reviewed and converted into maintenance actions.

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SOLUTION OVERVIEW – ROBOT, SENSORS AND uPathWay®

The solution combines a wheeled quadruped robot, visual and thermal sensing, autonomous navigation capabilities and GMV’s **uPathWay®** platform for centralized mission management, operational supervision and inspection analysis.

The main solution components include the robot, autonomous charging system, visual cameras, thermal cameras, navigation and perception sensors, and the **uPathWay®** platform for mission planning, supervision and reporting.

The robot autonomously executes predefined inspection routes, captures geolocated visual and thermal inspection data, and transmits the data to **uPathWay®** for supervision, storage and analysis. Operators can review incidents, compare historical inspection results and generate maintenance actions. Missions can be scheduled periodically, launched on demand or associated with operation and maintenance events.

The **uPathWay®** platform provides centralized management and reporting through a single web interface. Through its hardware-agnostic architecture, the robot and sensor setup can be tailored to each customer’s site conditions and operational needs.



BUSINESS BENEFITS



Reduction of manual and repetitive inspection rounds across large utility-scale PV sites.



Earlier identification of visual and thermal anomalies before they evolve into larger operational issues or production losses.



Better planning of corrective maintenance activities.



Progressive scalability from pilot deployments to multi-site operation through centralized fleet management.

WHY GMV

- GMV technologies are currently used in autonomous inspection deployments across critical energy infrastructures, enabling remote operations and AI-assisted asset monitoring.
- **uPathWay®** provides a centralized platform with AI-powered inspection and mission orchestration capabilities, modular architecture for progressive deployment and multi-site scalability.
- **Certifications & Compliance:** Equipment options include IP67/IP68 weatherproofing and ATEX-certified robots for hazardous environments. GMV’s processes operate under rigorous ISO 9001 (Quality), ISO 14001 (Environment), and ISO 27001 (Information Security) standards.

NEXT STEPS



Step 1 Site assessment and use-case definition: Review of PV site layout, inspection priorities and pilot objectives.



Step 2 Deployment and commissioning: Deployment of the robot and **uPathWay®** platform, validation and capability transfer.



Step 3 Pilot operation and validation: Execution of autonomous inspection missions and validation of inspection workflows.



Step 4 Scale-up and multi-site deployment: Extension of inspection coverage and introduction of centralized multi-site fleet management.

Interested in autonomous PV inspection?

- Request a pilot assessment: alazaro@gmv.com