

Velodyne Lidar® Security Solutions

PROTECTION, MONITORING, AND PRIVACY



A breakthrough advance in security applications, Velodyne's lidar sensors generate real-time 3D maps for users to easily define and monitor customized digital boundaries. Velodyne sensors provide centimeter-level distance measurement data in all light conditions to facilitate highly reliable object detection and tracking. Lidar-based security solutions increase effective threat response while reducing false readings that frequently hamper other technologies. In security applications, lidar data can also support privacy protection while improving system implementation and performance efficiency. Velodyne's sensors deliver powerful monitoring and protection in a range of physical environments, including:

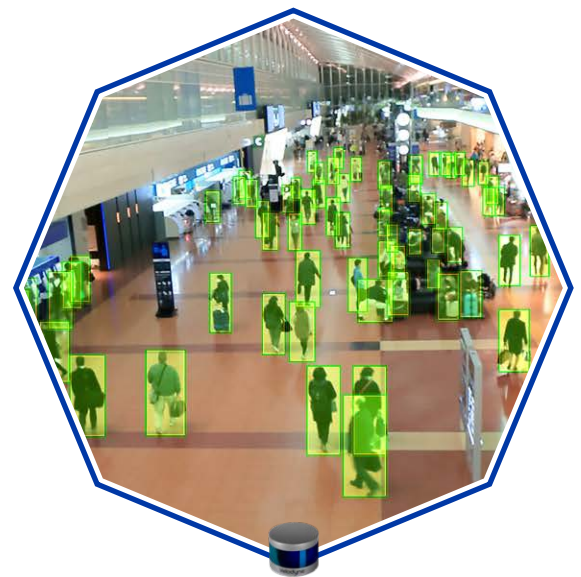
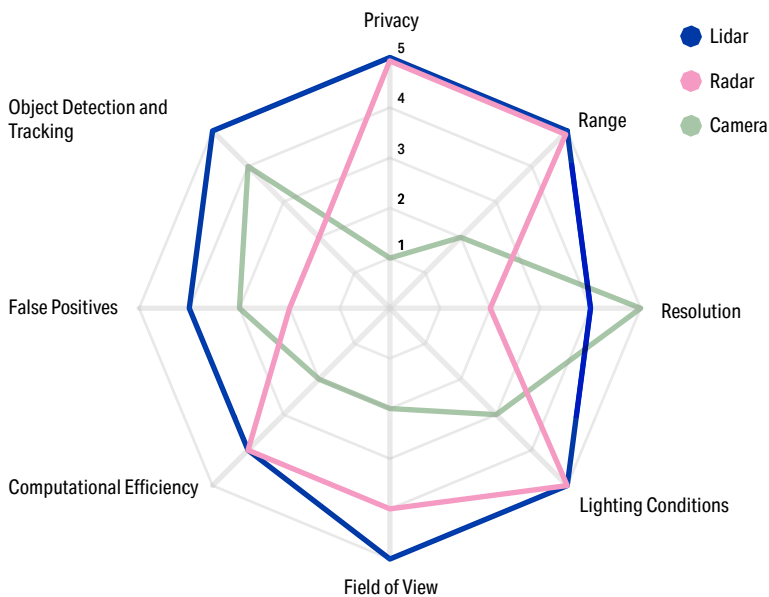
- Airports
- Energy facilities
- Industrial plants
- Institutions
- Commercial and private property
- Transportation infrastructure



ADVANTAGES OF LIDAR-BASED SECURITY

- Real-time distance measurements (3D perception)
- Object detection and tracking in all light conditions
- Increased signal-processing and automated detection efficiency
- Decreased false positive/negative readings
- Superior perception coverage for simplified and less expensive installation
- Privacy protection
- Digital boundary definition

SENSOR PERFORMANCE COMPARISON FOR SECURITY





Ultra Puck™



Puck™

Specifications¹

(Subject to change)

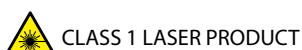
Specifications:

<p>Sensor</p>	<ul style="list-style-type: none"> • Channels: 32 • Measurement Range: 200 m • Range Accuracy: Up to ±3 cm (Typical)² • Horizontal Field of View: 360° • Vertical Field of View: 40° (-25° to +15°) • Minimum Angular Resolution (Vertical): 0.33° (non-linear distribution) • Angular Resolution (Horizontal/Azimuth): 0.1° to 0.4° • Frame Rate: 5 Hz to 20 Hz • Integrated Web Server for Easy Monitoring and Configuration 	<ul style="list-style-type: none"> • Channels: 16 • Measurement Range: 100 m • Range Accuracy: Up to ±3 cm (Typical)² • Horizontal Field of View: 360° • Vertical Field of View: +15.0° to -15.0° (30°) • Minimum Angular Resolution (Vertical): 2.0° (non-linear distribution) • Angular Resolution (Horizontal/Azimuth): 0.1° to 0.4° • Frame Rate: 5 Hz to 20 Hz • Integrated Web Server for Easy Monitoring and Configuration
<p>Laser</p>	<ul style="list-style-type: none"> • Laser Product Classification: Class 1 – Eye-safe per IEC60825-1:2014 • Wavelength: ~903 nm 	<ul style="list-style-type: none"> • Laser Product Classification: Class 1 – Eye-safe per IEC 60825-1:2007 & 2014 • Wavelength: 903 nm
<p>Mechanical/ Electrical/ Operational</p>	<ul style="list-style-type: none"> • Power Consumption: 10 W (Typical)³ • Operating Voltage: 10.5 V – 18 V (with interface box and regulated power supply) • Weight: ~925 g (typical, without cabling and interface box) • Dimensions: See diagram on previous page • Environmental Protection: IP67 • Operating Temperature: -20°C to +60°C⁴ • Storage Temperature: -40°C to +85°C 	<ul style="list-style-type: none"> • Power Consumption: 8 W (Typical)³ • Operating Voltage: 9 V – 18 V (with interface box and regulated power supply) • Weight: ~830 g (typical, without cabling and interface box) • Dimensions: See diagram on previous page • Environmental Protection: IP67 • Operating Temperature: -10°C to +60°C⁴ • Storage Temperature: -40°C to +105°C
<p>Output</p>	<ul style="list-style-type: none"> • 3D Lidar Data Points Generated: <ul style="list-style-type: none"> - Single Return Mode: ~600,000 points per second - Dual Return Mode: ~1,200,000 points per second • 100 Mbps Ethernet Connection • UDP Packets Contain: <ul style="list-style-type: none"> - Time of Flight Distance Measurement - Calibrated Reflectivity Measurement - Rotation Angles - Synchronized Time Stamps (µs resolution) • GPS: \$GPRMC and \$GPGGA NMEA Sentences from GPS Receiver (GPS not included) 	<ul style="list-style-type: none"> • 3D Lidar Data Points Generated: <ul style="list-style-type: none"> - Single Return Mode: ~300,000 points per second - Dual Return Mode: ~600,000 points per second • 100 Mbps Ethernet Connection • UDP Packets Contain: <ul style="list-style-type: none"> - Time of Flight Distance Measurement - Calibrated Reflectivity Measurement - Rotation Angles - Synchronized Time Stamps (µs resolution) • GPS: \$GPRMC and \$GPGGA NMEA Sentences from GPS Receiver (GPS not included)

63-9662 Rev-A

For more details and ordering information, contact Velodyne Sales (sales@velodyne.com)

1. These are projected specifications for final production parts. The specifications for any sample, prototype, or other non-final or pre-production parts may be different from the specifications in this document. For more information, please contact Velodyne Sales.
 2. Typical accuracy refers to ambient wall test performance across most channels and may vary based on factors including but not limited to range, temperature and target reflectivity.
 3. Operating power may be affected by factors including but not limited to range, reflectivity and environmental conditions.
 4. Operating temperature may be affected by factors including but not limited to air flow and sun load.



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