Milesight VS132 ToF People Counting Sensor Instruction Manual

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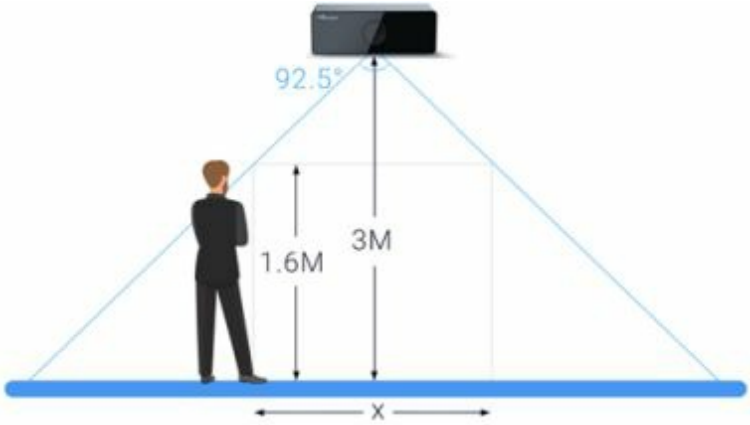
Milesight is a fast-growing and innovation-driven technology company with a focus on 5G, AI, IoT and LoRaWAN ®. With advanced IoT insights, it helps customers worldwide optimize their business operations efficiently and sustainably in an actionable and locally adapted way. By deepening vert ical market segments, the Occupancy &

People Counting Series is developed for space occupancy and people counting in diverse applications. 3D ToF People Counting Sensor as a member of the series specializes in people count ing for data-based management. Different from many devices on the market, the sensor featuring ToF technology helps to accurately and anonymously get statistics by 3D depth images. Testing in a large data volume, you will find out how it works in an accurate way.

Covered Detection Area



The detection area covered by the 3D ToF People Counting Sensor is related to the field of view angle of the device, the installation height and the target height. The length of the detection area is approximately x=2. l x(H-hmin) and the width of the detection area is approximately y=l .32 x (H-hmin).

For example, if the minimum height of pedestrians is 1.6 m, the detection area corresponding to each installation height is as follows:

Installation Height /FoV Monitored Area (m) /Detection Area (m)

2.4	5.01 X 3.18	1.67 X 1.06
2.5	5.22 X 3.31	1.88×1.19
2.6	5.43 X 3.44	2.09 X 1.32
2.7	5.64 X 3.57	2.30 X 1.46
2.8	5.85 X 3.71	2.51 X 1.59
2.9	6.06 X 3.84	2.72 X 1.72
3.0	6.27 X 3.97	2.92×1.85

Testing Environment

- Indoor Entrance
- **Installation Height:** 2747mm
- **Entrance Width:** 2100mm

Configuration

- **Max Target Height:** 2000mm
- **Min Target Height:** 1000mm

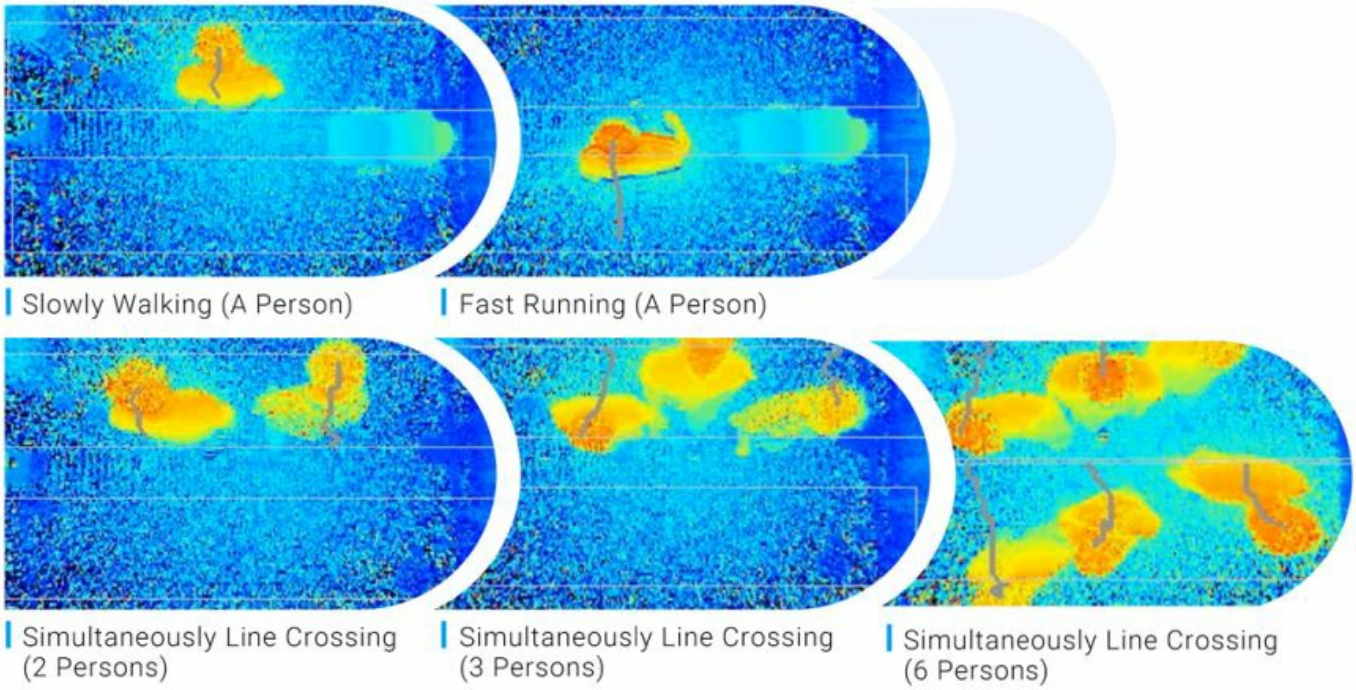
Testing Results

General Scenarios

Testing Items /Total Number of People/Counting Number of People /Accuracy

Slowly Walking (A Person)	20	20	100.00%
Fast Running (A Person)	22	22	100.00%
Cross Line Forward and Backward	56	56	100.00%
Simultaneously Line Crossing(2 Persons)	46	46	100.00%
Simultaneously Line Crossing(3 Persons)	75	75	100.00%
Simultaneously Line Crossing(6 Persons)	48	48	100.00%

Testing Sample Pictures



Analytics

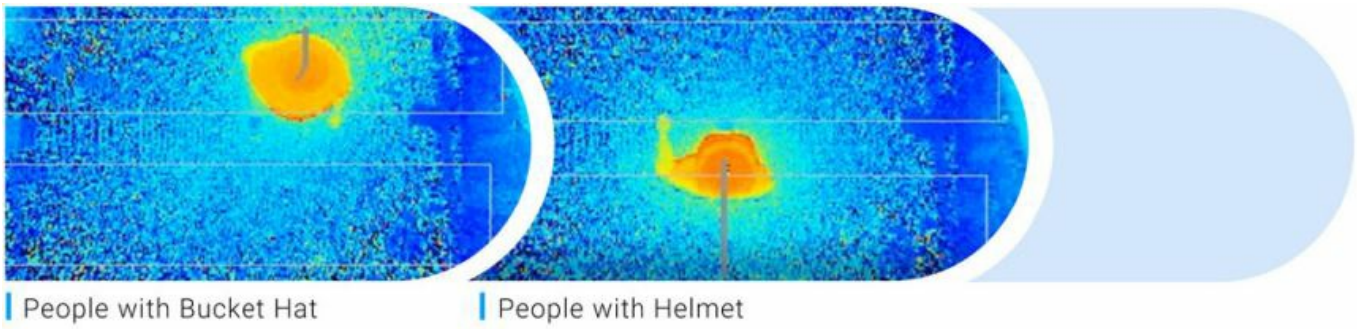
- The accuracy is high in general scenarios.

Hat Testing

Testing Items/ Total Number of People/ Counting Number of People /Accuracy

People with Bucket Hat	26	25	96.15%
People with Helmet	21	21	100.00%

Testing Sample Pictures



Analytics

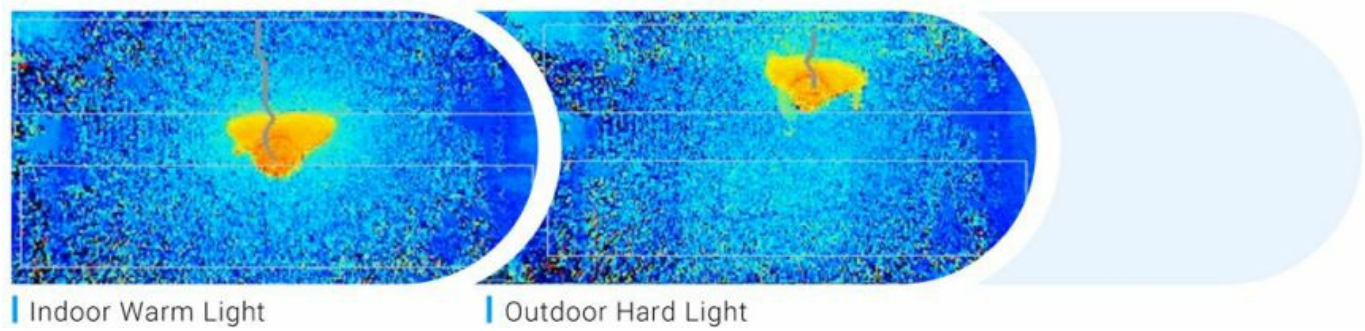
- Since the device is installed above. It may cause a loss because bucket hats could change the objects' three dimension imaging.

Lighting Environment Testing

Testing Items /Total Number of People /Counting Number of People/ Accuracy

Indoor Cold Tone	20	20	100.00%
Indoor Warm Light	26	26	100.00%
Outdoor Hard Light	18	18	100.00%

Testing Sample Pictures



Analytics

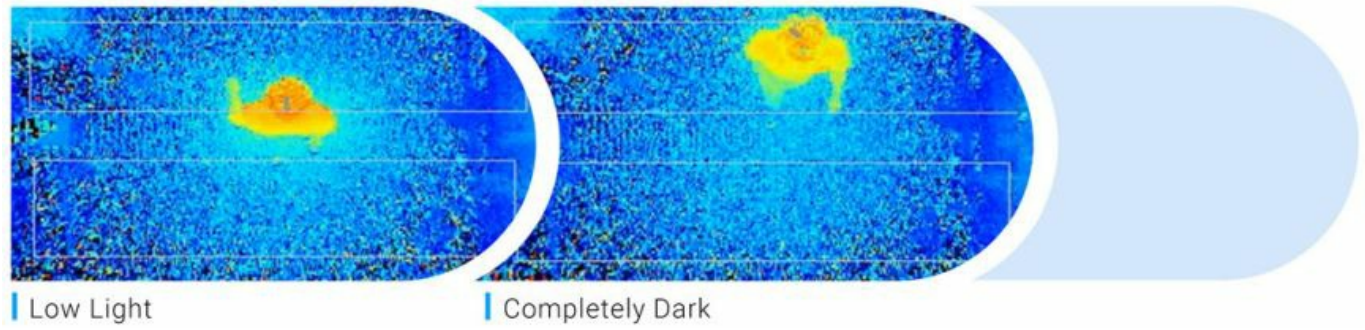
- Sunlight has an obvious impact on ToF devices. But according to t he test result, the counting won't be in fluenced if the 3D ToF People Counting Sensor doesn't expose to direct lighting of strong light.

Environment Adaptability Testing

Testing Items/ Total Number of People/ Counting Number of People /Accuracy

Low Light	21	21	100.00%
Completely Dark	27	27	100.00%

Testing Sample Pictures



Analytics

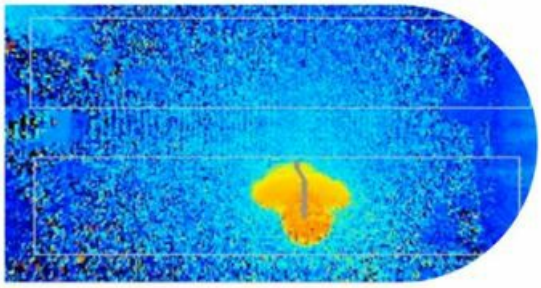
ToF stands out compared with other people counting technologies which can't operate efficiently under low light

even in completely dark environments. The ambient light doesn’t inf luence its performance since it projects active light itself. The accuracy can be ensured in low light environments.

Clothing Influence Testing

Testing Items	Total Number of People	Counting Number of People	Accuracy
People Dressed in Black	20	20	100.00%

Testing Sample Pictures



People Dressed in Black

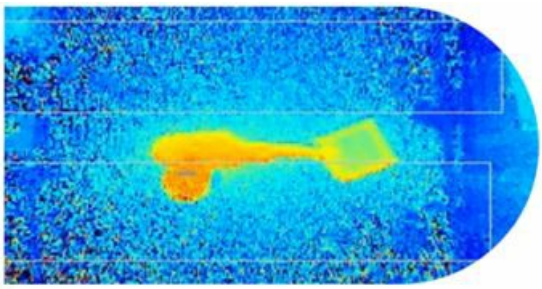
Analytics

- Black objects can also influence ToF technology theoretically. But the testing result eliminates the worry. The accuracy keeps at a high level.

Sundries Testing

Testing Items	Total Number of People	Counting Number of People	Accuracy
People with Sundries or Equipment	23	22	95.65%

Testing Sample Pictures



Sundries

Analytics

- Carrying a sundry with a human-l ike shape will be a problem for accurately counting.
- It may cause fa else detection. But if the sundry is not simi lar to human shape, it won’t affect a lot.

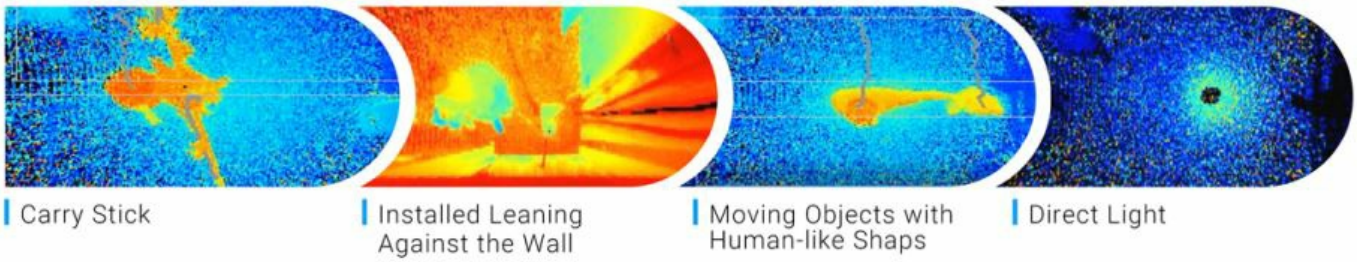
Influence Factors

Influence Factors /Influenced or Not /Description

Object	Hair Color	No	The color is not the detection dimension of ToF, which is different from images produced by the RGB principle. So it won't influence the countin g results.
	Peaked Cap / Helmet	No	Under ceiling mount circumstances, it won't ch ange the shape of the objects detected and infl uence the counting results.
	Bucket Hat	Yes	It will influence the 3D depth information of det ected objects, which is not a human-like shape. It lowers the counting accuracy.
	Carry Stick or Plank	Yes	
	Moving Objects with Hu man-like Shapes	Yes	It may cause false detection if the object can't be filtered by height. For example, the human-li ke dolls.
	Non Moving Objects That Are Not Human-lik e Shapes	No	Carts, suitcases, movable desks and wheelcha irs won't make confusion as objects not in hum an-like shpaes won't influence the counting res ults.
	Jump over Line	Yes	The jump will change the height of the detected objects to affect the counting results.
Environment	Lighting Condition	No	Low light or completely dark environments won 't cause any problem for accurate people count ing.
	Directly Lighting	Yes	Direct light will influence the counting result es pecially when the direct light is in between the area of in and out.
	Outdoor Sunlight Shines on the Indoor Area	No	It doesn't influence the counting results.
	Short Distance Between Sensors	Yes	The visual view angle should be taken into con sideration when deploying. Or the ToF light sou rce will interact between sensors.

Installation	The Sensor Installed Leaning Against the Wall	Yes	When the sensor is installed leaning against the wall, the ToF light source will reflect from the wall, which influences the distance judgement. It will cause people counting accuracy problems.
	The Sensor Installed Near Light Source	No	Most indoor lighting sources are visible light, the Infrared band is weak, and the ToF infrared light is modulated. So the factor has little influence to counting results.
	The Sensor Installed Aslant	Yes	The suggested installed angle of inclination is -10°~10°. The over angle of inclination will cause influence.

Sample Pictures of Influence Factors



Conclusion

The 3D To People Counting Sensor VS132 will truly accomplish its values for reliable data-driven management on condition that high accuracy is ensured. Through massive testing, the accuracy result is obvious. With 3D ToF technology, it can efficiently count people regardless of the effects of complicated objects, environments, and installations. But Inevitably, some factors like human-like objects, direct light, installation leaning against the wall, etc., still challenge the results. Avoiding those adverse factors, it will unleash its best performance for applications.

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Scan

Documents / Resources

	Milesight VS132 ToF People Counting Sensor [pdf] Instruction Manual VS132, VS132 ToF People Counting Sensor, ToF People Counting Sensor, People Counting Sensor, Counting Sensor, Sensor