

Integration of HyDrone USV with Exyn Nexys Pro SLAM LiDAR for Advanced Hydrographic Surveying

Unified data collection for complete coverage above and below the waterline.



Integration Overview

The Seafloor Systems HyDrone USV, equipped with a sonar such as the Hydrolite SF200 and integrated with the Exyn Nexys Pro SLAM LiDAR, enables high-resolution mapping above and below the waterline. LiDAR point cloud and bathymetric data are collected in a single deployment and can be merged into a unified, geospatially aligned dataset, enhancing coverage and data completeness for hydrographic and nearshore applications.

Nexys Pro SLAM LiDAR

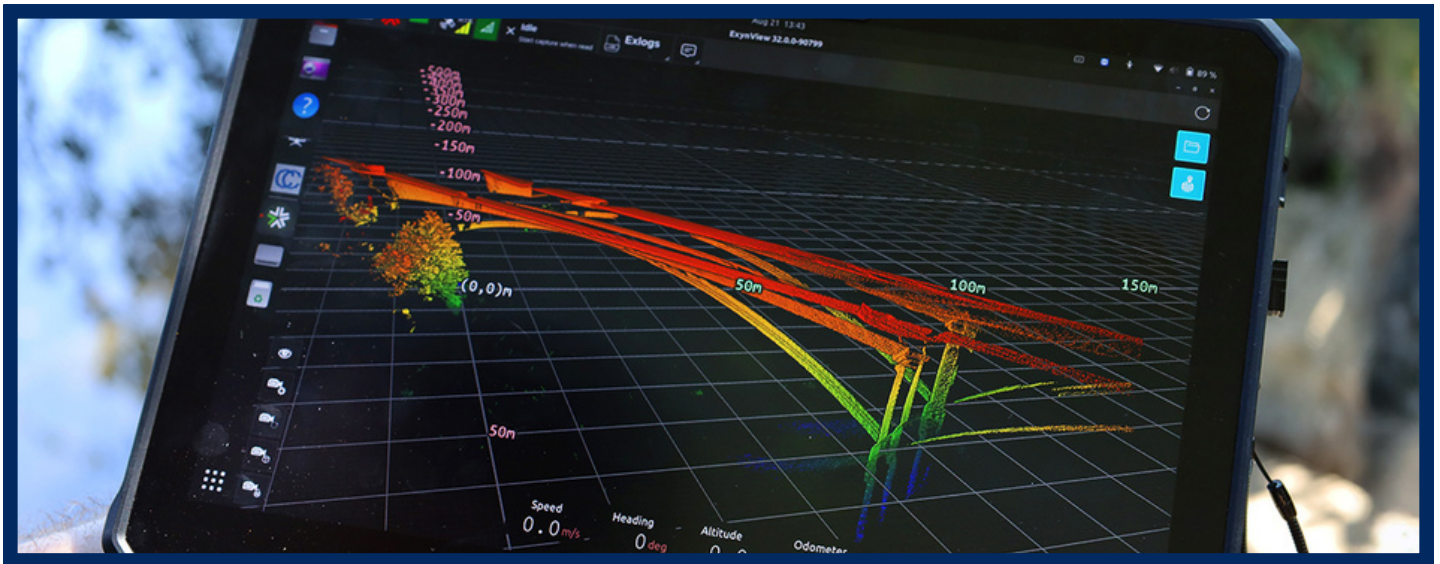


HyDrone USV



Objective

The goal of this integration is to demonstrate a rapid, reliable workflow for combining a SLAM LiDAR sensor with the HyDrone's autonomous hydrographic survey capabilities, enabling high-accuracy, high-resolution mapping in complex or difficult-to-map environments. The workflow efficiently generates unified surface and subsurface datasets, providing comprehensive spatial coverage where traditional survey methods may be limited.



System Configuration

The HyDrone USV features a compact, stable design that allows for quick preparation and deployment, with generation 4.5 offering rapid, tool-less assembly for even faster setup. Mounting the Nexys Pro was seamless, enabling immediate survey operations and efficient data collection. This integration is compatible across all generations of the HyDrone, providing flexibility for a wide range of survey operations while delivering reliable, high-resolution LiDAR and bathymetric data for safe and effective surveys in challenging environments.



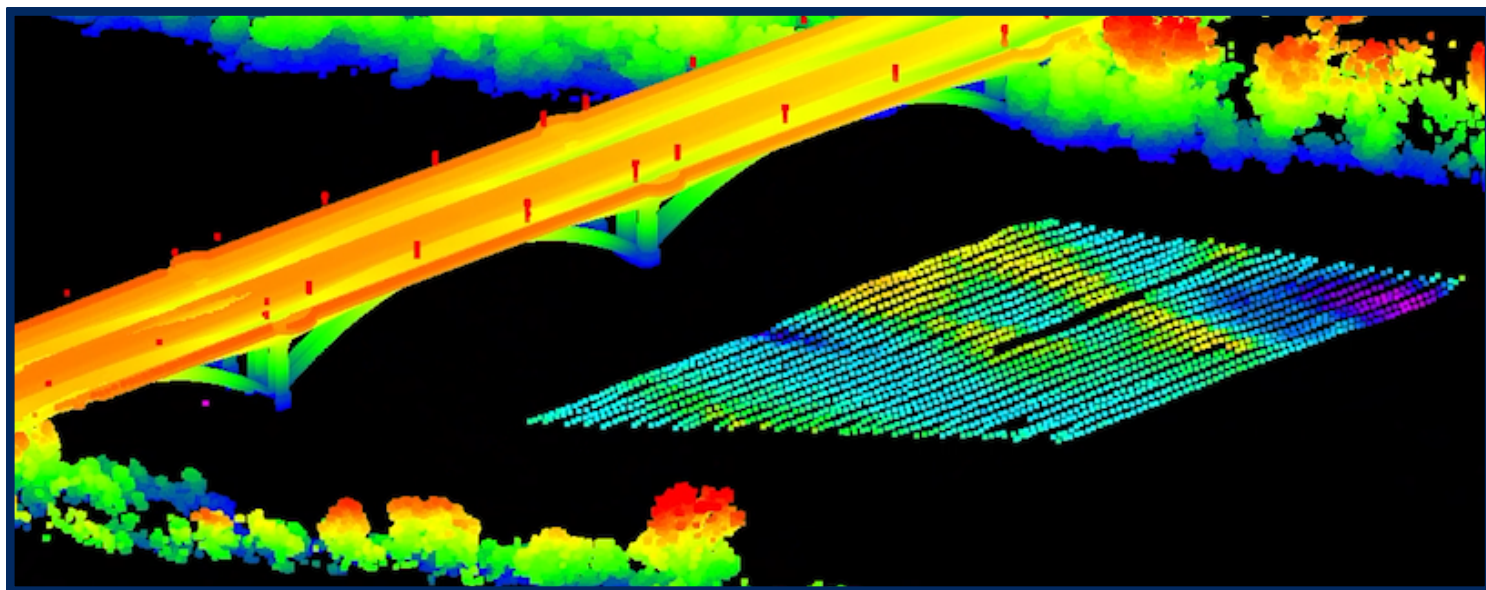
Methodology

The HyDrone USV is deployed from shore, enabling survey operations to begin quickly with minimal setup. While underway, the USV's autonomous capabilities allow it to efficiently follow planned survey paths while collecting bathymetric measurements below the waterline. Simultaneously, the Nexys Pro SLAM LiDAR captures high-density spatial data above the surface, delivering consistent and repeatable survey-grade accuracy of up to ± 1 cm (1σ) at scan rates of up to 1.92 million points per second.

LiDAR data capture and post-processing can be performed in the field, allowing real-time visualization with full detail and colorization to verify coverage and data quality before leaving the site. Surface and subsurface datasets are then combined within HYPACK® software to produce a unified, geospatially aligned dataset, though surveyors may also use another preferred software if desired. This workflow provides a continuous, comprehensive view of the surveyed area above and below the waterline.

Results and Capabilities

High-resolution LiDAR and bathymetric data can be captured concurrently during a single deployment, producing dense, consistent datasets above and below the waterline. The unified workflow delivers complete area coverage and a continuous, geospatially aligned representation of the survey environment. Remote operation and the HyDrone's autonomous capabilities allow surveyors to efficiently map areas that are difficult to access, while real-time visualization and post-processing in the field support data quality verification and improve overall survey efficiency.



Applications & Conclusion

The HyDrone integration with the Exyn Nexys Pro SLAM LiDAR is ideal for survey and inspection tasks that require detailed spatial data both above and below the waterline in a single workflow. Typical applications include bridge inspections, where LiDAR captures decks, piers, and abutments while the USV maps submerged foundations and scour zones, as well as dam and levee assessments, shoreline and nearshore mapping, port and harbor surveys, and mining or tailings facility monitoring. By enabling efficient data collection in hard-to-access areas and producing unified surface and subsurface datasets, this integration delivers a complete and comprehensive view of the survey environment.