Robot Anti-collision Application

Application Overview

There are many factors to choose proper anti-falling and obstacle avoidance sensors. It should be considered the surrounding environment, the size, shape, range, position, posture, materials and etc. Benewake LiDAR sensor specially designed for robots to avoid obstacles such as stairs, pits, and walls.

LiDAR is a non-contact, based on Time of Flight principle measurement equipment. Single beam of light can be used to detect obstacles. Because of its high accuracy performance, it will help robots to stop and detour in time to prevent falling.

Customer Benefits

- Improve the safety rate of robot. Automatically detect obstacles at long range (0-12m), and prevent damage.
- Optimize the measurement capability in outdoor, high light, complex reflectivity background. There is no false or missed report.
- Small spot with stable detection. Small volume could be integrated easily and flexible. No harm to human eyes.
- The power consumption is generally lower than 1W,. It will save energy and power. 20 USD for sample price.

LiDAR Sensor Advantages

Performance

Product	 TF-Luna	 TFmini-S	 TFmini Plus
Range	0.3-8m@90%reflectivity	0.1-12m@90%reflectivity	0.1-12m@90%reflectivity
Accuracy	±6cm@(0.2-3m) ±2%@(3-8m)	±6cm@(0.1-6m) ≤1%@(6-12m)	±5cm@(0.1-5m) ±1%@(5-12m)
FoV	2°	2°	3.6°
Interface	UART、I²C	UART、I²C、I/O	UART、I²C、I/O
Power	≤0.35W	≤0.7W	≤0.55W
Frequency	1-125Hz	1-1000Hz	1-1000Hz
Protection	N/A	N/A	IP65
Volume	35mm*21.2mm*12.5mm (L*W*H)	42mm*15mm*16mm (L*W*H)	35mm*18.5mm*21mm (L*W*H)

For more details, please visit en.benewake.com

Case Study

The real-time measurement ability of Benewake LiDAR sensor is remarkable. Its Fov is small, energy is concentrated, accuracy is high and reliability is strong. Compared with the infrared sensor or ultrasonic, it can obtain more accurate and stable measurement with flexible installation. The service life is more than 3 years. At present, Benewake LiDAR sensor is widely used in clean robot, inspection robot, delivery robot and etc.

Clean Robot

TFmini-S is installed at the height of 50 cm, maintaining the tilting angle of 30°, capable of detecting obstacles within 1 meter on the ground. LiDAR readings will increase when there is a staircase.

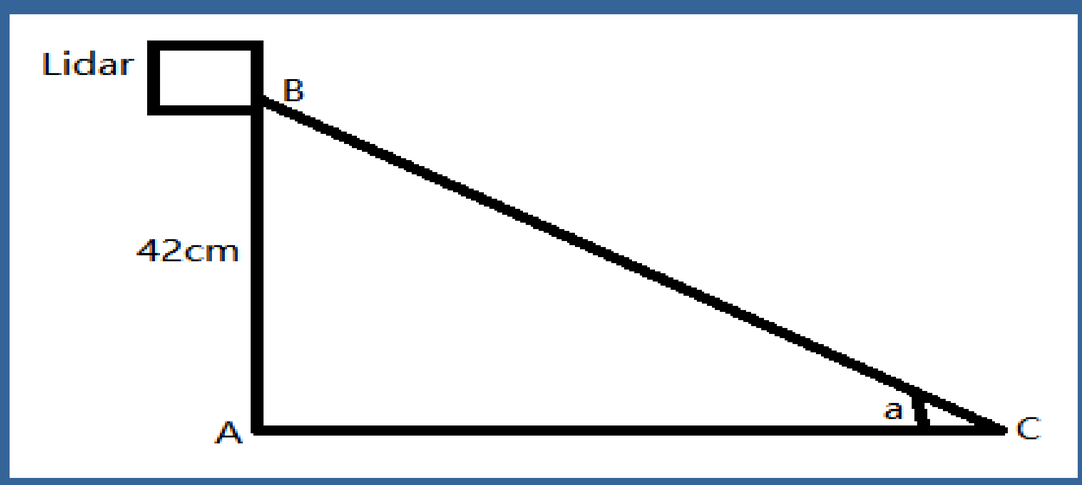
Medical Robot

TFmini-S is installed at the height of 30cm above the ground, maintaining the angle of 16° to horizontal surface. Therefore, it is able to detect obstacles within the range of 1.1 meters towards the front ground. Distance values will increase when there is a staircase.

Self-balance Robot

Installed at the height of 42cm on the body of robots, two TFmini-S sensors probe the grounds on both left and right sides. The angle between LiDAR beam and horizontal surface is 15° when the robot stays upright. It varies from 10° to 57° when the robot tilts forward and backward.

Installation



For instance, when the LiDAR is installed at the height of 42 cm, i.e. AB=42cm as shown in the figure; given that ∠a=30°, according to the trigonometry, BC=42/Sin∠a=84cm

Conclusion: we recommend setting angle∠a to 20°-60° and the height of the Lidar to 30-50 cm above the ground; Otherwise, it may cause inaccurate measurements or reduce the valid range.

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