YDLIDAR

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YDLDIAR T-MINI PLUS USER MANUAL

www.ydlidar.com

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CONTENTS

1 YDLIDAR T-mini Plus LIDAR DEVELOPMENT KIT

The development kit of YDLIDAR T-mini Plus lidar (hereinafter referred to as T-mini Plus) is an accessory tool provided for performance evaluation and early development of the T-mini Plus. Through the T-mini Plus development kit, and with the evaluation software, users can observe point cloud data scanned by T-mini Plus on your environment or development on the SDK.

1.1 Development Kit

The T-mini Plus development kit has the following components:

T-mini Plus Lidar

USB Type-C Cable

USB Adapter Board

FIG 1 YDLIDAR T-MINI PLUS DEVELOPMENT KIT

CHART 1 YDLIDAR T-MINI PLUS LIDAR DEVELOPMENT KIT DESCRIPTION

Item	Qty.	Description
T-mini Plus Lidar	1	Standard version of the T-mini Plus Lidar, internal integrated motor drive, can realize motor stall control and motor control
USB Type-C Cable	1	Use with USB adapter board to connect T-mini Plus and PC. USB cable is both a power supply cable and a data cable
USB Adapter Board	1	Realize USB to UART, convenient for the rapid interconnection of T-mini Plus lidar and PC. In addition, it provides Micro USB power interface (PWR) for auxiliary power supply

Note: USB Adapter board has two interface: USB_DATA、USB_PWR.

USB_DATA: Data powered interface. In most cases, this interface can be used to meet power and communication requirements.

USB_PWR: Auxiliary power supply interface. The USB interface of some development platforms has weak current drive capability. At this time, auxiliary power supply can be used.

2 OPERATION UNDER WINDOWS

2.1 Device Connection

When T-mini Plus is evaluated and developed under windows, T-mini Plus and PC need to be interconnected. The specific process is as follows:

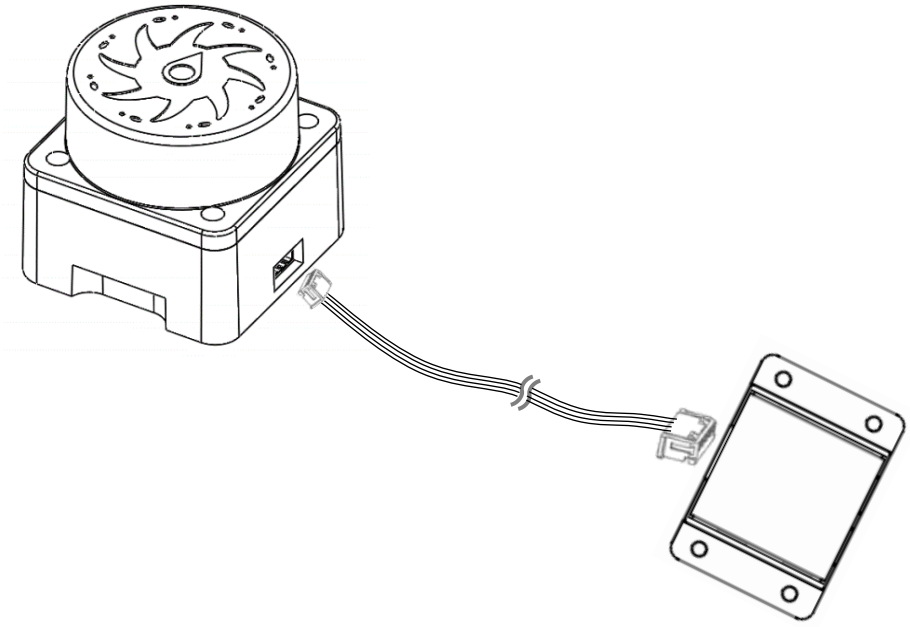


FIG 2 YDLIDAR T-MINI PLUS DEVICE CONNECTION STEP 1

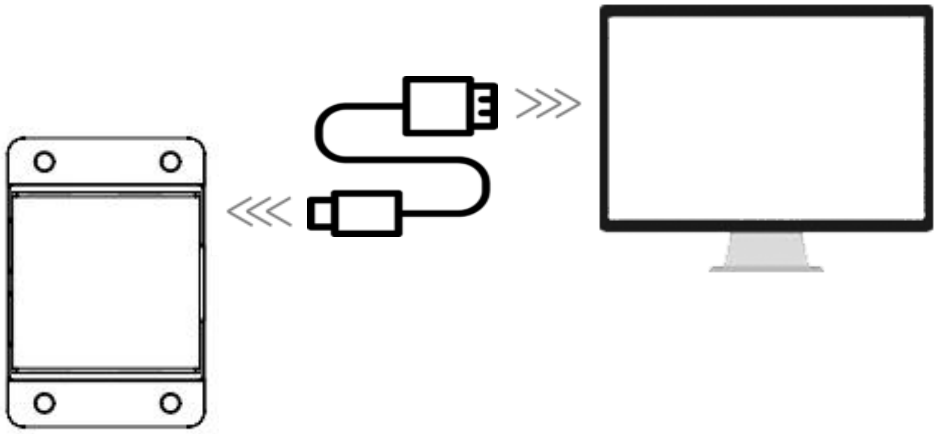


FIG 3 YDLIDAR T-MINI PLUS DEVICE CONNECTION STEP 2

Connect the adapter board with T-mini Plus first, then connect the USB cable to the USB port of the adapter board and the PC. Note that the Type-C interface of the USB cable is connected to the USB_DATA of the USB interface board, and the idle mode is used after T-mini Plus is powered on. The motor does not rotate.

The drive current of USB interface of some development platforms or PC is not sufficient. T-mini Plus need to be connected to the auxiliary power supply of +5V, otherwise the lidar will be abnormal.

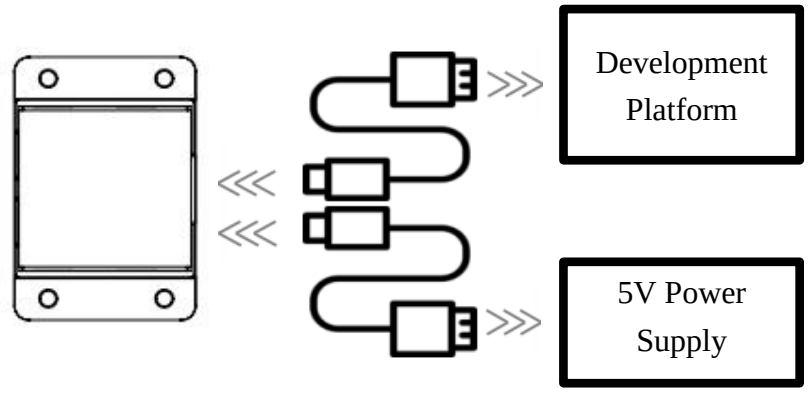


FIG 4 YDLIDAR T-MINI PLUS AUXILIARY POWER SUPPLY

2.2 Driver Installation

To evaluate and develop the T-mini Plus under Windows, you need to install the serial port driver of the USB adapter board. The USB adapter board of this kit adopts CP2102 chip to realize serial port (UART) to USB signal conversion. Its driver can be downloaded from our official website or downloaded from the official website of Silicon Labs.

https://www.ydlidar.com/dowfile.html?id=97

http://cn.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers

After unzipping the driver package, run the CP2102's Windows driver installation file (exe file under CP210x_VCP_Windows). Please select the 32-bit version (x86) or 64-bit version (x64) installation program according to the version of the windows operating system.

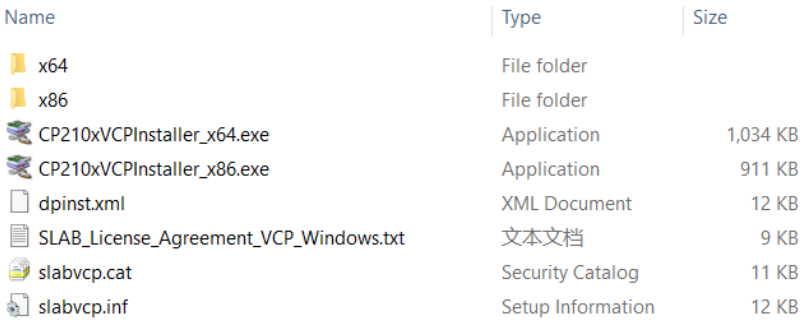


FIG 5 YDLIDAR T-MINI PLUS DRIVER VERSION SELECTION

Double-click the exe file and follow the prompts to install it.

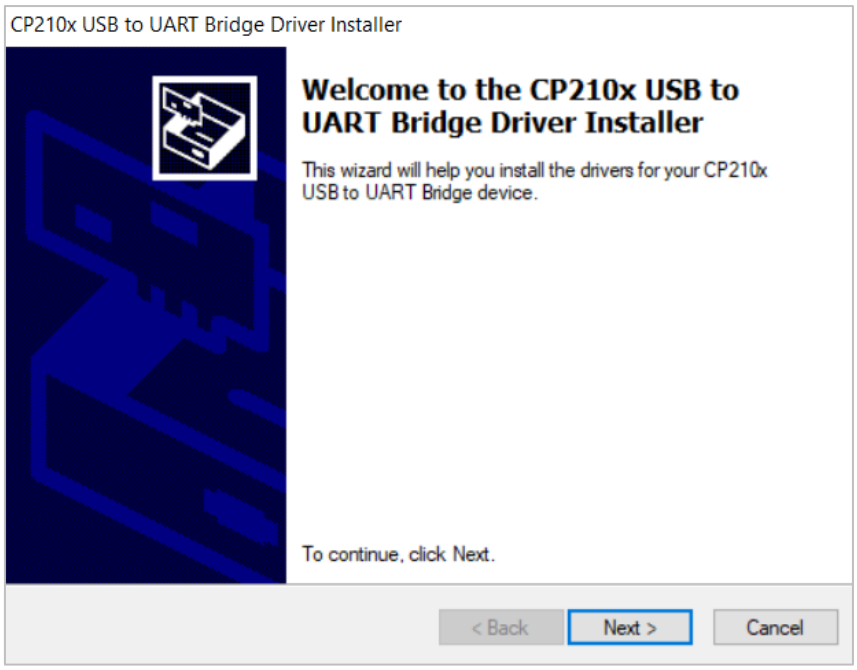


FIG 6 YDLIDAR T-MINI PLUS DRIVER INSTALLING

After the installation is complete, you can right-click on [My Computer] and select [Properties]. On the open [System] screen, select [Device Manager] from the left menu to access the Device Manager.

Expand [Port] to see the serial port name corresponding to the identified USB adapter, that is, the driver installation is successful. The following figure shows COM3. (Note that the port must be checked in case of T-mini Plus and PC interconnection).

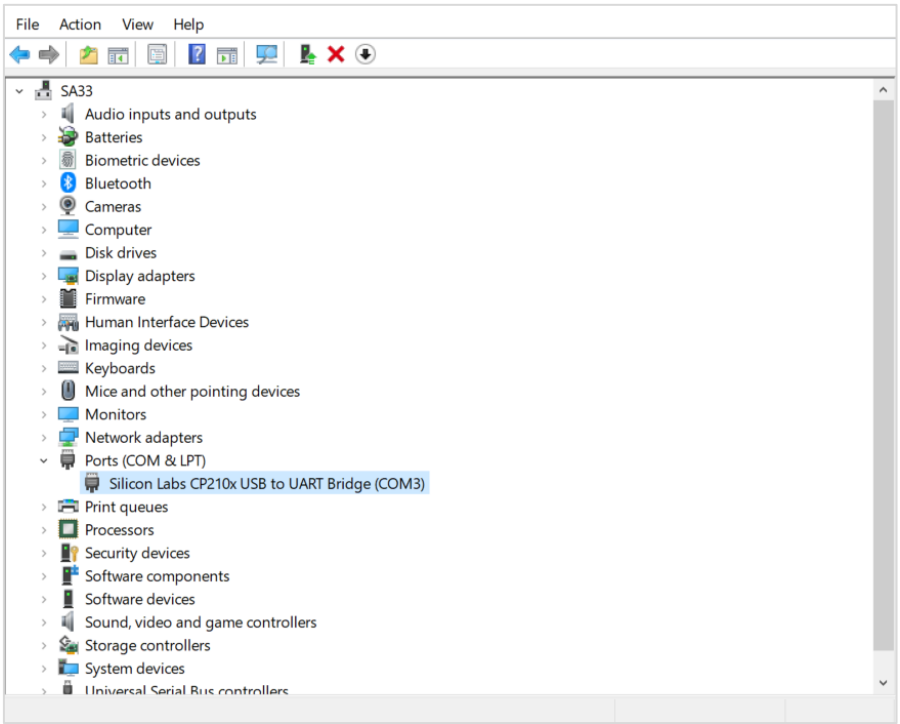


FIG 7 YDLIDAR T-MINI PLUS DRIVER INSTALLATION CHECK

2.3 How to Use LidarViewer

YDLIDAR provides LidarViewer, a point cloud data visualization software for T-mini Plus real-time scanning. Users can use this software to visually observe the T-mini Plus scanning map: YDLIDAR provides T-mini Plus real-time point cloud data and real-time scanning frequency. At the same time, the scanned data can be saved offline to an external file for further analysis. Visualization software download link: https://www.ydlidar.com/Public/upload/download/TOOL.zip

Before using the YDLIDAR software, make sure that the T-mini Plus USB adapter board serial port driver is installed successfully, and interconnect the T-mini Plus with the USB port of the PC. Run the evaluation software: LidarViewer.exe, select the corresponding serial port number and model number. Meanwhile, users could choose language on the top right corner.

FIG 8 YDLIDAR T-MINI PLUS EVALUATION SOFTWARE

If the connection is correct, you will see the following screen:

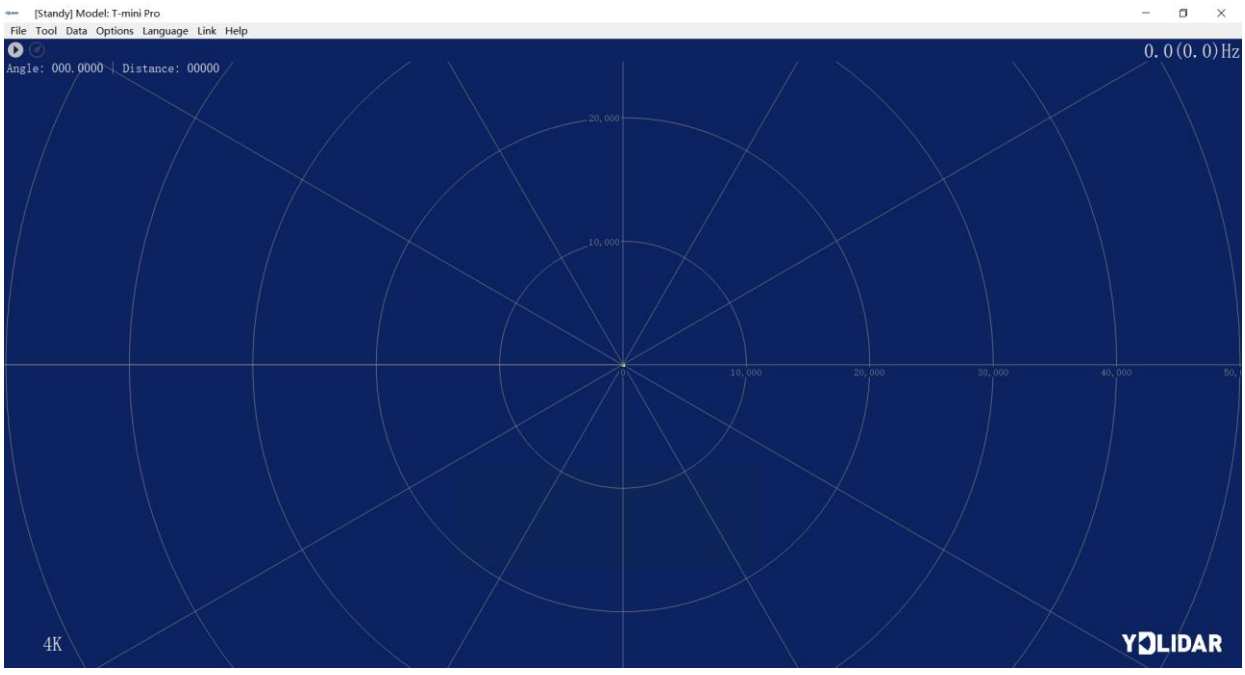


FIG 9 POINTCLOUD VIEWER INTERFACE

2.3.1 Start Scanning

Click to start scanning and display the environment point cloud. Click to stop it. as shown below:

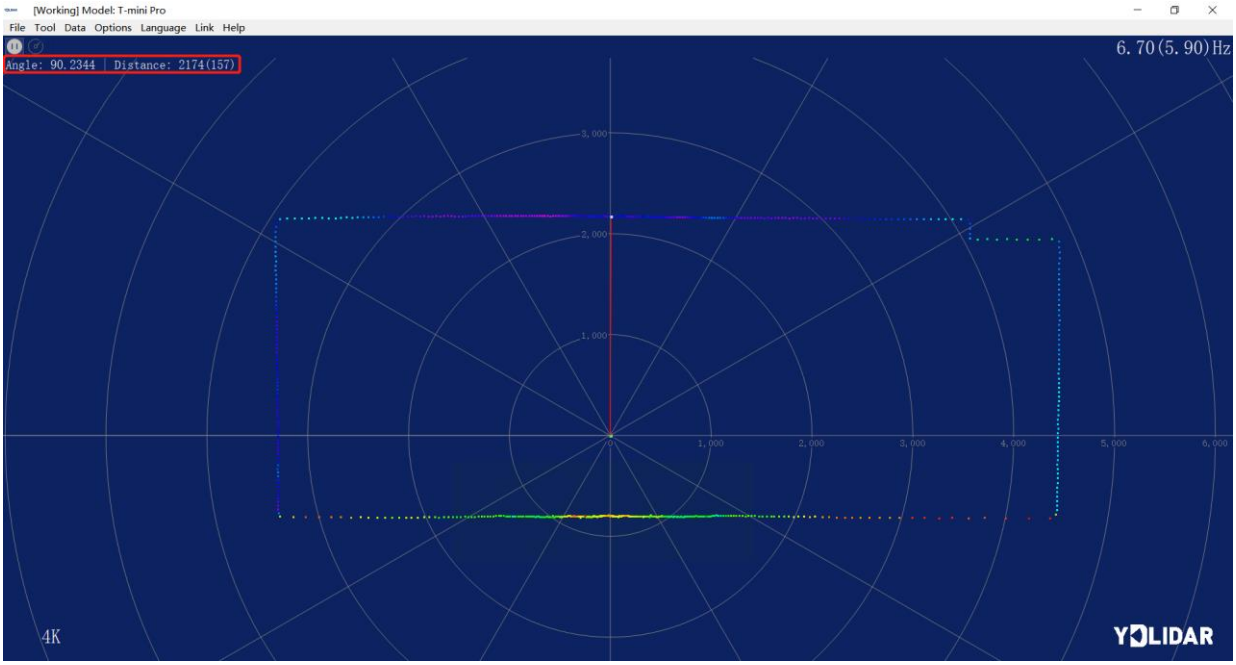


FIG 10 LIDAR SCANNING POINT CLOUD DISPLAY

2.3.2 Data Storage

During lidar scanning, click [File] in the main menu, select [Export to Excel], and save point cloud data according to the prompts. Then the system will save the point cloud information scanned in a circle in Excel format.

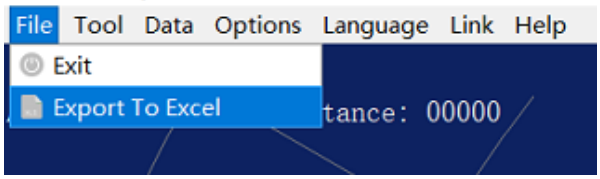


FIG 11 SAVE DATA

2.3.3 Display Mean and Standard Deviation

Click [Tools] in the main menu, then select [Mean And STD] - [View].

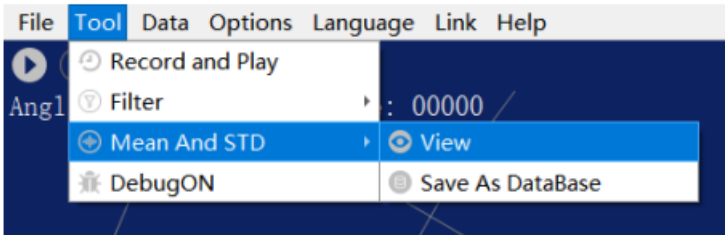


FIG 12 YDLIDAR T-MINI PLUS DISPLAY MEAN AND STANDARD DEVIATION

Choose one according to your needs, move the mouse to the test position, right-click the pop-up menu, and select [Lock Mouse Tracking].

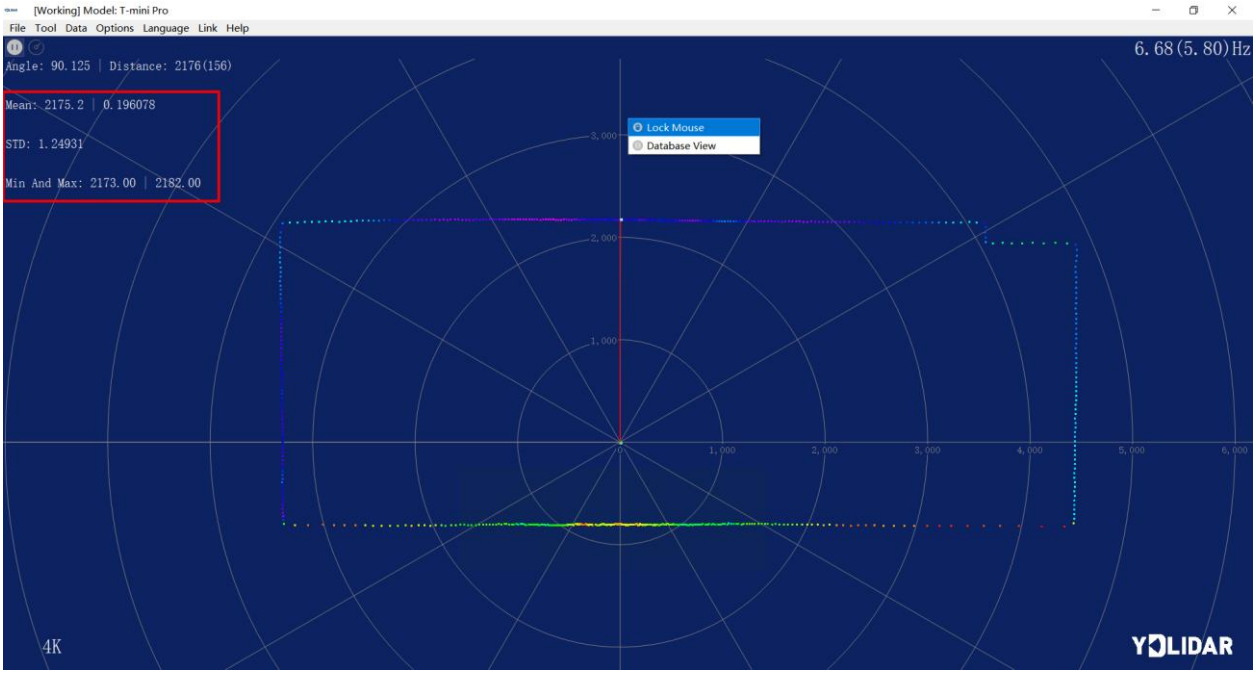


FIG 13 LOCK MOUSE TRACKING

2.3.4 Display Intensity Value

Click [Data] in the main menu and select [Intensity Histogram].

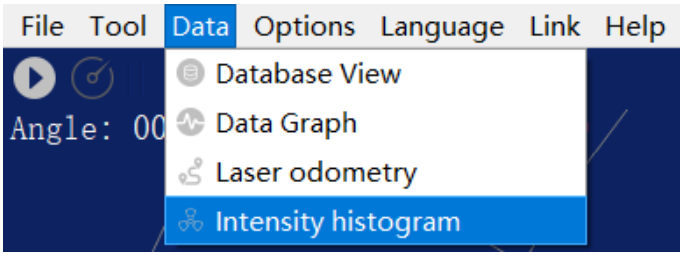
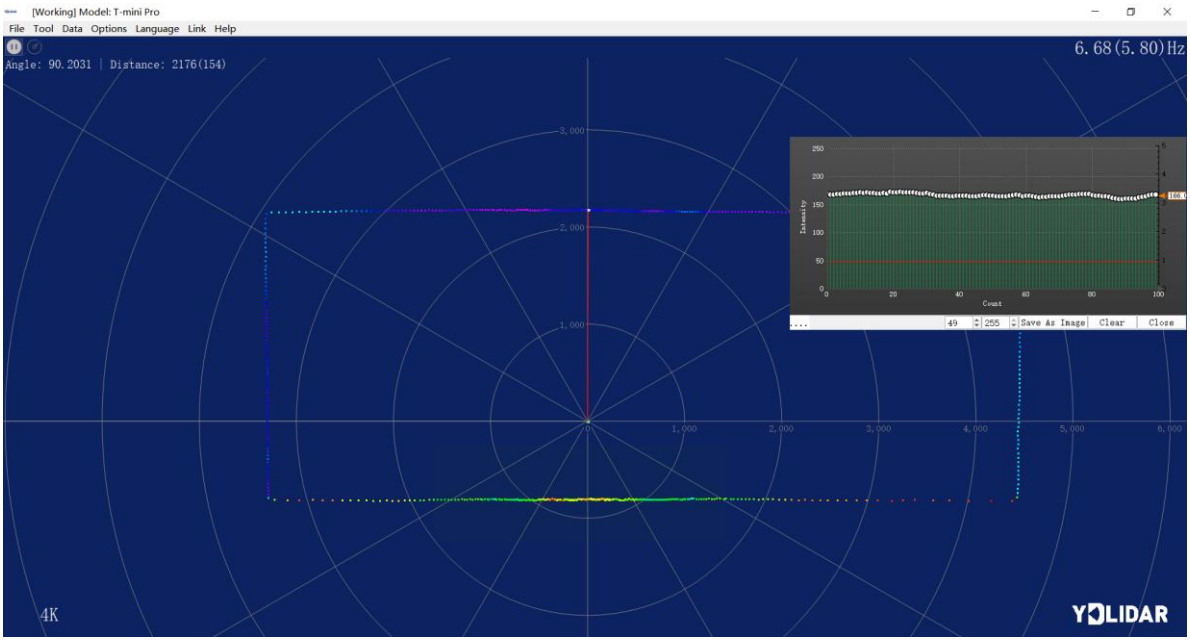


FIG 14 DISPLAY INTENSITY VALUE

The main window is displayed as follows, showing the intensity values of a total of 100 points on the left and right of the mouse lock position.



Display intensity histogram

2.3.5 Play and Record

Click [Tools] in the main menu, then select [Record and Play].

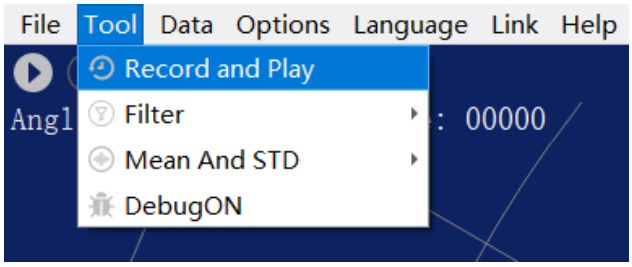


FIG 15 RECORD AND PLAY

The main window is displayed as follows:

To record lidar data, click to start recording, and click to stop recording.

In non-scanning mode, click to start play.

The play process is as follows:

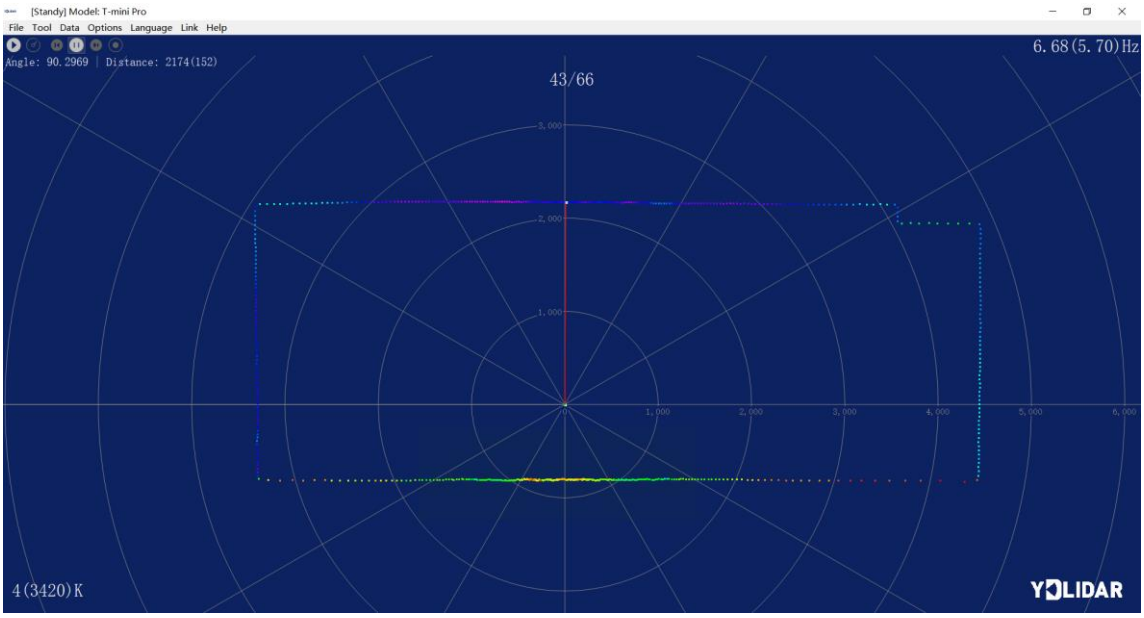


FIG 16 PLAY PROCESS

2.3.6 Debug

Click [Tools] in the main menu, and then select [DebugON] to output the raw lidar data to the "viewer_log.txt" and "viewer_log_err.txt" files.

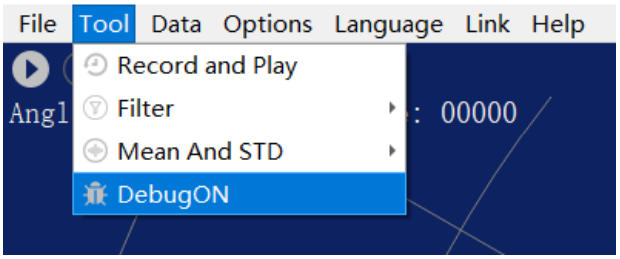


FIG 17 START DEBUGGING

2.3.7 Filter

Click [Tools] in the main menu, and then select [Filter] to add Lidar data filtering algorithm.

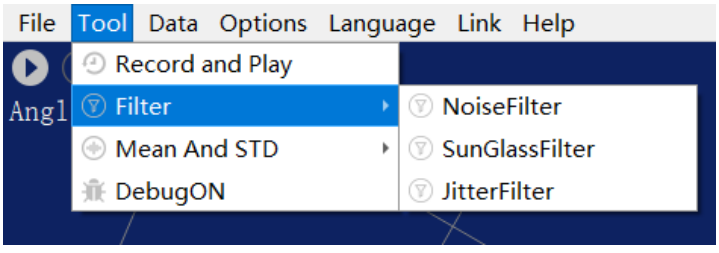


FIG 18 FILTER SETTING

Note: For more functions of LidarViewer, please click [Help], select [More Information], and learn more about how to use it.

3 LINUX ROS OPERATION

There are many Linux versions，this article only uses Ubuntu 18.04, Melodic version ROS as an example.

SDK driver address:

https://github.com/YDLIDAR/YDLidar-SDK

ROS driver address:

https://github.com/YDLIDAR/ydlidar_ros_driver

3.1 Device Connection

Under Linux, the T-mini Plus and PC interconnect processes are consistent with those under Windows. See Device Connection under Window.

3.2 Compile and Install YDLidar-SDK

ydlidar_ros_driver depends on the YDLidar-SDK library. If you have never installed the TDLlidar-SDK library, or it has expired, you must first install the YDLidar-SDK library. If you have the latest version of YDLidar-SDK installed, please skip this step, then go to the next step.

```
$ git clone https://github.com/YDLIDAR/YDLidar-SDK.git
$ cd YDLidar-SDK/build
$ cmake ..
$ make
$ sudo make install
```

3.3 ROS Driver Installation

1) Cloning GitHub's ydlidar_ros_driver Package:

```
$ git clone https://github.com/YDLIDAR/ydlidar_ros_driver.git
ydlidar_ws/src/ydlidar_ros_driver
```

2) Build the ydlidar_ros_driver software package:

```
$ cd ydlidar_ws
$ catkin_make
```

3) Package environment Settings:

```
$ source ./devel/setup.sh
```

Note: Add a permanent workspace environment variable. It will be very convenient if ROS environment variables are automatically added to your bash session every time you start a new shell:

```
$ echo "source ~/ydlidar_ws/devel/setup.bash" >> ~/.bashrc
$ source ~/.bashrc
```

4) Verify that your package path is set, echo the ROS_PACKAGE_PATH variable.

```
$ echo $ROS_PACKAGE_PATH
```

You should see something like this: /home/tony/ydlidar_ws/src:/opt/ros/melodic/share.

5) Create Serial Port Alias [Optional]

```
$ chmod 0777 src/ydlidar_ros_driver/startup/*

$ sudo sh src/ydlidar_ros_driver/startup/initenv.sh
```

Note: After completing the previous operation, re-insert the LiDAR again.

3.4 Run the ydlidar_ros_driver

Run ydlidar_ros_driver with startup file, as shown below:

```
$ roslaunch ydlidar_ros_driver Tmini.launch
```

3.5 RVIZ Scan Result Checking

```
$ roslaunch ydlidar_ros_driver lidar_view.launch
```

Note: Take G4 as an example by default. If you use other lidars, change the lidar.launch file in lidar_view.launch file to the corresponding **. (If using T-mini Plus lidar, change to Tmini.launch)

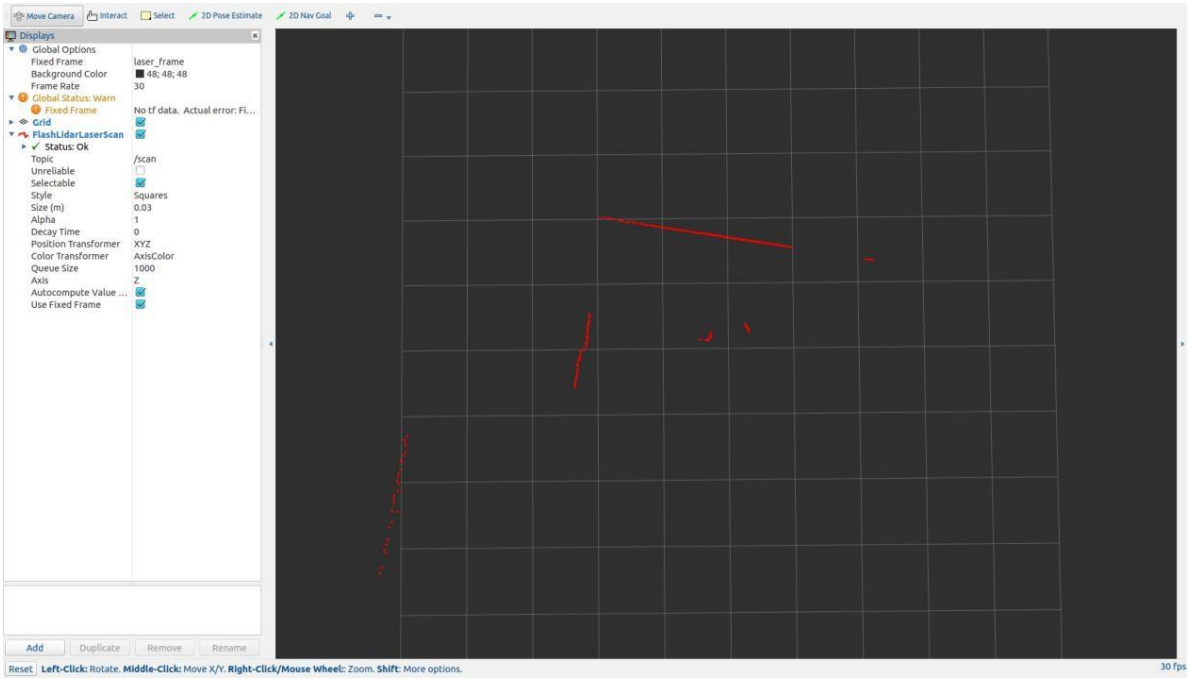


FIG 19 YDLIDAR T-MINI PLUS RVIZ

3.6 Modify Scan Angle

The scanning data seen by running the launch file is displayed by default with 360- degree data. To modify the display range, you need to modify the configuration parameters in the launch file. The specific operation is as follows:

1) Switch to the directory where the corresponding [launch file] is located, edit the file, and its content is as shown in the figure:

```
$ vim Tmini.launch
```

```
<launch>
  <node name="ydlidar_lidar_publisher"  pkg="ydlidar_ros_driver"  type="ydlidar_ros_d
river_node" output="screen" respawn="false" >
    <!-- string property -->
    <param name="port"         type="string" value="/dev/ydlidar"/>
    <param name="frame_id"     type="string" value="laser_frame"/>
    <param name="ignore_array"     type="string" value=""/>

    <!-- int property -->
    <param name="baudrate"         type="int" value="230400"/>
    <!-- 0:TYPE_TOF, 1:TYPE_TRIANGLE, 2:TYPE_TOF_NET -->
    <param name="lidar_type"       type="int" value="1"/>
    <!-- 0:YDLIDAR_TYPE_SERIAL, 1:YDLIDAR_TYPE_TCP -->
    <param name="device_type"         type="int" value="0"/>
    <param name="sample_rate"         type="int" value="4"/>
    <param name="abnormal_check_count"         type="int" value="4"/>

    <!-- bool property -->
    <param name="resolution_fixed"    type="bool"   value="false"/>
    <param name="auto_reconnect"    type="bool"   value="true"/>
    <param name="reversion"    type="bool"   value="true"/>
    <param name="inverted"    type="bool"   value="true"/>
    <param name="isSingleChannel"    type="bool"   value="false"/>
    <param name="intensity"    type="bool"   value="true"/>
    <param name="support_motor_dtr"    type="bool"   value="false"/>
    <param name="invalid_range_is_inf"    type="bool"   value="false"/>
    <param name="point_cloud_preservative"    type="bool"   value="false"/>

    <!-- float property -->
    <param name="angle_min"    type="double" value="-180" />
    <param name="angle_max"    type="double" value="180" />
    <param name="range_min"    type="double" value="0.0" />
    <param name="range_max"    type="double" value="16.0" />
    <param name="frequency"    type="double" value="6.0"/>
  </node>
  <node pkg="tf" type="static_transform_publisher" name="base_link_to_laser4"
    args="0.0 0.0 0.2 0.0 0.0 0.0 /base_footprint /laser_frame 40" />
</launch>
```

FIG 20 TMINI.LAUNCH FILE

Note: For more information about the file contents, please refer to

https://github.com/YDLIDAR/ydlidar_ros_driver#configure-ydlidar_ros_driver-internal-parameter

2) The T-mini Plus lidar coordinates follow the right-hand rule within ROS, with an angle range of [-180, 180]. "angle_min" is the start angle, and "angle_max" is the endangle. The specific scope needs to be modified according to actual use.

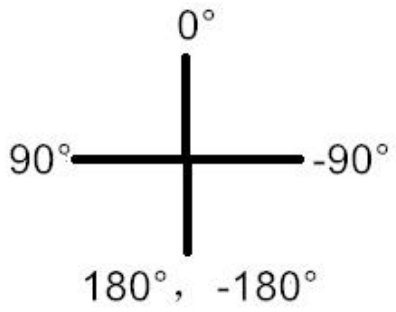


FIG 21 YDLIDAR T-MINI PLUS COORDINATES DEFINITION

4 Revise

Date	Version	Content
2023-12-21	1.0	The 1st release