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The Hido II Rover

Hido II is the newest rover developed in-house at Hidonix. Designed for reliable operation in real environments, it integrates a precise sensing stack, controlled mechanical articulation, and a mobility system that maintains continuous movement across complex terrain.

The platform was born from the need to scale human mapping: it increases acquisition speed by over 50% compared to manual workflows, enabling larger areas to be mapped in significantly less time while preserving consistency in the collected data.

The second version was redesigned in our lab to remove the geomagnetic interference introduced by the third-party robot previously used. By refining the chassis architecture and material composition, Hido II maintains a clean geomagnetic fingerprint and supports the accuracy required for downstream navigation.

Perception System

Hido II is built around a dual-modality perception architecture. A front-mounted 2K stereo camera provides depth reconstruction and visual classification, while a top-mounted Ouster LiDAR—developed in collaboration with Ouster to achieve a state-of-the-art specification for our requirements—delivers continuous 360-degree point-cloud coverage. Together, these systems enable human and object detection, obstacle characterization, and real-time generation of spatial heatmaps. The integration of visual and LiDAR domains yields deterministic environmental awareness, allowing the rover to operate reliably in dense, irregular, or dynamic spaces.

2K stereo camera (front-mounted)

- Baseline optimized for depth reconstruction
- Used for human detection, object detection, and visual obstacle classification

- Real-time video feed

Ouster LiDAR (top-mounted)

- 360° point-cloud acquisition

- Real-time obstacle mapping

- Distance-based heatmap generation

- Real Time SLAM (Simultaneous Localization And Mapping)

- Dynamic Replanning

Sensor fusion provides continuous spatial awareness for navigation and data acquisition.

Acquisition Module

The platform includes a folding, extendable robotic arm that carries the Hidonix Acquisition Module. Inside the module, the HEC—Hidonix Embedded Computer—runs proprietary firmware designed for precise geomagnetic fingerprint acquisition. The arm's kinematics support controlled, repeatable placement of the module, ensuring consistent contact geometry and low-variance signal collection across changing environments. This mechanical–computational coupling is central to Hido II's role as a high-fidelity data acquisition system.

The acquisition module:

- Contains the **HEC (Hidonix Embedded Computer)**

- Runs proprietary firmware and acquisition pipelines

- Uses NVIDIA compute modules to support real-time processing and parallelized sensor workloads

- Captures and processes geomagnetic fingerprints in real time

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Arm Kinematics:

- Compact fold for transit

- Full extension for environmental reach

- Designed for stable placement and repeatable contact geometry

Mobility Architecture

Mobility is provided by a commercial implementation of a NASA-derived rocker-bogie suspension. This architecture enables stable stair climbing and descent, distributing loads across the wheel assemblies to maintain traction and orientation. The chassis also supports zero-radius rotation for fine positioning and sideways motion enabled by proprietary mechanical components. These capabilities allow Hido II to maintain continuous mobility and uninterrupted sensor operation over uneven surfaces, architectural transitions, and cluttered layouts.

Capabilities:

- Controlled stair traversal

- Rotation in place

- Sideways motion

- Stable movement over uneven surfaces

These capabilities give Hido II a predictable and adaptable mobility profile.

CMS Intrgration

Thanks to the integration with ION's CMS, operators will be able to view the camera's live video feed, monitor the robot's operations and position on the site map, and communicate with it to define the routes it needs to follow.

Purpose

The system is designed as a technical platform rather than a general-purpose robot. Its architecture prioritizes mechanical continuity, predictable sensor performance, and low-variance geomagnetic acquisition. Hido II operates with minimal external dependencies, maintaining accuracy in both indoor and outdoor environments while supporting repeatable, structured data collection workflows.