ATOMBOTIX
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How Are LiDAR Sensors Classified

for AGVs and AMRs?

AGV & AMR LiDAR Classification

LiDAR is widely used in mobile robots, but not all LiDAR sensors work the same way. We can look at them from four perspectives: sensing dimension, application, scanning architecture, and ranging principle.

01 Sensing Dimension

- 2D LIDAR
- 3D LIDAR

02 Application & Function

- Navigation & Localization
- Object Recognition
- Safety Laser Scanner

03 Scanning Architecture

- Mechanical/Rotating
- Hybrid Solid-State
- Fully Solid-State

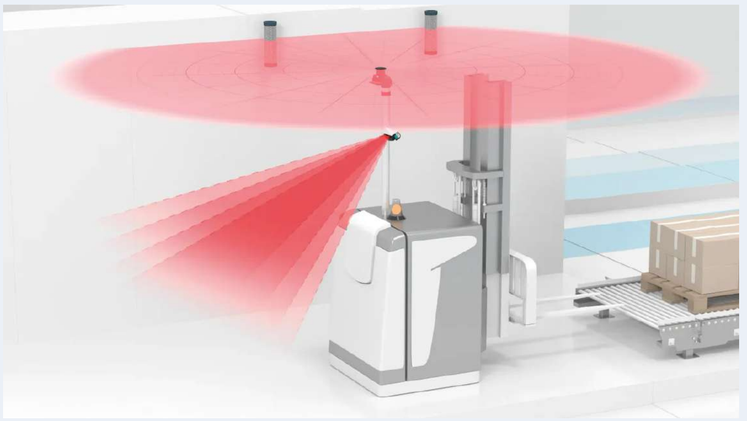
04 Ranging Principle

- Triangulation
- Time-of-Flight (ToF)

By Sensing Dimension

2D LiDAR scans a single plane and provides planar range data. On an AGV, it is widely used for localization, navigation, obstacle detection, and safety monitoring.

- 2D LiDAR — Product Examples



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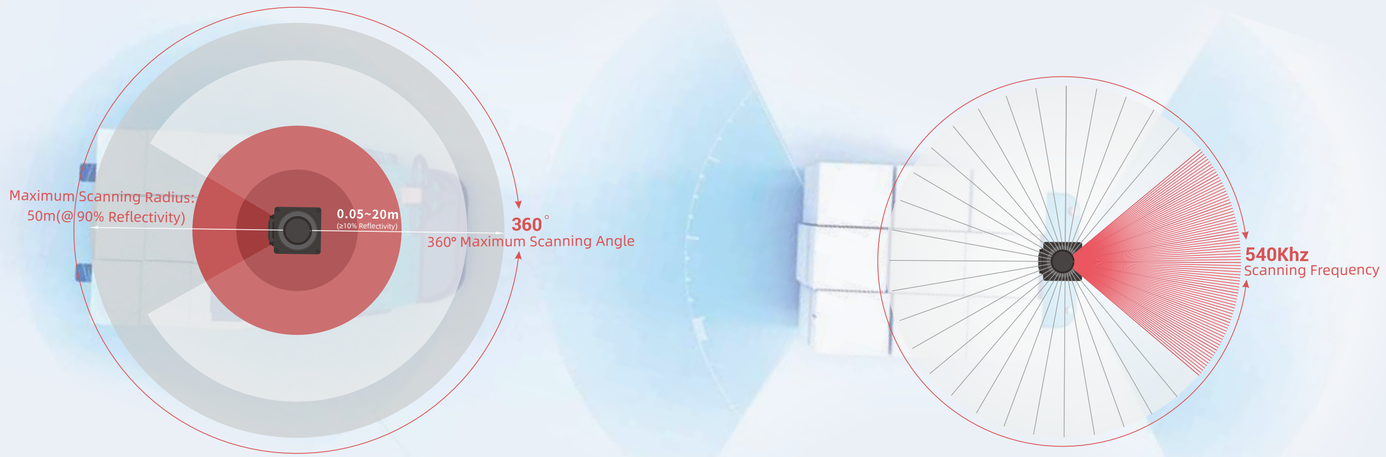
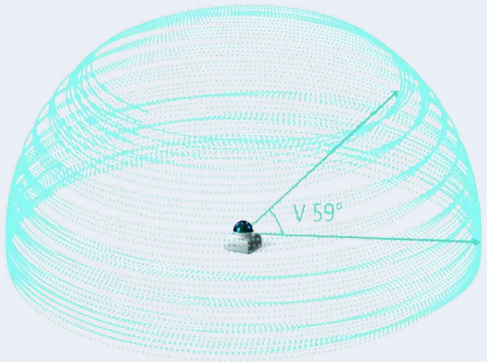
2D LiDAR — Product Examples

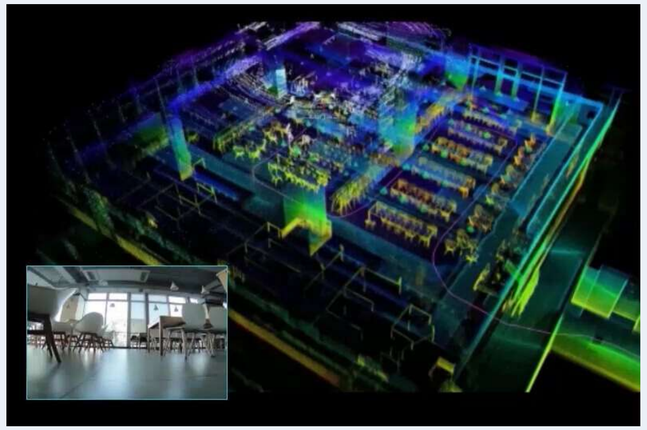


By Sensing Dimension

3D LiDAR captures spatial data across different heights and generates 3D point clouds. This can support 3D mapping and localization, spatial perception, and more complex object and environment detection.

- 3D LiDAR — Product Examples



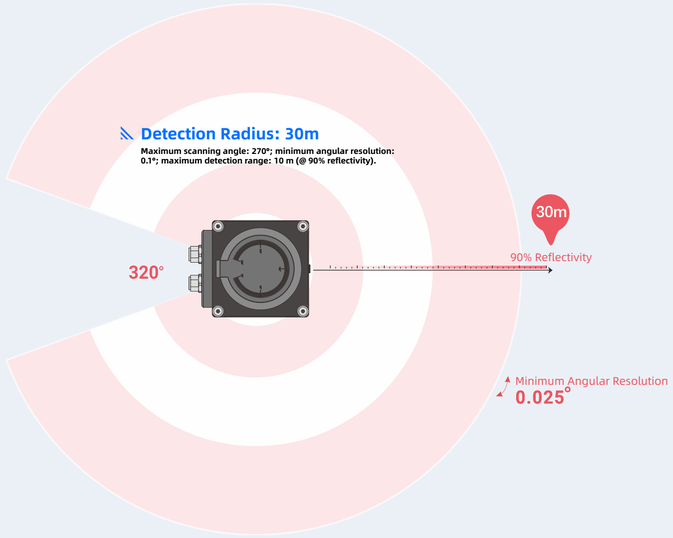


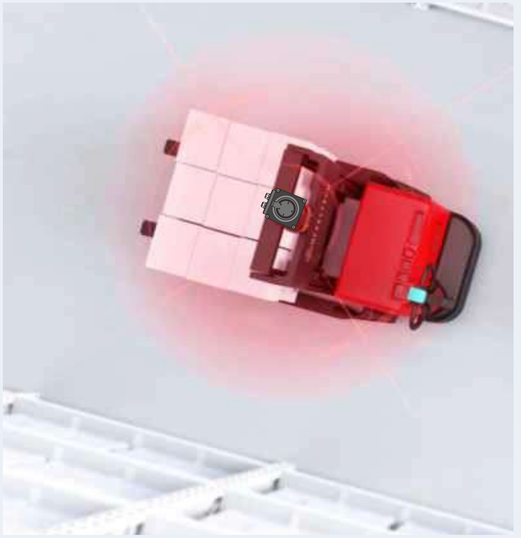
By Application and Function

LiDAR can also be classified by its role on the robot.

Navigation and localization LiDAR helps the AGV map its surroundings and continuously determine its position while moving.

- Navigation & Localization LiDAR — Product Examples



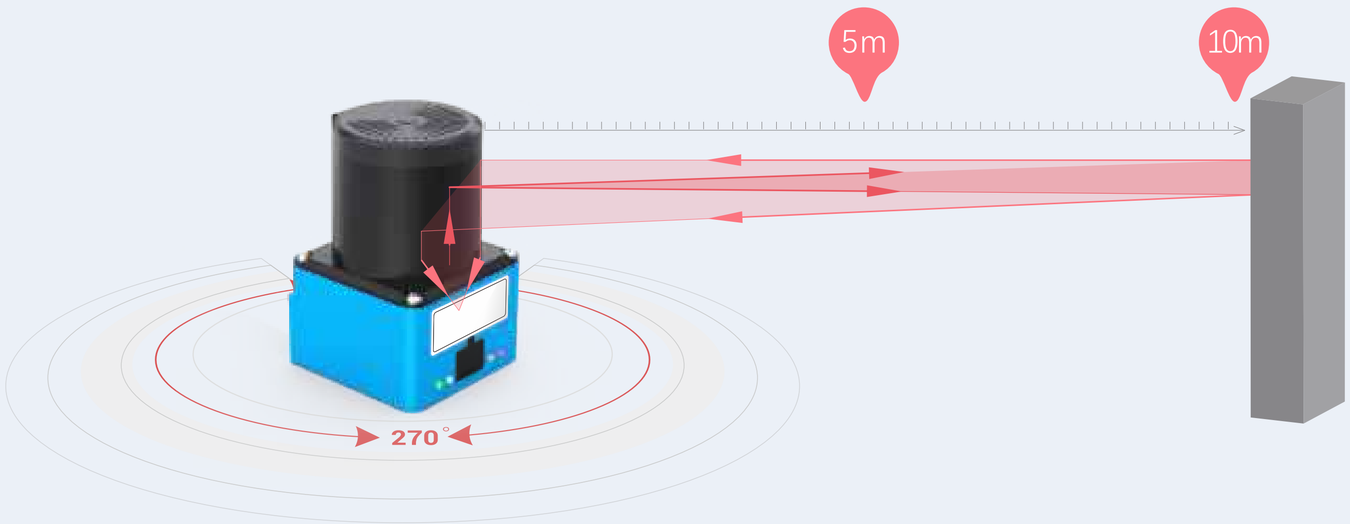


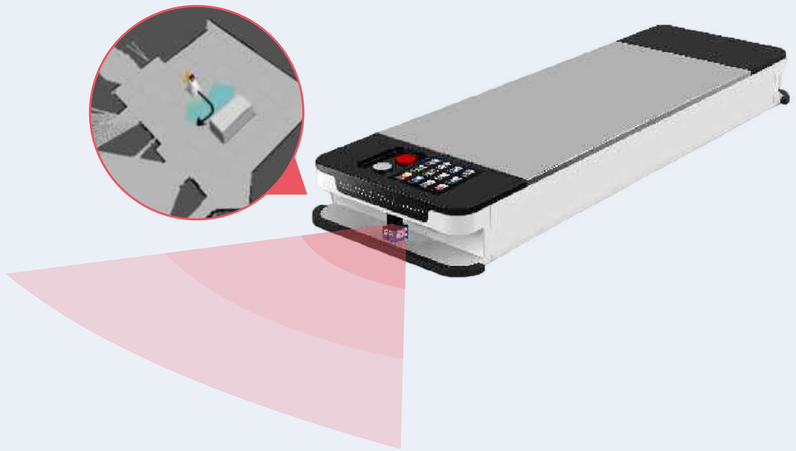
By Application and Function

Object recognition LiDAR provides range or point-cloud data for detecting and locating objects.

Combined with perception algorithms, it can support pallet, rack, load, and obstacle recognition.

- Object Recognition LiDAR — Product Example

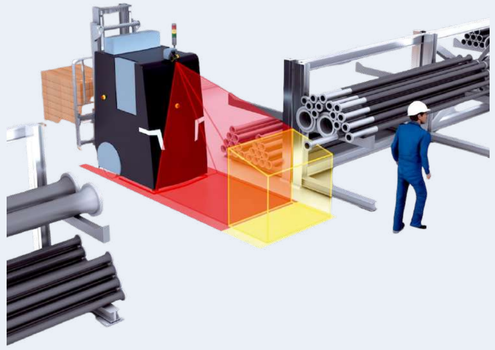




By Application and Function

Safety LiDAR monitor protective fields around the AGV. When a person or obstacle enters the safety zone, the safety system can command the vehicle to slow down or stop.

Safety LiDAR — Product Examples



By Scanning Architecture

Another difference is how the LiDAR scans its surroundings.

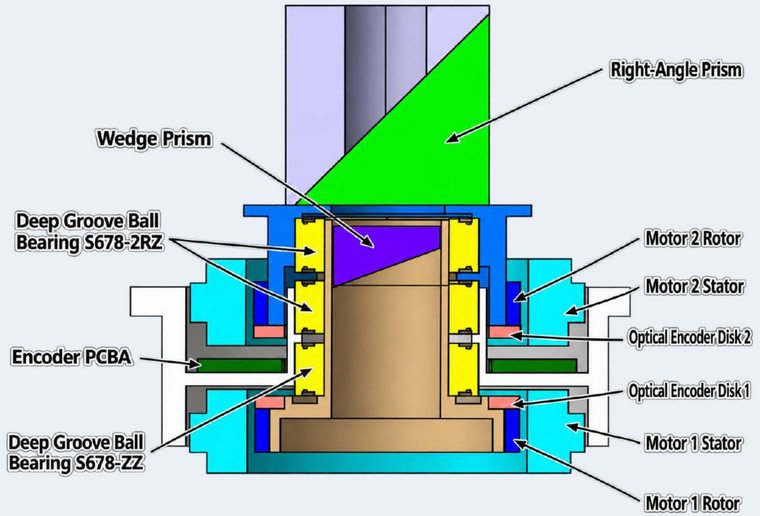
Mechanical or rotating LiDAR uses a rotating scanning structure to collect environmental data. It is widely used in both 2D and 3D LiDAR.

- Mechanical / Rotating — Product Example

By Scanning Architecture

Hybrid solid-state LiDAR combines compact moving optical components with solid-state technologies.

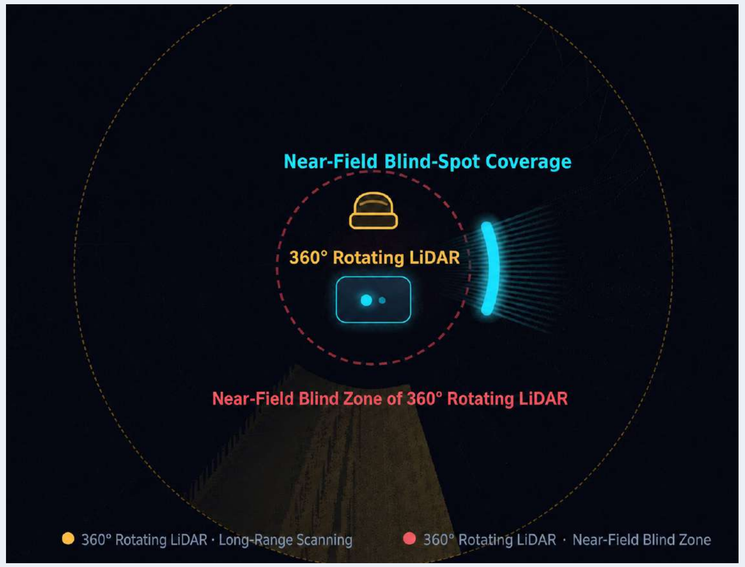
- Hybrid Solid-State — Product Example



By Scanning Architecture

Fully solid-state LiDAR removes conventional mechanical scanning and uses electronic or optical methods to capture the environment.

- Fully Solid-State — Product Example



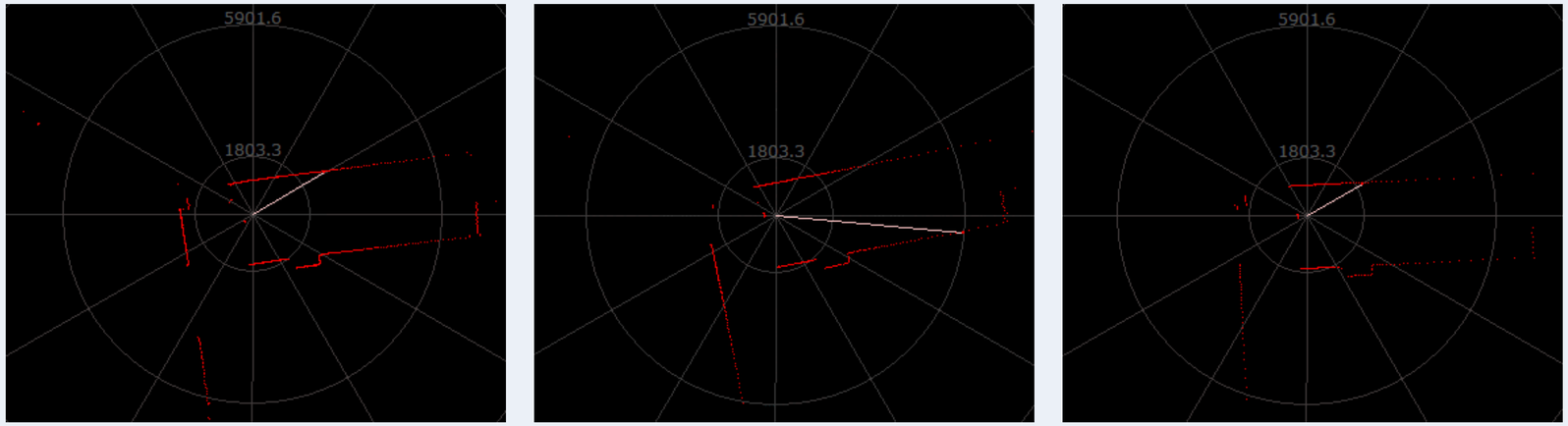
By Ranging Principle

At a deeper level, LiDAR can be classified by how it measures distance.

Triangulation calculates distance from the position of the reflected laser spot. It can be found in some short-range 2D LiDAR used for mobile robots.

- Triangulation — Product Example

10Hz 8000 Points vs 10Hz 4000 Points vs 5Hz 2000 Points



By Ranging Principle

Time-of-Flight, or ToF, measures how long the laser takes to travel to an object and return. It is widely used in industrial 2D and 3D LiDAR.

- ToF — Product Examples

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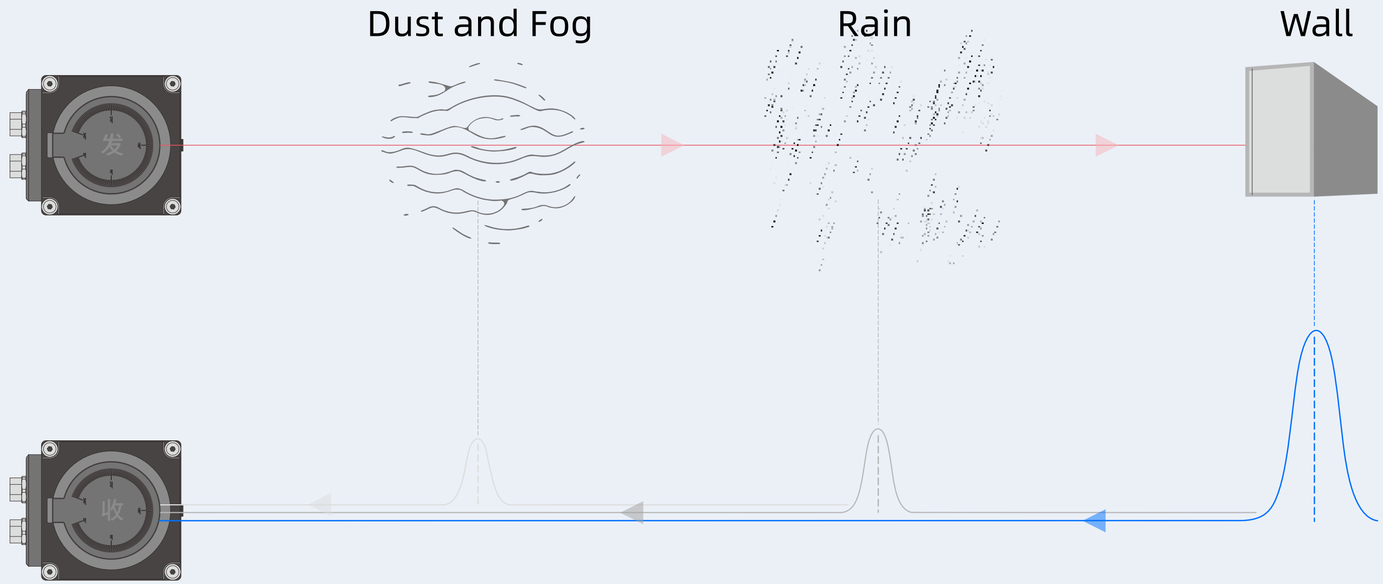
■ ToF — Product Examples



As these examples show, one LiDAR can fit into several categories at the same time.

So choosing the right LiDAR is not just about 2D or 3D. It depends on what your AGV needs to sense and what the sensor needs to do.

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