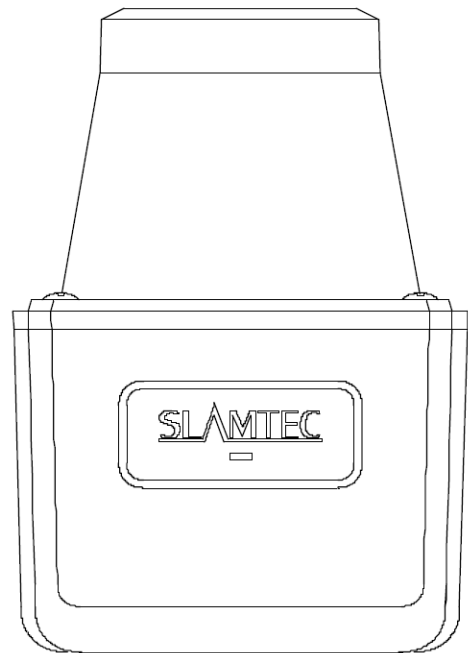


LPX T1

Indoor and Outdoor Laser Range Scanner
For Middle and Long Range Application

Development Kit User Manual

Model: LPX-T1M4



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LPX-T1 development kit includes the matched tools used for evaluating LPX-T1's performance and initial development. After connecting the LPX-T1 with PC via a network cable and with power via a power cable, users can observe the cloud map of the environment scanning point collected by the Lidar plugin in RoboStudio and start development based on the SDK.

Items in the Development Kit

LPX-T1 Development Kit contains:

- LPX-T1 Module
- Network Cable (Require purchase separately)
- Power Cable (Require purchase separately)



Figure 1-1 Items in the LPX-T1 Development Kit

LPX-T1 Module

The LPX-T1 development kit contains standard LPX-T1 module. The default IP address of LPX-T1 is 192.168.11.2, therefore users need to use a different Ethernet address.



Figure 2-1 The LPX-T1

Device Connection

LPX-T1 can be easily connected to PC according to the following steps:

Take out the LPX-T1 from the development kit;

Connect the LPX-T1 network interface with PC via a network cable;

Connect the LPX-T1 power interface with power via a power adapter;

If PC is on, the indicator on the LPX-T1 turns green. And at the time, LPX-T1 module is not rotating.

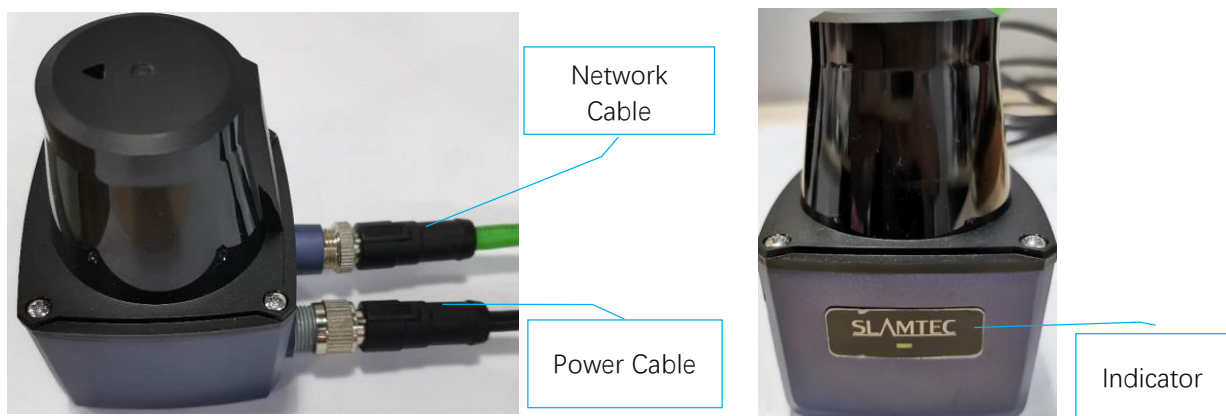


Figure 2-2 LPX-T1 Connection

Network Configuration

Before using LPX-T1 module, please configure the Ethernet network (after connecting the LPX-T1 to PC) as below:

Open Network & Internet Settings on PC;

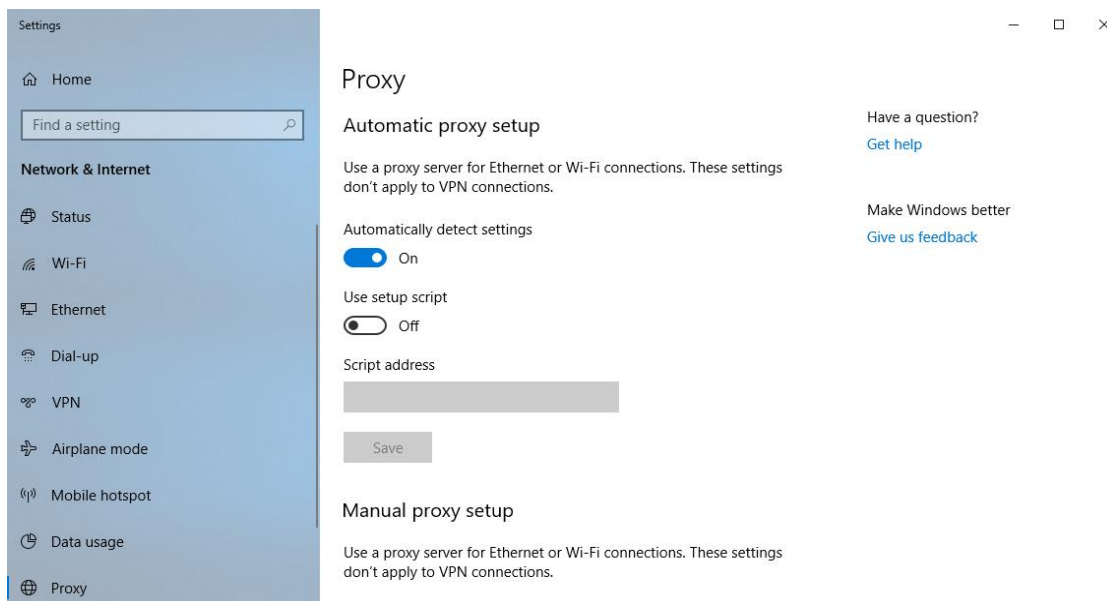


Figure 2-3 Network Connection Configuration

Click Ethernet in the left menu and choose Change adapter options;

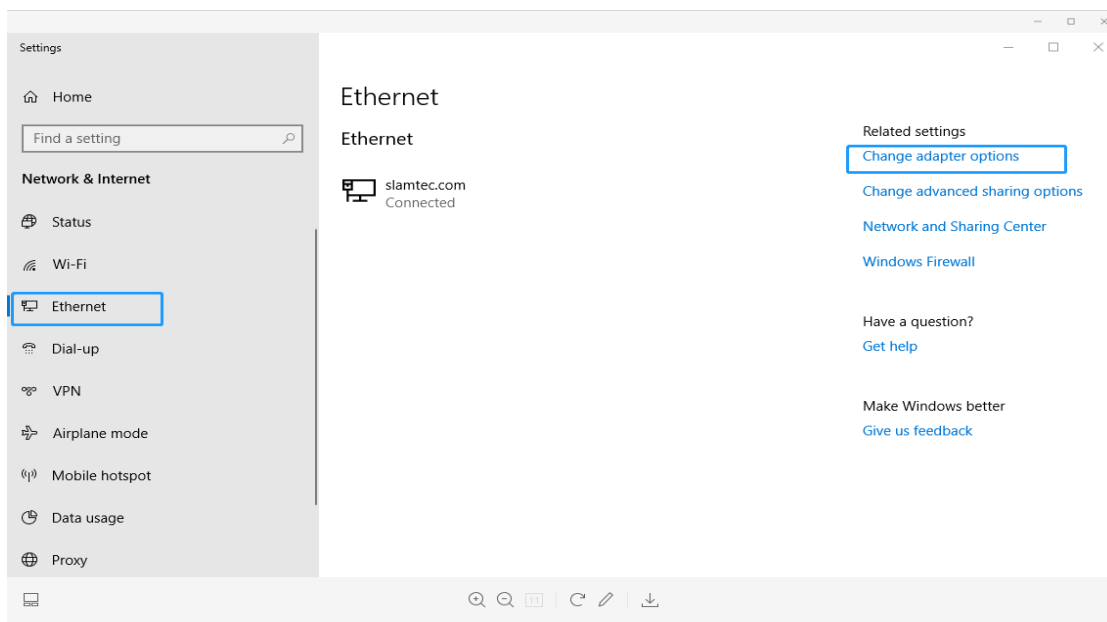


Figure 2-4 Change Adapter Options

Double-Click Ethernet port and choose Properties on the open page;

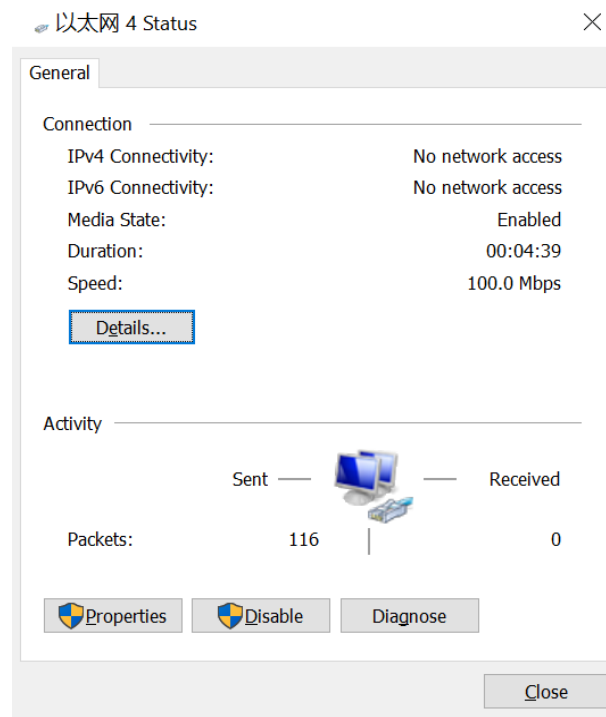


Figure 2-5 Ethernet Port Setting

Choose TCP/IPv4;

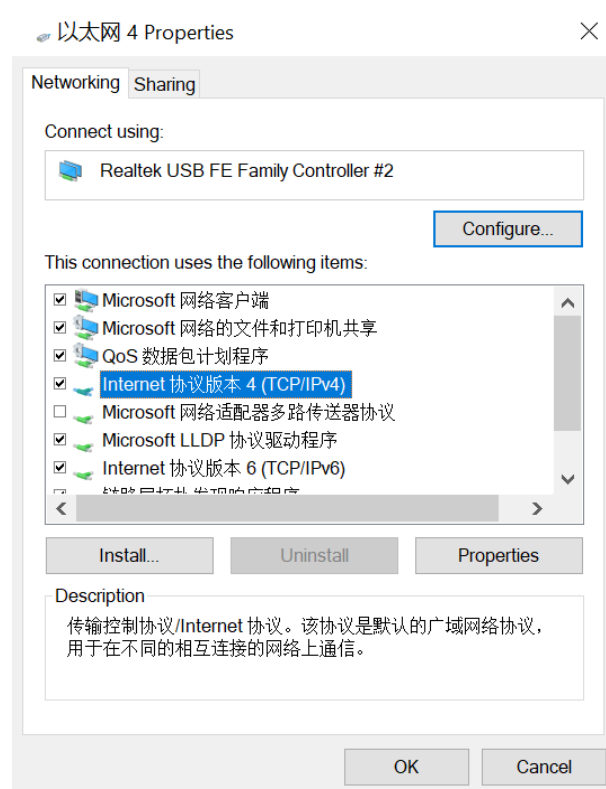


Figure 2-6 Ethernet Contribution Setting

Click Properties button;

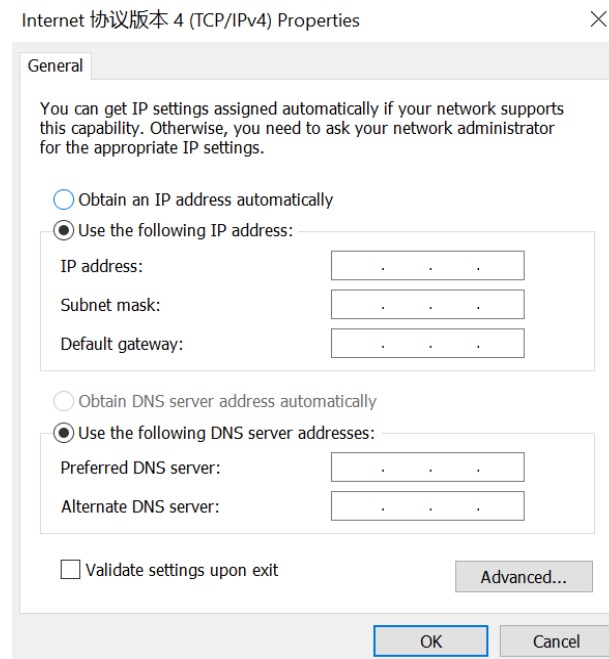


Figure 2-7 Internet Protocol Version(TCP/IPv4) Setting

Choose Use the following IP address and enter 192.168.11.30(or any other IP address except for the default Lidar IP address 192.168.11.2) in the IP address bar, use the default settings in the Subnet mask bar, and click OK.

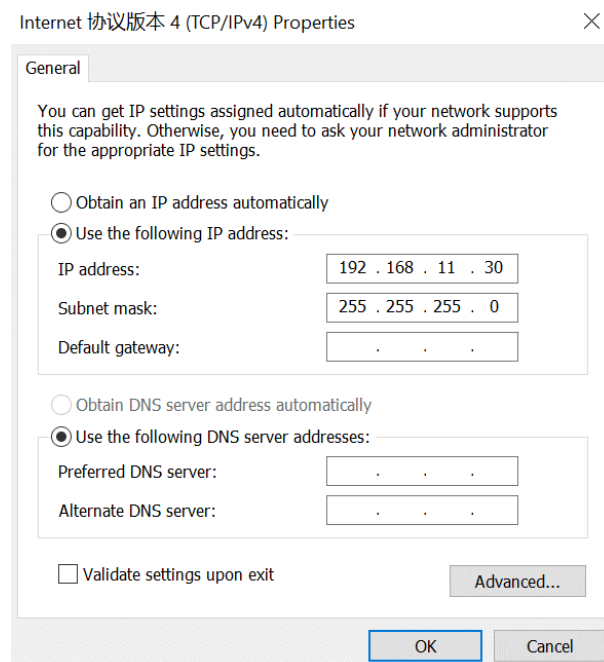


Figure 2-8 IP Address Setting

Run Demo Application

SLAMTEC provides Lidars, a GUI plugin, in RoboStudio for users in LPX-T1 test and evaluation. You can view the scan result directly in the UI and save the scan result to files for further analysis or processing.

This RoboStudio only runs under Windows. For Linux and MacOS users, please refer to the other simple demo provided in the SDK.

Please make sure you have connected LPX-T1 to PC via network interface before running the demo application in RoboStudio. Launch RoboStudio and log in.

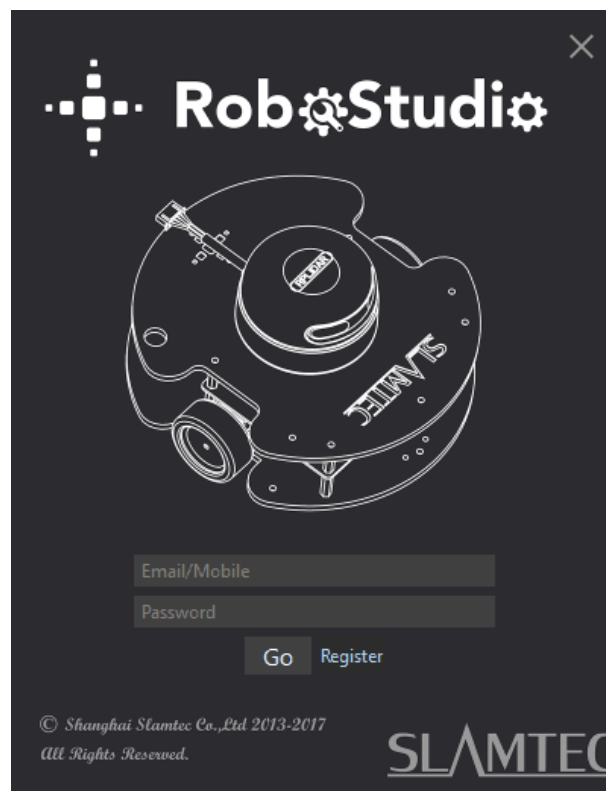


Figure 2-9 RoboStudio Login Page

If the connection is ok, you shall see the user interface is shown as below. Click File->Lidars to open the lidar control panel in the left; Right click the blank area under Lidars and Choose “Manually connecting Lidar” in the drop-down menu;

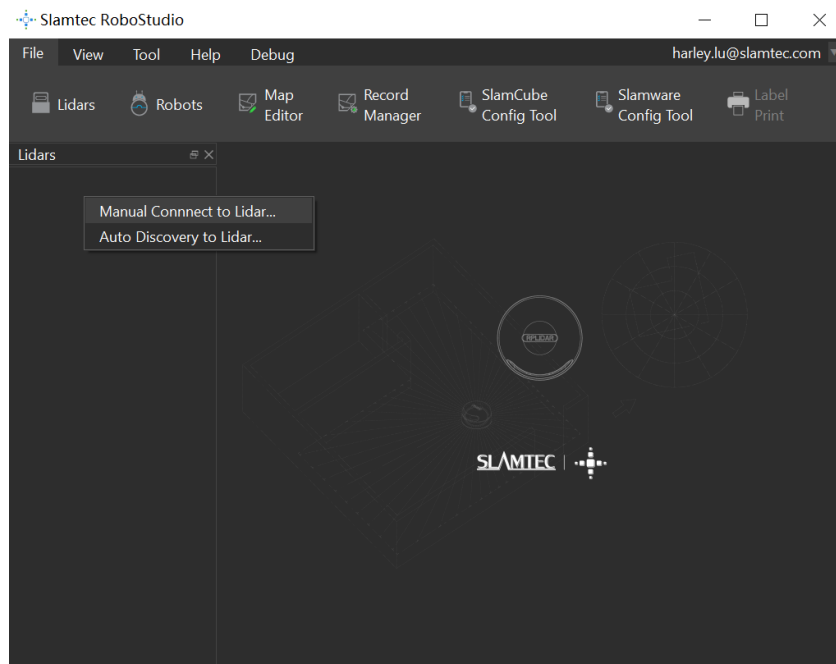


Figure 2-10 RoboStudio Manual Connect to Lidar Page

Click Udp Server in the dialogue and click Connect to confirm the connection.

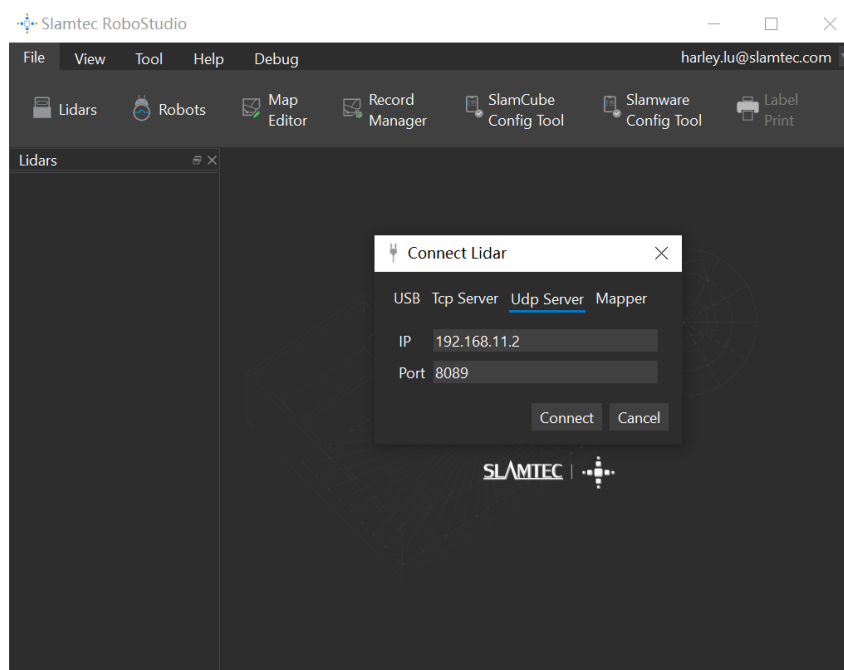


Figure 2-11 RoboStudio Udp Connecting Page

Click the floating window Lidars in the left, the LPX-T1 connected to PC will show in the list. Click the icon of LPX-T1 in the list to extend the tool buttons below the icon: the right button is to open the tool bar in the major work area as shown in Figure 2-12.

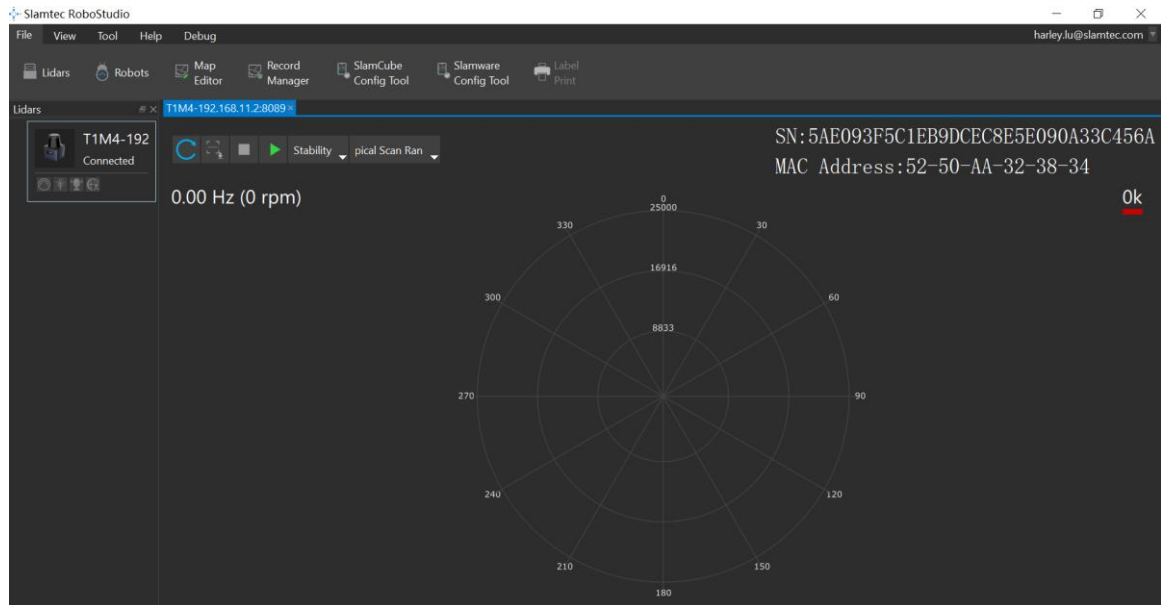


Figure 2-12 The Lidar Plugin in RoboStudio

The serial number, version and model of the LPX-T1 will show in the lidar window. The supported commands of LPX-T1 are showed in the tool bar. The descriptions are listed in the bellow table.





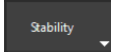

Button	Function	Description
	Restart LPX-T1	Restart scan core to clear internal errors
	Save Scan Data	Save current scan data to the local file
	Stop Scan	Scan core enter power save mode
	Start Scan	Scan data will be displayed after scan core starting work
	Work Mode Switch	Switch among different work modes to fit in specific environments

Figure 2-13 The Supported Commands of LPX-T1 in RoboStudio

Press the Start Scan button , the scan data will be displayed as below (by default, the motor rotating speed should be about 20Hz.):

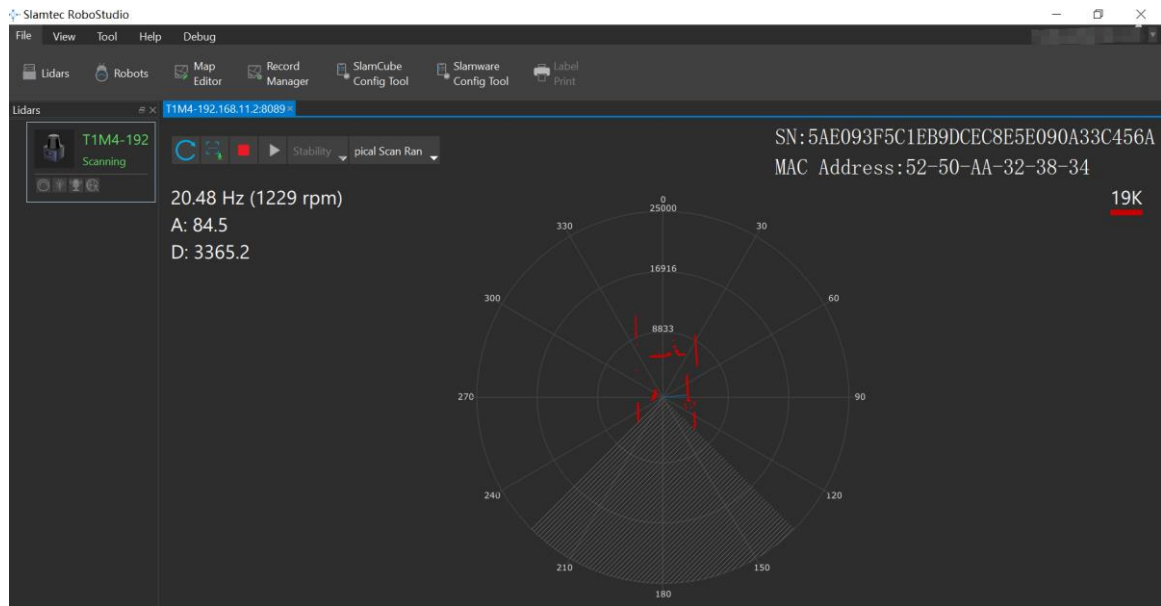



Figure 2-14 The Scan Outline by LPX-T1 in RoboStudio


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.

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 20.59Hz.

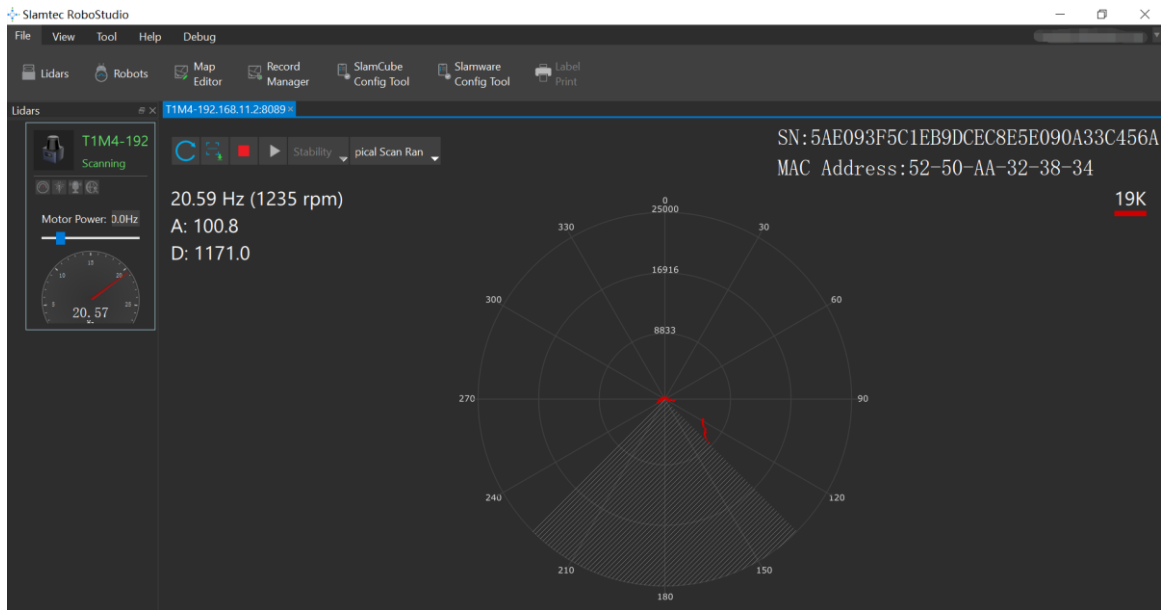
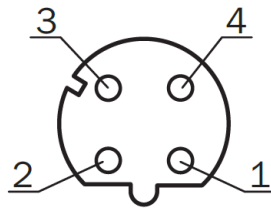


Figure 2-15 The Motor Speed Adjustment Dialogue of LPX-T1 in RoboStudio

LPX-T1 Module Interface Specification and Definition

In the LPX-T1 development kit, the interfaces are the standard M12-4P-D and M12-5P-A aviation plugs. Users should use cables with matched plugs to connect to LPX-T1. The interface definition are as below:

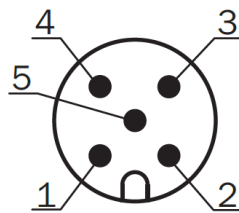
Network interface



Pin	Signal	Type	Description
1	TD+	Output	Sending data+
2	RD+	Input	Receiving data+
3	TD-	Output	Sending data-
4	RD-	Input	Receiving data-

Figure 3-1 LPX Network Interface Definition

Power Supply Interface



Pin	Signal	Type	Description	Min	Typical	Max
1	VCC	Power Supply	System Power Supply	9V	12V	28V
2	SYNC	Output	Sync Output	0V	3.3V	3.5V
3	GND	Power Supply	GND	0V	0V	0V
4	NA	Reserved	Not for GND or any other circuit			
5	NA	Reserved	Not for GND or any other circuit			

Figure 3-2 LPX Power Supply Definition

Power Supply Interface Specification

LPX-T1 takes the only external power to power the range scanner core and the motor system which make the core rotate. To make the LPX-T1 work normally, the host system needs to ensure the output of the power and meet its requirements of the power supply ripple.

LPX-T1M4	Min	Typical	Max	Remark
Power Supply Voltage	9V	12V	28V	If the voltage exceeds the max value, it may damage the core 12V Power Supply
System Start Current	-	1200mA	1500mA	The system startup requires relatively higher current under low voltage.
Working Power Current	-	200mA	220mA	12V Power Supply

Figure 3-3 RPLIDAR Power Supply Specification

Configure LPX-T1 Scan Frequency

Users can configure the motor speed of LPX-T1 directly by invoking the function in the SDK, so as to modify the Lidar scan frequency (supported range: 20Hz~40Hz).

Please refer to the LPX-T1 protocol and application note for more information and the SDK for the sample code on LPX-T1 scan frequency.

SDK Usage

SLAMTEC provides LPX-T1 SDK support on both Windows and Linux platform. And users can embed the SDK source code to other operational system or embedded system quickly. Please refer to the SDK document for more information.

Pre-Heating for Best Performance

The scan core will be heating when start working. We recommend pre-heating LPX-T1 (Start the scan mode and the scan motor is rotating) for more than 2 minutes to get the best measurement accuracy.

Ambient Temperature

LPX-T1's measurement resolution is sensitive to the ambient temperature. Improper use may even damage the sensor. Please avoid using LPX-T1 in extreme high temperature (>50 degree) and too low temperature (<-20 degree).

Ambient Light

Compared with LPX-T1 series, LPX-T1 performs better to resist ambient light interference, which supports it to work properly in outdoor environment.

LPX-T1 can work in two modes: enhanced mode and outdoor mode.

Enhanced mode is designed for indoor environment. Typical indoor light (including situations without light) will not affect the performance of LPX-T1. Strong light (such as high power laser) will harm the optical system of LIDAR, which should be avoided.

During outdoor mode, LPX-T1 can work normally to detect objects under direct ambient light. However, the ranging distance might be shorter under strong direct sunlight and it is still necessary to protect the optical system from direct sunlight.

Maintenance and repair

Please do not open the shell of this equipment for maintenance without authorization, otherwise the warranty will be invalid.

In the process of use, pay attention to keep the equipment shell clean, to ensure the radar production and use.

Date	Version	Description
2022-12-10	1.0	LPX-T1 initial version

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