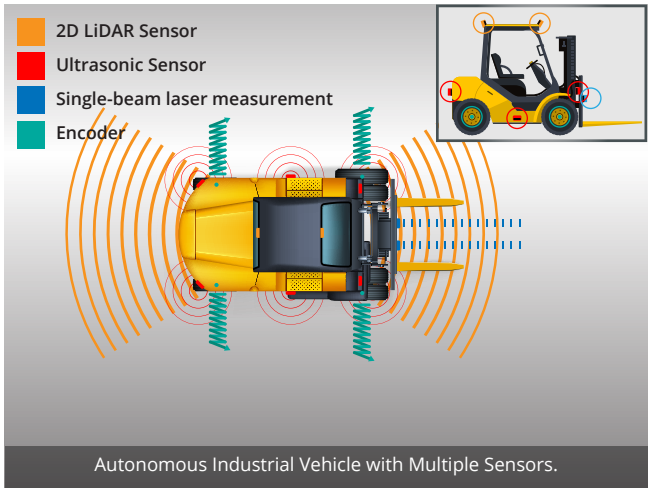
Velodyne LiDAR™

3D LiDAR Displaces reflector-based Navigation Systems

Velodyne's PUCK 3D LiDAR scanner improves supply chain efficiency by eliminating wall-mounted reflectors or in-floor guidance systems. Autonomous industrial vehicles are the next frontier in innovation to help achieve these goals. Implementing Velodyne LiDAR sensors reduces sensor count, simplifies design, reduces commissioning time and lowers labor costs.

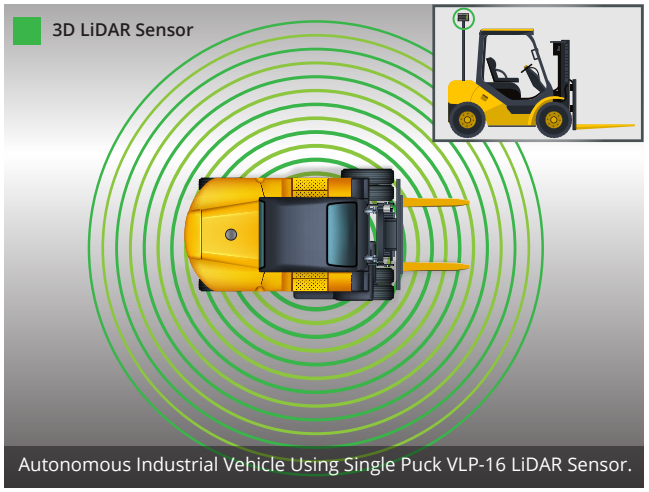
INDUSTRIAL VEHICLES

Current Solution



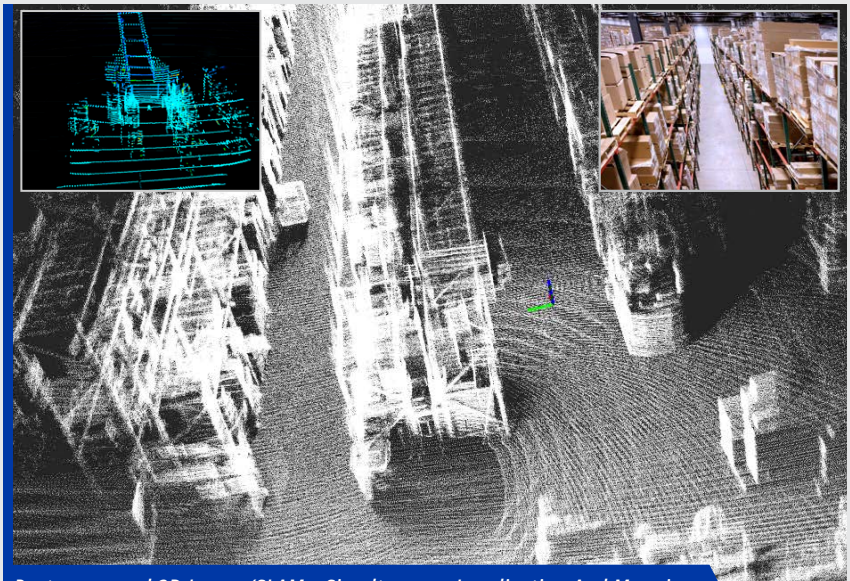
Autonomous Industrial Vehicle with Multiple Sensors.

Future Solution



Autonomous Industrial Vehicle Using Single Puck VLP-16 LiDAR Sensor.

Sensor Coverage	Multiple Sensor Technologies Required; Specific Sensors Perform Individual Tasks Over a Limited Area.	One 3D LiDAR Sensor Performs Multiple Functions and Covers Greater Spatial Area
On-site Vehicle Installation Time	Long Calibration Times and Requires Many Navigational Markers and Aids.	Fast Calibration Time and Utilizes 3D Map for Navigation.
Data Measurements	Different Output formats from sensors are more difficult to integrate	Distance Measurements in 3D, Calibrated Reflectivity Values and Rotation Angles
Field of View	Limited; Requires Multiple Sensors to Increase Field of View	Full Surround View – 360° with Single Velodyne LiDAR Sensor
System Integration	Long Hardware and Software Design Times to Integrate All Sensors and Fuse Data	Simpler Design Flow and Implementation Process



Post-processed 3D Image (SLAM – Simultaneous Localization And Mapping Localization and Mapping) of Aisle in Warehouse with Puck™ VLP-16.

Velodyne LiDAR™ Sensor Advantage:

› Lowers Total Cost of Ownership

- Reduced Sensor Count
- Shortens and Simplifies Design and Implementation Time

› Detailed 3D Maps/Images for Navigation

- Full Surround View in both Horizontal and Vertical Fields

› Fast On-site Commissioning Time

› Flexibility in Use from Pure Measurement Data

Real-Time 3D LiDAR Sensors

The Puck™ and HDL-32E provide high definition 3-dimensional information about the surrounding environment.

Parameters	VLP-16 	HDL-32E 	Benefit
Range	100 m (>300 feet)	100 m (>300 feet)	Detects objects at farther distances.
# of Channels	16	32	Visualize actual scanned objects.
Horizontal Field of View	360°	360°	Detect and maintain visibility continuously.
Horizontal Resolution (Azimuth)	0.1° to 0.4°	0.1° to 0.4°	No laser beam gaps for accurate measurements.
Vertical Field of View	30° (-15° to +15°)	40° (-30.67° to +10.67°)	Follow objects as they move.
Vertical Resolution	2.00°	1.33°	Determine potential hazards before they enter critical scan line.
Rotation Rate	5 Hz to 20 Hz	5 Hz to 20 Hz	Reliable Time-of-Flight Measurement Techniques.
Accuracy	±3.0 cm (±1.2")	±2.0 cm (±0.8")	Measure stationary and moving objects accurately.
Data Output Information	UDP Packets • Distance Measurements • Calibrated Reflectivities • Rotation Angles • Time Stamps (µs resolution)	UDP Packets • Distance Measurements • Calibrated Reflectivities • Rotation Angles • Time Stamps (µs resolution)	Provides a wealth of information to distinguish different types of vehicles and objects.
Data Output	Single Return Mode: 300k points/s Dual Return Mode: 700k points/s	Single Return Mode: 695k points/s Dual Return Mode: 1,390k points/s	More than 4x data output from competing solutions.
Operating Voltage	9 V to 18 V (Directly to Sensor) 9 V to 32 V (Thru Interface Box)	9 V to 18 V (Directly to Sensor) 9 V to 32 V (Thru Interface Box)	Standard operating voltage range.
Power Consumption	8 W	12 W	Low energy consumption, decreases operating expenses.
Enclosure Rating	IP67	IP67	Operates in wet and cold environments.
Operating Temperature	-10°C to +60°C	-10°C to +60°C	Works in hot and cold weather conditions.
Size	Ø103 mm x 72 mm (Ø4.1" x 2.8")	Ø85 mm x 144 mm (Ø3.6" x 5.68")	Smaller size allows for smaller mast size.
Weight	830 g (1.8 lbs)	1 kg (2.2 lbs)	Lower weight decreases need for larger mast.

63-9363 Rev-B

Contact us for a video or onsite product demonstration. **Email:** sales@velodyne.com **Phone:** +1-408-465-2899

www.velodynelidar.com