

Livox Viewer

Auto Extrinsic Calibration User Guide v1.0



2021.03

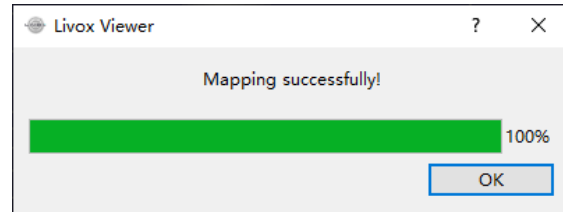
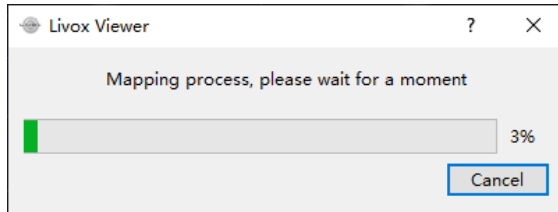


Introduction

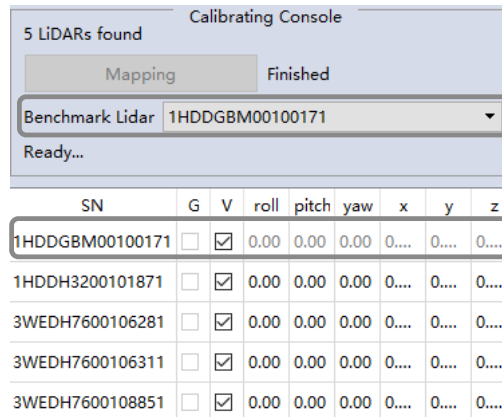
Auto extrinsics calibration enables users to automatically calibrate the extrinsics of multiple LiDAR sensors at the same time. It is particularly useful for LiDAR sensors with little or no FOV overlap.

Auto Extrinsic Calibration Procedure

1. Click  to open the extrinsic parameter tool and select Auto Calibrating.
2. Click  to import the calibration data of lvx file. Check Calibration Data Collection Requirements and Calibration Data Collection Scenario Requirements for more information.
3. Click Mapping and wait until the point cloud reconstruction is completed.



4. Select a LiDAR sensor as the Benchmark LiDAR. The extrinsics of the benchmark LiDAR will remain zero during the auto extrinsics calibration. Users can adjust the extrinsics of the remaining LiDAR sensors where necessary.



5. Uncheck the box in column V to hide a LiDAR on the display.

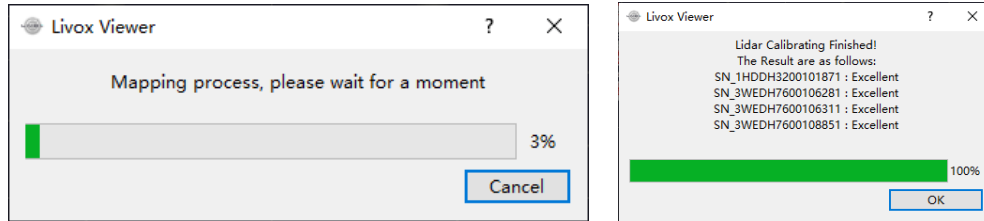


6. Select the extrinsic in the table to adjust. The point cloud data of the selected LiDAR will change to red in the display. Hold Shift and press Up/Down or scroll the mouse wheel to adjust extrinsics by 0.01° or 0.001 m. Hold Ctrl and press Up/Down or scroll the mouse wheel to adjust extrinsics by 0.1° or 0.05 m. The real-time point cloud data will be updated immediately after the extrinsic is adjusted.

SN	G	V	roll	pitch	yaw	x	y	z
1HDDGBM00100171	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.00	0.00	0.00	0.000	0.000	0.000
1HDDH3200101871	<input type="checkbox"/>	<input type="checkbox"/>	0.00	0.00	122.00	0.000	0.000	0.000
3WEDH7600106281	<input type="checkbox"/>	<input type="checkbox"/>	0.00	0.00	-48.00	0.000	0.000	0.000
3WEDH7600106311	<input type="checkbox"/>	<input type="checkbox"/>	0.00	0.00	224.00	0.000	0.000	0.000
3WEDH7600108851	<input type="checkbox"/>	<input type="checkbox"/>	0.00	0.00	38.00	0.000	0.000	0.000

- When adjusting extrinsics, it is recommended to keep the margin of error within 2° or 0.5 m.

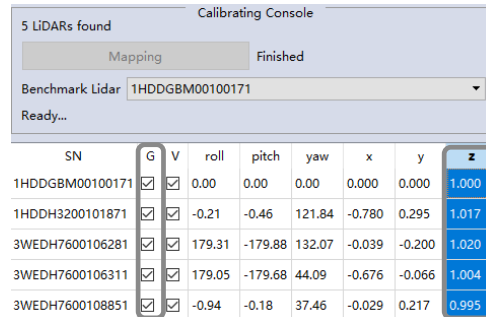
7. Once all extrinsics are adjusted, select Calibrating to perform auto extrinsics calibration.




SN	G	V	roll	pitch	yaw	x	y	z
1HDDGBM00100171	<input type="checkbox"/>	<input checked="" type="checkbox"/>	0.00	0.00	0.00	0.000	0.000	0.000
1HDDH3200101871	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-0.21	-0.46	121.84	-0.780	0.295	0.017
3WEDH7600106281	<input type="checkbox"/>	<input checked="" type="checkbox"/>	179.31	-179.88	132.07	-0.039	-0.200	0.020
3WEDH7600106311	<input type="checkbox"/>	<input checked="" type="checkbox"/>	179.05	-179.68	44.09	-0.676	-0.066	0.004
3WEDH7600108851	<input type="checkbox"/>	<input checked="" type="checkbox"/>	-0.94	-0.18	37.46	-0.029	0.217	-0.005

- For improved accuracy, repeat Steps 5-7. If calibration fails or the extrinsics are inaccurate, check if the point cloud data was recorded properly. Check Calibration Data Collection Requirements and Calibration Data Collection Scenario Requirements for more information.

8. After calibration, users can adjust the extrinsics of all LiDAR sensors as a group by checking one of the boxes in column G. Follow Step 6 to perform a coarse or fine adjustment of extrinsics.



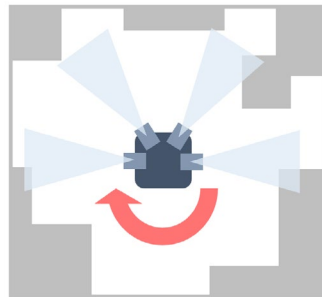
9. Click  to save the current extrinsics or click Apply to confirm and update the extrinsics in Livox Viewer and all connected LiDAR sensors.

Calibration Data Collection Requirements

1. Currently, only Horizon LiDAR sensors support auto extrinsics calibration. Make sure no other models are connected to the Livox Viewer at the same time. Otherwise, calibration cannot be performed.
2. Two to five LiDAR sensors can be calibrated at the same time.
3. Make sure to clear the extrinsics of the LiDAR before recording point cloud data.
4. Make sure to record the point cloud data in lvx format.
5. Record at least 10 seconds but no more than 30 seconds of point cloud data.
6. Use Livox Hub to ensure the time of all LiDAR sensors are synchronized.
7. It is not necessary for the FOVs of the LiDAR sensors to overlap, but the point cloud data should have an overlap of at least 80% after mapping.
8. If there is less than 80% overlap between the FOVs of two LiDAR sensors, scan and keep the surface that the LiDAR sensors are attached to stationary for 3 seconds before completing a 360° rotation. Make sure the ground is flat and the rotational speed is slow.
9. If there is more than 80% overlap between the FOVs of two LiDAR sensors, scan for 10 seconds and keep the surface that the LiDAR sensors are attached to stationary for the entire period.

Calibration Data Collection Scenario Requirements

1. Choose scenarios with abundant spatial geometric characteristics for data collection as shown in the figure below.
2. Avoid scanning areas without spatial geometric features as well as point cloud interference between LiDAR sensors.



Copyright © 2021 Livox Tech. All Rights Reserved.

Livox and Livox Mid are trademarks of Livox Technology Company Limited.

Windows is a registered trademark of Microsoft Corporation in United States and other countries.