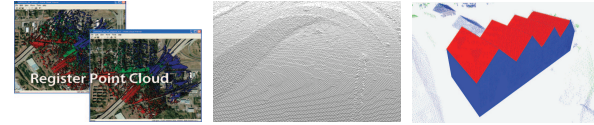


LIDAR Fusion™ Tool Suite



Fast, Accurate Database Creation

Automatic LIDAR Processing for Point Cloud Visualization, Feature Identification and Database Generation



Why use LIDAR?

The utilization of Light Detection and Ranging (LIDAR) sensor devices during the war in Iraq and Afghanistan has generated a wealth of highly detailed, geospatial source data. While this data is successfully exploited by the Geospatial Intelligence community (GEOINT), it has not yet been fully leveraged by the 3D Visual Simulation community (VISSIM).

The LIDAR Fusion Tool Suite product is based on the successful commercialization of a NAVAIR SBIR specifically aimed to allow LIDAR sensor data to become a new source for VISSIM synthetic environment databases. With LIDAR Fusion, this new source data can be rapidly visualized and transformed into a synthetic environment for immediate use in Image Generator-based simulation and training or mission rehearsal.

LIDAR Fusion: Versatile, Fast and Accurate

LIDAR Fusion can collect multiple overlapping sensor scans from multiple perspectives and fuse them into a unified geospatial representation within a 3D point cloud. Automated registration tools are provided to correct for any inconsistencies in the source data telemetry due to factors such as GPS error. The resulting unified 3D point cloud provides a complete representation of all

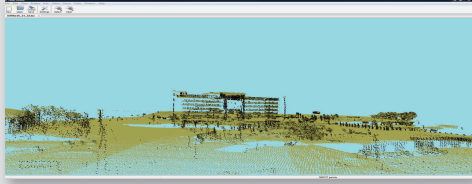
the terrain and features contained within the area, and boosts the data resolution in areas of overlap. At this stage, the user can visualize, examine, and query the contents of the unified point cloud using the integrated 3D viewer.

For 3D features such as buildings, LIDAR Fusion goes far beyond the typical 2D extrusion of rooftops by providing full 3D feature extraction. This means you get the full building representation in the 3D point cloud as captured by all the scans, including building sides and details such as doors and windows. LIDAR Fusion also has the capability to accurately capture, identify, and convert natural features such as trees, producing a synthetic database that contains exact placement and scale of these individual and collective features. These exact tree and forest patterns provide an indispensable visual guide to pilots during simulation-based training exercises. In addition to fusing and displaying the 3D LIDAR point cloud, LIDAR Fusion can automatically analyze the features within the point cloud, and extract the information into standard VISSIM data formats compatible with current Image Generator technology. This automatic analysis and extraction process from a point-based representation to a polygonal-based representation.

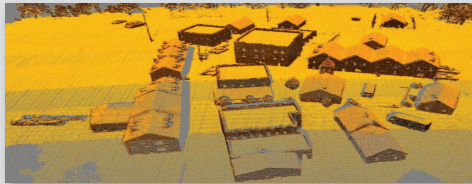
The LIDAR Fusion Tool Suite

Viewer	Point Cloud Import and Visualization <ul style="list-style-type: none"> • Import LIDAR source scans from oblique or nadir scans in LAS or GeoTIFF format • Combine multiple LIDAR point clouds within a single 3D geospatial reference • Visualize and examine the LIDAR point cloud in 3D with many display options including colorization by scan or by elevation and multiple lighting controls
Registrar	Correction of Geospatial Errors <ul style="list-style-type: none"> • Correct geospatial errors between overlapping LIDAR source scans • Align the point cloud with other geospatial sources such as orthorectified satellite or aerial imagery
Interpreter and API*	Fused Point Cloud Analysis <ul style="list-style-type: none"> • Identify features, such as terrain, natural features and man-made features, within the fused point cloud with no user interaction required. • *Next product release: API/SDK to allow 3rd party developers to embed the LIDAR Fusion processes into their own applications
DBGS Formatter	Point Cloud Feature Extraction and Database Generation <ul style="list-style-type: none"> • Automatically translate the geospecific real-world classified features such as terrain, trees and buildings from point data into polygonal surfaces • Generate synthetic environment databases in VISSIM standard formats: OpenFlight, Shapefile, GeoTIFF

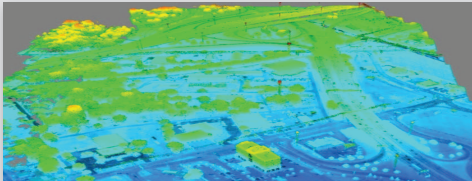
LIDAR Fusion Features



**IDENTIFY & CLASSIFY FEATURES
(INTERPRETER)**



**IMPORT & DISPLAY SCANS IN 3D
(VIEWER)**



**GEOINT QUERY OF FEATURES & ELEVATIONS
(REGISTRAR)**



**RAPID, AUTOMATIC DATABASE CREATION
(DBGS FORMATTER)**



**AUTOMATIC, GEOSPECIFIC TREE CREATION
(DBGS FORMATTER)**



**AUTOMATIC, GEOSPECIFIC BUILDING CREATION
(DBGS FORMATTER)**

Benefits of LIDAR Fusion

- Conversion of point cloud to a polygonalized is completely automatic and can be run as a distributed batch process. No feature selection or edge tracing is required by the user in order to convert the data from points to polygons.
- The automatic direct conversion of LIDAR scans into a visual synthetic environment provides a spatial accuracy above and beyond what can be achieved by hand modeling the environment based on source from a labor intensive site survey.
- The ability to incorporate low-angle LIDAR scans provides accurate details (such as the sides of buildings) that are simply unavailable with traditional top-down nadir LIDAR utilization.
- LIDAR Fusion is not limited to using high-altitude nadir LIDAR scans. It can use scans captured from sensors on low-altitude flight such as helicopters, ground vehicles, and hand-held devices.
- The vast amount of automatically generated and accurately represented urban clutter goes beyond anything that can be hand-modeled given 10X the amount of time and expense.
- The rapid conversion of this real-world sensor data into a 3D synthetic environment makes this tool ideal for time critical mission rehearsal training and disaster relief services.
- The ability to export VISSIM industry standard data formats allows this tool to be introduced naturally into existing VISSIM database generation processes and utilized on the majority of fielded VISSIM simulators.