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SLAMTEC RPLIDAR S2E Low Cost 360 Degree Laser Range Scanner User Manual

Contents

SLAMTEC RPLIDAR S2E Low Cost 360 Degree Laser Range Scanner

Overview

RPLIDAR S2E development kit includes the matched tools used for evaluating RPLIDAR's performance and initial development. After connecting the RPLIDAR S2E with PC via Network cable and connecting the power adapter to the power supply and the power adapter cable, users can observe the cloud map of the environment scanning point collected by the RPLIDAR in Robo Studio and start development based on the SDK.

Items in the Development Kit

RPLIDAR Development Kit contains:

Figure 1-1 Items in the RPLIDAR Development Kit

The standard version of the RPLIDAR S2E module is included in the RPLIDAR S2E development kit. The default IP address of RPLIDAR S2E is 192.168.11.2. The user Ethernet address cannot be the same as that of RPLIDAR S2E.

Connection and Usage

Device Connection

1. Connect the network port line of RPLIDAR S2E module provided in the development kit to the PC, and connect the power cord to the power supply through the power adapter and power adapter.
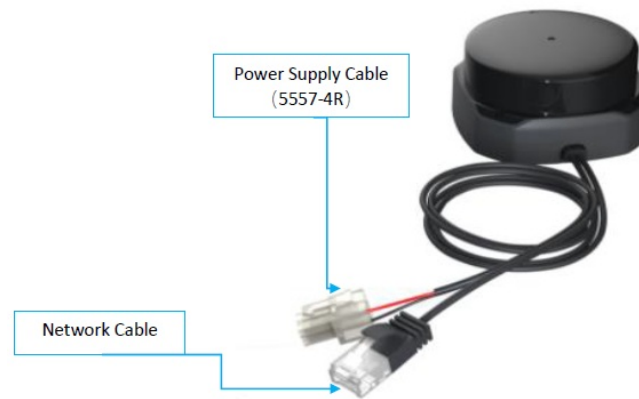
Figure 2-1 Connect RPLIDAR S2E

Need to configure the Ethernet before using the RPLIDAR S2E module. Make sure that the RPLIDAR S2E module is connected to a PC through network ports. Perform the following steps to configure the Ethernet:

1. Windows Network Configuration:

    As shown in Figure 2-2, open the Ethernet attribute configuration of the network interface connected to RPLIDAR S2E and set the IP address of the local network to 192.168.11.2, which is in the same network segment as the lidar (the change is based on the default IP address of the lidar 192.168.11.2).
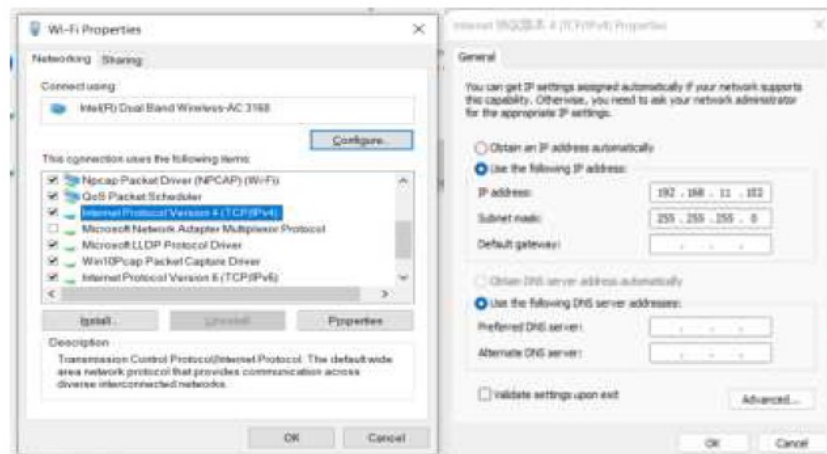
2. Linux/MacOs Network Configuration:

As shown in Figure 2-3, in Linux, run the sudoifconfig enp4s0 192.168.11.2 command to configure the network. Enp4s0 indicates the interface name. Change the port name based on the actual situation.
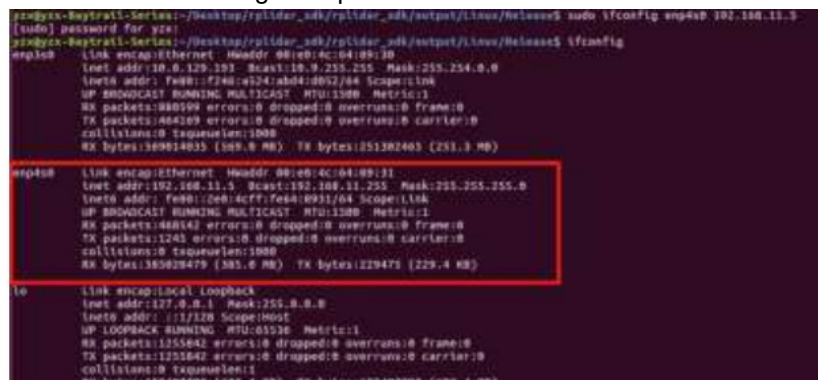

Figure 2-3 IP Address Setting

After the network configuration is complete, ping 192.168.11.2 to check whether the network configuration is successful.

Run Demo Application

SLAMTEC provides a Lidars plugin in Robo Studio for users in test and evaluation. You can view the scan result directly in the UI and save the scan result to files for further processing.
Currently the software needs to run on Windows, but for Linux and MacOS users, additional sample programs are available with the SDK.

1. Please make sure you have connected RPLIDAR to PC by using network interface before running the demo application in Robo Studio. Launch Robo Studio and log in.

Figure 2-4 RoboStudio Login Page

2. If the connection is ok, you will see the user interface is shown as below.
   Click the " Lidars " option in the "File" menu, and then right click on the Lidars below the box area, the content of dialog box will be "Manual Connect to Lidar… / Auto Discovery to Lidar…".
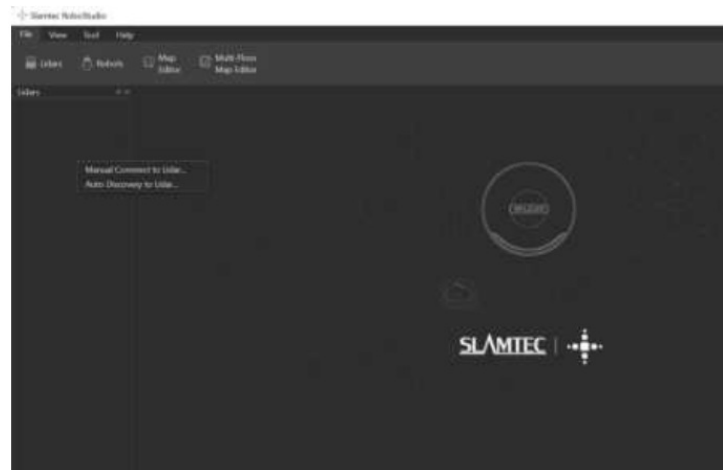

Figure 2-5 Manual Connection Menu for RoboStudio

3. Click on " Manual Connect to Lidar.. ", select "Udp Server" connection mode in the dialog box, configure the Lidar IP address (192.168.11.2) and port (8089), and then click "Connect".

4. Or click on " Auto Discovery to Lidar… "Use the device discovery function of RPLIDAR S2E to find the automatic detection lidar, and the lidar connected to PC will appear in the list. Click the lidar icon to expand the list of tool ICONS below the lidar, and click the toolbar button to open the toolbar options on the main interface, as shown below:

Figure 2-7 Lidars Plugin Work Interface of RoboStudio

The lidar display window shows the serial number, version and model information of the current connected lidar. All the operations available for RPLIDAR are listed in the toolbar:

Button	Function	Description
	Restart RPLIDAR	Restart scan core to clear internal errors
	Save Scan Data	Save current scan data to the local file
	Stop Scan	Scan core enter power save mode
	Start Scan	Scan data will be displayed after scan core starting work
	Work Mode Switch	Switch among different work modes to fit in specific environments
	Adjust Motor Speed	Adjust the motor speed as required

Figure 2-8 The Supported Commands of RPLIDAR in RoboStudio

Press the Start Scan button the scan data will be displayed as below(by default, the motor rotating speed should be about 10Hz.):
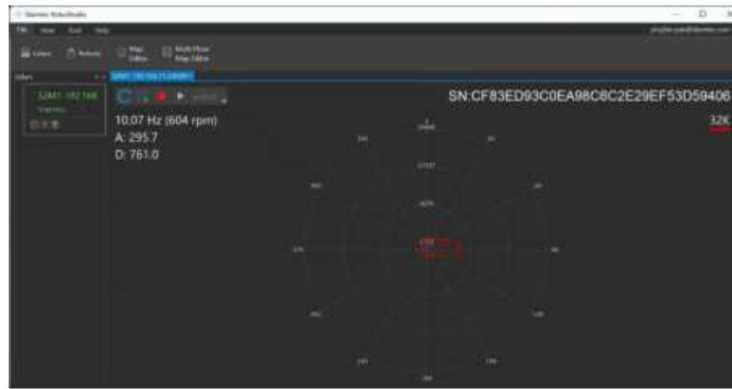
Figure 2-9 The Scan Outline by RPLIDAR in RoboStudio

Right click in the major working area to choose a range so as to zoom in or out the view. The scan frequency is also showed in the above interface.

eg 10.07Hz(604rpm)

Troubleshooting

When the scan core or the laser power works abnormally, the scan core will enter protection mode. This state can be retrieved via SDK API. If such scenario happened, please send restart command to reset the scan core.

Motor Speed Adjustment

During the running process, different motor rotating speed can be achieved by pressing the button, which can fit in different working environments or meet specific requirements. There will be a speed adjustment dialog box and dash board popped up for users to enter required speed. After entering a value, the motor will work as the settled rotating speed automatically. User can also drag the sliding handle to the required rotating speed.
The current actual rotating speed will show in the upper left corner of the major work area. For instance, the actual rotating speed in the following screenshot is 15.14Hz.

Figure 2-10 The Motor Speed Adjustment Dialogue of RPLIDAR in RoboStudio

SDK Introduction and Usage

Power Supply Specification

The RPLIDAR S2E uses a unique external power supply to drive both the range core and a motor system that makes the range core rotate. The external system needs to ensure the current output capacity and ripple characteristics of the power supply to ensure the normal operation of the lidar. Please refer to Datasheet for details.

S2E	Min	Typical	Max	Comments
Power Voltage	9V	12V	28V	If the voltage is not enough, the measurement will not be accurate.
Start Current		1200mA	1500mA	12V power, lower voltage start-up requires more current.
Working Current		200mA	220mA	12V power

Figure 3-1 RPLIDAR S2E Power Supply Specification

SDK Usage

RPLIDAR S2E can use open source code RPLIDAR SDK provided by SLAMTEC for rapid development and validation. Please refer to the website the SDK user manual for details. (**https://github.com/Slamtec/rplidar_sdk)** This section will briefly introduce the visual point cloud display Demo(Frame _Grabber) on Windows.

1. Set frame _grabber to start the project and compile

2. Find frame_grabber.exe and double-click it under the path of \output\win32\Debug or.\output\win32\Release. If an error occurs, copy the DLL from dL. rar to the directory, start the program, select Network, and manually fill in the DLL according to the interface parameters of RPLIDAR S2E.
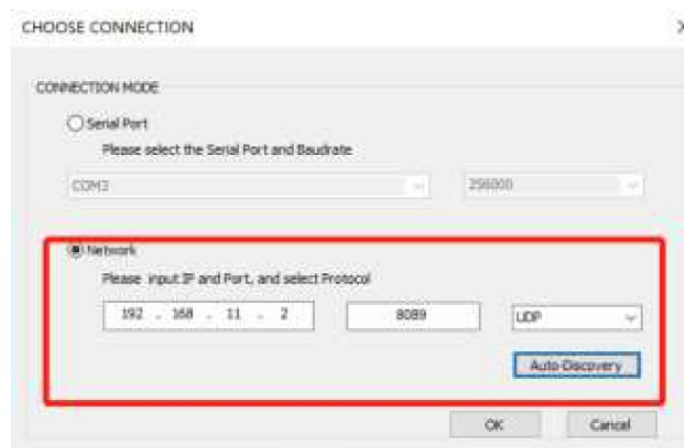

Figure 3-3 Selection Interface of Lidar Connection

3. If Bonjour has been installed on Windows (the SDK directory contains the installation package bonjour. rar), you can use the device Discovery function of RPLIDAR S2E, click "Auto-Discovery", wait for 2 to 3 seconds, double-click the corresponding lidar device as shown in the figure, and click "OK".
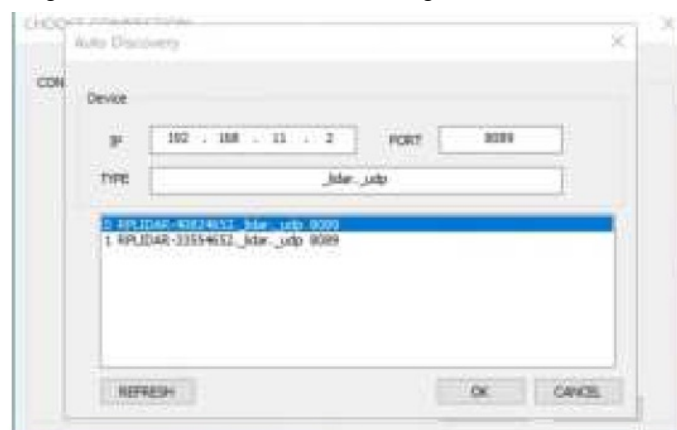

Figure 3-4 Lidar Equipment Detection Function

4. Click "OK" in Figure 3-3 and then click to scan point cloud, as shown in Figure 3-5. For SDK, please refer to start Scan Express and grab Scan Data Hq.
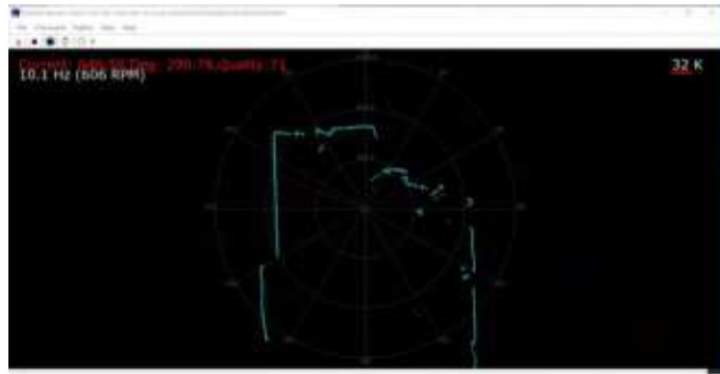

Figure 3-5 Point Cloud Display Interface

5. The RPLIDAR S2E supports three scan modes. The Sensitivity mode can output range, angle and intensity information, as well as internal lidar time stamps for each 96 point cloud data. For details, please refer to the communication protocol documents on the official website.
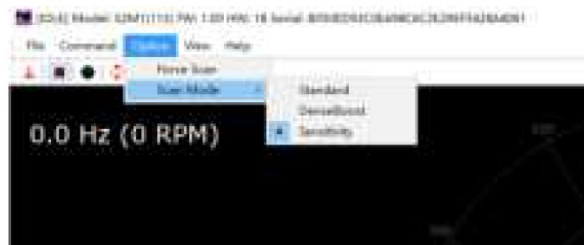

Figure 3-6 Scan Mode Selection

6. After starting lidar scanning, you can click to adjust the speed. Please check the SDK check Motor Ctrl Support and set Motor Speed.
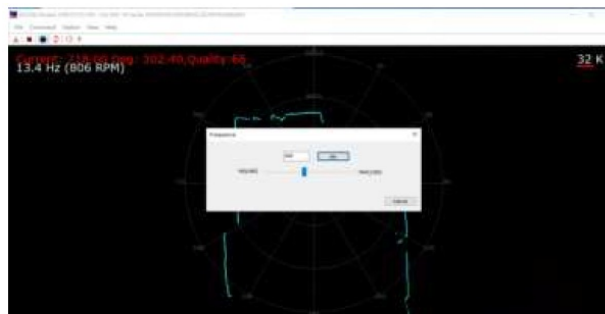

Figure 3-7 Lidar Speed Regulation

7. Click Command >IP Config to configure the IP address. As Figure 3-7 shows resetting the device after the configuration is complete. For SDK, see set Lidar Ip Cone and reset.

Figure 3-8 IP Configuration

8. Click to download single point cloud data.

ROS/ROS2 Usage

1. Please refer to **https://github.com/Slamtec/rplidar_ros** for ROS and run relaunch rapider _roes

view_rplidar_s2e.launch to perform visual tests.

2. Please refer to **https://github.com/Slamtec/sllidar_ros2** for ROS2 and run ros2 launch sllidar_ros2 view_sllidar_a3_launch.py to perform visual tests.

Operation Recommendation

Please refer to Slamtec Github for details.

Pre-Heating for Best Performance

The scan core will be heating when start working. We recommend pre-heating RPLIDAR (Start the scan mode and the scan motor is rotating) for more than 2 minutes to get the best measurement accuracy.

Ambient Temperature

RPLIDAR's measurement resolution is sensitive to the ambient temperature.
Improper use may even damage the sensor. Please avoid using RPLIDAR in extreme high temperature (>50℃) and too low temperature (<-10 ℃).

Ambient Light
Compared with RPLIDAR A series, RPLIDAR S2E performs better to resist ambient light interference, which supports it to work properly in outdoor environment.
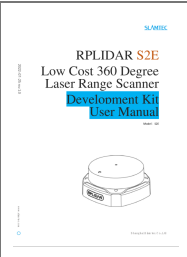
Maintenance and Repairs

Please do not open the shell of the equipment for repair without authorization, otherwise the warranty will be invalid.
Pay attention to keep the equipment shell clean during using to ensure the normal operation of the lidar.

Date	Version	Description
2022-06-01	1.0	RPLIDAR S2E initial version

Documents / Resources

SLAMTEC RPLIDAR S2E Low Cost 360 Degree Laser Range Scanner [pdf] User Manual
RPLIDAR S2E, Low Cost 360 Degree Laser Range Scanner, RPLIDAR S2E Low Cost 360 Degree Laser Range Scanner, 360 Degree Laser Range Scanner, Laser Range Scanner, Range Scanner, Scanner

References

- **GitHub - Slamtec/rplidar_ros**
- **GitHub - Slamtec/rplidar_sdk: Open source SDK for Slamtec RPLIDAR series products**
- **GitHub - Slamtec/sllidar_ros2**