# **Full Tutorial: Running Point-LIO SLAM on Unitree L2 LiDAR with ROS2**

## **Overview**

This guide walks you step-by-step through setting up and running **Point-LIO SLAM** with the **Unitree L2 LiDAR** in **ROS2 (Humble)**. It assumes zero prior ROS2 experience.

## **🧠 Prerequisites**

### **Hardware**

* A computer running **Ubuntu 22.04 LTS**
* **Unitree L2 LiDAR**
* Ethernet port or adapter

### **Software**

* ROS2 Humble
* Git
* colcon
* pcl-tools

## **🔧 Step 1: Install ROS2 Humble**

Follow the official guide:<https://docs.ros.org/en/humble/Installation/Ubuntu-Install-Debians.html>

Once done:

source /opt/ros/humble/setup.bash

Add it to your ~/.bashrc:

echo "source /opt/ros/humble/setup.bash" >> ~/.bashrc

source ~/.bashrc

## **🧱 Step 2: Install Dependencies**

sudo apt update

sudo apt install -y \

ros-humble-pcl-ros \

ros-humble-pcl-conversions \

ros-humble-visualization-msgs \

libeigen3-dev \

pcl-tools \

python3-colcon-common-extensions \

build-essential \

git

## **📦 Step 3: Clone and Build the Unitree L2 ROS2 Driver**

git clone https://github.com/unitreerobotics/unilidar\_sdk2.git

cd unilidar\_sdk2/unitree\_lidar\_ros2

colcon build

source install/setup.bash

Add this to ~/.bashrc:

echo "source ~/unilidar\_sdk2/unitree\_lidar\_ros2/install/setup.bash" >> ~/.bashrc

## **🔁 Step 4: Set Up LiDAR Ethernet Communication**

### **Assign Static IP (computer)**

sudo ip addr add 192.168.1.3/24 dev <YOUR\_ETH\_DEVICE>

Find your Ethernet device name via:

ip addr

It may look like enp0s31f6 or enxa0cec88d4989.

### **Set LiDAR IP (only once or when resetting)**

cd ~/unilidar\_sdk2/unitree\_lidar\_sdk/build

../bin/set\_ip\_address # sets IP to 192.168.1.4

../bin/set\_to\_udp\_mode

Now **reboot the LiDAR**:

* Unplug power
* Wait 15 sec
* Plug back in
* Wait 20+ sec

### **Test ping:**

ping 192.168.1.4

If it replies, you're connected!

## **🧠 Step 5: Clone and Build Point-LIO (ROS2)**

cd ~/unilidar\_sdk2/unitree\_lidar\_ros2

mkdir catkin\_point\_lio\_unilidar && cd catkin\_point\_lio\_unilidar

mkdir src && cd src

# Clone Point-LIO with Unitree support

git clone https://github.com/dfloreaa/point\_lio\_ros2.git

cd ..

colcon build --symlink-install

source install/setup.bash

Add to ~/.bashrc:

echo "source ~/unilidar\_sdk2/unitree\_lidar\_ros2/catkin\_point\_lio\_unilidar/install/setup.bash" >> ~/.bashrc

## **🧾 Step 6: Edit the YAML Config File**

Edit unilidar\_l2.yaml inside point\_lio/config/.

Ensure these key parameters are set:

lid\_topic: "/unilidar/cloud"

imu\_topic: "/unilidar/imu"

...

mapping:

imu\_en: true

extrinsic\_est\_en: false

extrinsic\_T: [0.007698, 0.014655, -0.00667]

extrinsic\_R: [1.0, 0.0, 0.0,

0.0, 1.0, 0.0,

0.0, 0.0, 1.0]

gravity: [0.0, 0.0, -9.810]

...

## **🚀 Step 7: Enable Map Saving (Optional but Recommended)**

In mapping\_unilidar\_l2.launch.py, locate laser\_mapping\_params and append:

'pcd\_save\_en': True,

'pcd\_save\_interval': -1

## **▶️ Step 8: Run SLAM**

### **Terminal 1: Start Unitree Driver**

cd ~/unilidar\_sdk2/unitree\_lidar\_ros2

source install/setup.bash

ros2 launch unitree\_lidar\_ros2 launch.py

### **Terminal 2: Start Point-LIO**

cd ~/unilidar\_sdk2/unitree\_lidar\_ros2/catkin\_point\_lio\_unilidar

source install/setup.bash

ros2 launch point\_lio mapping\_unilidar\_l2.launch.py

Walk around slowly. After 5–10 seconds, you'll see points accumulate in RViz.

## **💾 Step 9: View Saved Map**

Once done, stop with Ctrl+C. The map will be saved to:

~/unilidar\_sdk2/unitree\_lidar\_ros2/catkin\_point\_lio\_unilidar/PCD/scans.pcd

View it with:

pcl\_viewer ~/unilidar\_sdk2/unitree\_lidar\_ros2/catkin\_point\_lio\_unilidar/PCD/scans.pcd

Use keys 1–5 in the viewer to change visualization styles.

## **🧼 Optional Cleanup**

To prevent IP conflicts, remove duplicate static assignments:

sudo ip addr del 192.168.1.3/24 dev <any\_wrong\_interface>

## **✅ Troubleshooting**

| **Problem** | **Solution** |
| --- | --- |
| Cannot ping LiDAR | Ensure Ethernet IP is set to 192.168.1.3 and LiDAR is rebooted |
| RViz shows blank | Wait longer, confirm topics /cloud\_registered or /Laser\_map are live |
| No scans saved | Ensure 'pcd\_save\_en': True is in your launch file |
| pcl\_viewer not found | Install: sudo apt install pcl-tools |

## **🎉 Done!**

You now have a working Point-LIO SLAM system with the Unitree L2. You can use the .pcd file for 3D reconstruction, analysis, or navigation experiments.