YDLIDAR

USER MANUAL

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DEVELOPMENT KIT

The development kit of YDLIDAR is an accessory tool provided for performance evaluation and early development of the sensors.

YDLIDAR X2/X4

| YDLIDAR X2/X4 | USB Micro cable | USB Adapter board | PH2.0-8P |

YDLIDAR G2/G4/G6

G2/G4/G6 Lidar   USB Type-C cable   USB Adapter board

CHART 1 YDLIDAR DEVELOPMENT KIT DESCRIPTION

Item	Qty	Description
Lidar	1	Standard version
USB cable	1	Use with USB adapter board to connect Lidar and PC. It is both a power supply line and a data line.
USB adapter board	1	This component is used for USB to UART functions. Also supports the serial port DTR signal to the Lidar motor stop control. PWR is provided for auxiliary power supply.
PH2.0-8P cable	1	This component meets the user's development needs in a multi-platform environment.

Note: USB adapter board has two USB Type-C interfaces: USB_DATA, USB_PWR.

USB_DATA: Data-powered multiplex 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.

WINDOWS USAGE GUIDE

Device connection

When evaluating and developing Lidar under windows, you need to interconnect Lidar and PC. The specific process is as follows:
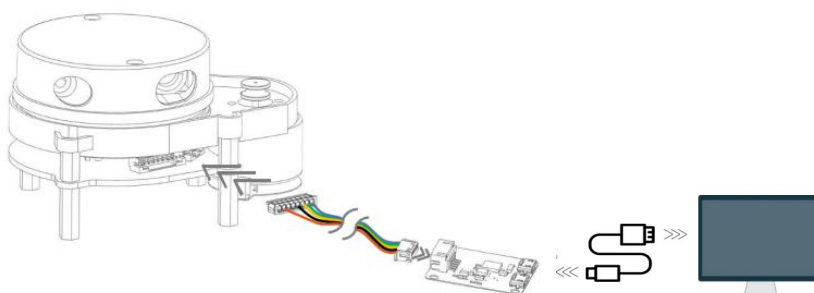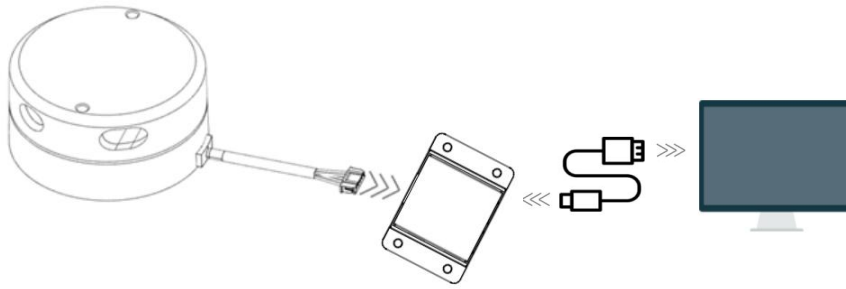

FIG 1 YDLIDAR X2/X4

FIG 2 YDLIDAR G2/G4/G6

Connect the adapter board and Lidar first, and then connect the USB cable to the USB port on the adapter board and the PC. Note that the USB cable is connected to the USB adapter's USB_DATA. After the Lidar is powered on, it is in idle mode and the motor does not rotate.

The drive current of the USB interface of some development platforms or PCs is weak, and the Lidar needs to access the +5V auxiliary power supply, otherwise it will work abnormally.
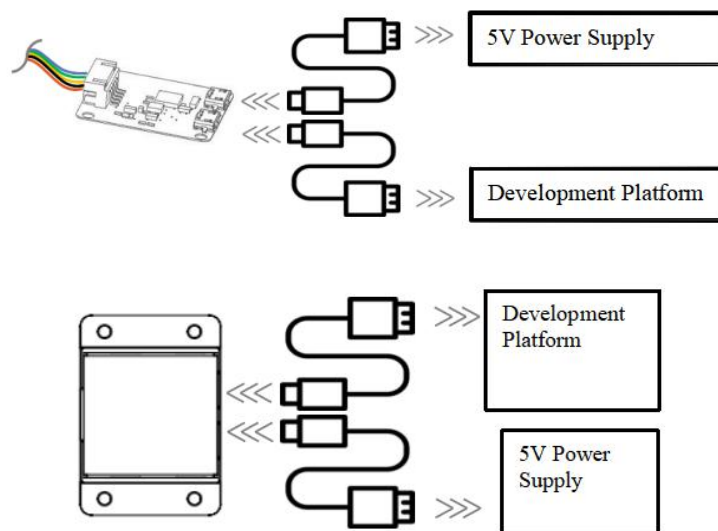

FIG 3 AUXILIARY POWER SUPPLY

Driver Installation

To evaluate and develop the YDLIDAR 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:

http://ydlidar.com/

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

After extracting 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.

x64	2013/10/25 11:39	文件夹	
x86	2013/10/25 11:39	文件夹	
CP210xVCPInstaller_x64.exe	2013/10/25 11:39	应用程序	1,026 KB
CP210xVCPInstaller_x86.exe	2013/10/25 11:39	应用程序	901 KB
dpinst.xml	2013/10/25 11:39	XML 文档	12 KB
ReleaseNotes.txt	2013/10/25 11:39	文本文档	10 KB
SLAB_License_Agreement_VCP_Windo...	2013/10/25 11:39	文本文档	9 KB
slabvcp.cat	2013/10/25 11:39	安全目录	12 KB
slabvcp.inf	2013/10/25 11:39	安装信息	5 KB

FIG 4 YDLIDAR DRIVER VERSION SELECTION

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

FIG 5 YDLIDAR DRIVER INSTALLATION I

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 Lidar and PC interconnection).
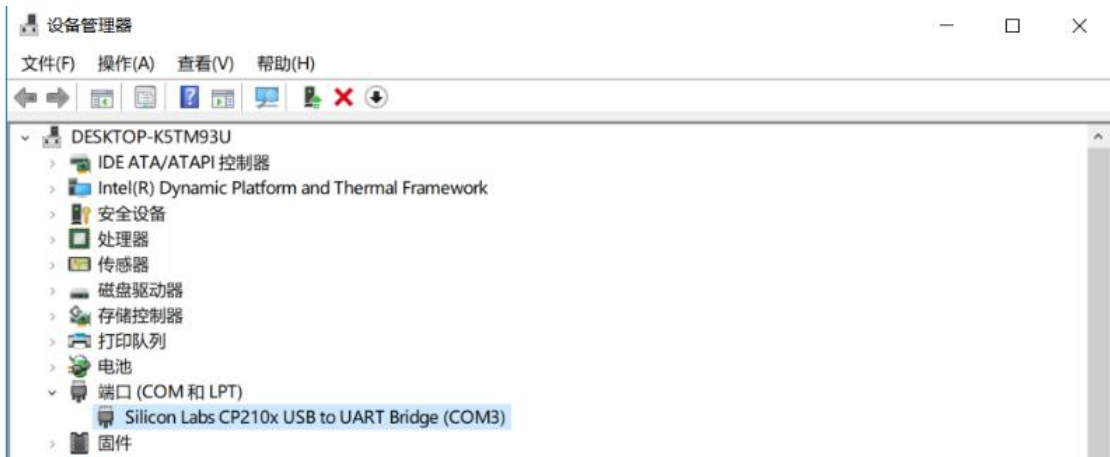

FIG 6 YDLIDAR DRIVER INSTALLATION II

> Note：Users can also choose Type-C on G2/G4/G6 to get started quickly. Connect the PC and G2/G4/G6 directly with Type-C data cable and download the vcp serial port driver of G6 on the www.ydlidar.com. After that, start the PCV to scan the map and observe the data.

LINUX ROS OPERATION

This article only uses Ubuntu 16.04, Kinetic version ROS as an example.

SDK driver address：
https://github.com/YDLIDAR/YDLidar-SDK;

ROS driver address：
https://github.com/YDLIDAR/ydlidar_ros_driver;

ydlidar_ros_driver depends on YDLidar-SDK library, If you have never installed YDLidar-SDK or it is out of date, you must first install YDLidar-SDK.

Device connection

Under Linux, Lidar and PC interconnect processes are consistent with those under Windows. See Device Connection under Window.

YDLidar-SDK Installation

Before doing the following, make sure that the git and cmake is installed correctly.
1.Download or Clone the YDLIdar-SDK repository on GitHub.

```
$git clone    https://github.com/YDLIDAR/YDLidar-SDK
```

2.Compile and Install the YDLidar-SDK.

```
$ cd YDLidar-SDK/build

$ cmake ..

$ make

$ sudo make install
```

ROS Driver Installation

Before doing the following, make sure that the Kinetic version ROS environment is installed correctly.

1. Use the command to create the ydlidar_ws workspace and copy the ROS driver package ydlidar_ros_driver in the YDLIDAR package to the ydlidar_ws/src directory. Switch to the ydlidar_ws workspace and compile again.

```
$ mkdir -p ~/ydlidar_ws/src

$ cd ~/ydlidar_ws

$ catkin_make
```

2. After the compilation is complete, add the ydlidar_ws environment variable to the ~/.bashrc file and make it effective.

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

$ source ~/.bashrc
```

3. Add a device alias /dev/ydlidar to the YDLIDAR serial port.

```
$ cd ~/ydlidar_ws/src/ydlidar_ros_driver/startup

$ sudo chmod +x initenv.sh

$ sudo sh initenv.sh
```

RVIZ installation

1. Online installation
```
$ sudo apt-get install python-serial ros-kinetic-serial g++ vim \
ros-kinetic-turtlebot-rviz-launchers
```

2. If something went wrong, update the source cache and re-install it.

```
$ sudo apt-get update
```

Run ROS Package

Run the corresponding launch file according to the lidar model, The command format is:

$roslaunch ydlidar_ros_driver [launch file]

Examples of use are as follows:

a) X2 Lidar

$ roslaunch ydlidar_ros_driver X2.launch

b) X4 Lidar

$ roslaunch ydlidar_ros_driver X4.launch

c) G2 Lidar

$ roslaunch ydlidar_ros_driver G2.launch

d) G4/G5 Lidar

$ roslaunch ydlidar_ros_driver lidar.launch

RVIZ results

After running the launch file, open rviz to view the YDLIDAR scan results, as shown in the following figure:
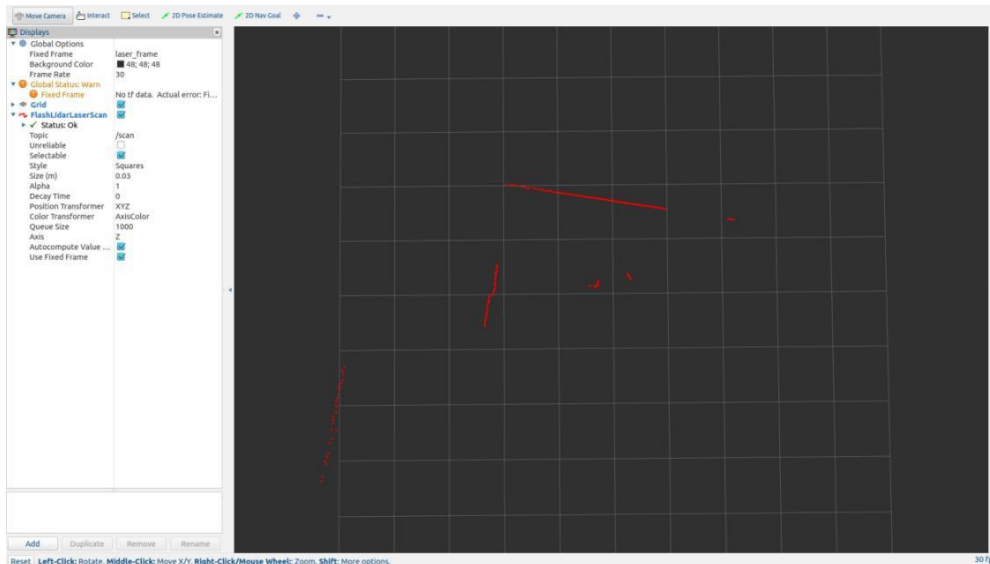

FIG 8 YDLIDAR RVIZ

Modify Angle Problem

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. Go to launch directory and use vim to edit launch file of the corresponding Lidar model(take X4 as an example). The contents are as shown in the figure:

$ roscd ydlidar_ros_driver/launch

$ vim X4.launch

```
1 <launch>
2   <node name="ydlidar_lidar_publisher"  pkg="ydlidar_ros_driver"  type="ydlidar_ros_driver_node" output="screen" respawn="false" >
3     <!-- string property -->
4     <param name="port"         type="string" value="/dev/ydlidar"/>
5     <param name="frame_id"     type="string" value="laser_frame"/>
6     <param name="ignore_array"     type="string" value=""/>
7
8     <!-- int property -->
9     <param name="baudrate"         type="int" value="128000"/>
10    <!-- 0:TYPE_TOF, 1:TYPE_TRIANGLE, 2:TYPE_TOF_NET -->
11    <param name="lidar_type"       type="int" value="1"/>
12    <!-- 0:YDLIDAR_TYPE_SERIAL, 1:YDLIDAR_TYPE_TCP -->
13    <param name="device_type"         type="int" value="0"/>
14    <param name="sample_rate"         type="int" value="5"/>
15    <param name="abnormal_check_count"         type="int" value="4"/>
16
17    <!-- bool property -->
18    <param name="resolution_fixed"     type="bool"   value="true"/>
19    <param name="auto_reconnect"     type="bool"   value="true"/>
20    <param name="reversion"     type="bool"   value="false"/>
21    <param name="inverted"     type="bool"   value="true"/>
22    <param name="isSingleChannel"     type="bool"   value="false"/>
23    <param name="intensity"     type="bool"   value="false"/>
24    <param name="support_motor_dtr"     type="bool"   value="true"/>
25    <param name="invalid_range_is_inf"     type="bool"   value="false"/>
26
27    <!-- float property -->
28    <param name="angle_min"     type="double" value="-180" />
29    <param name="angle_max"     type="double" value="180" />
30    <param name="range_min"     type="double" value="0.1" />
31    <param name="range_max"     type="double" value="12.0" />
32    <!-- frequency is invalid, External PWM control speed -->
33    <param name="frequency"     type="double" value="10.0"/>
34  </node>
35  <node pkg="tf" type="static_transform_publisher" name="base_link_to_laser4"
36    args="0.0 0.0 0.2 0.0 0.0 0.0 /base_footprint /laser_frame 40" />
37 </launch>
```

FIG 9 YDLIDAR.LAUNCH FILE

2. YDLIDAR 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 end angle.
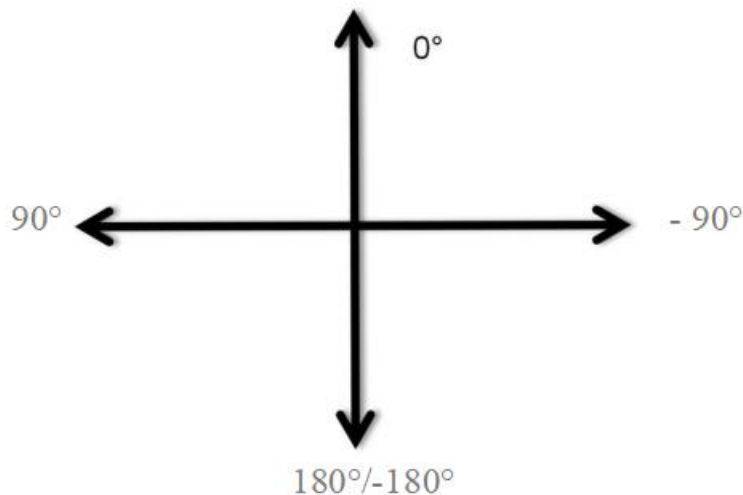The specific scope needs to be modified according to actual use.

FIG 10 YDLIDAR COORDINATES DEFINITION

Temperature

When the working environment temperature of YDLIDAR is too high or too low, it will affect the accuracy of the distance measuring system. It may also damage the structure of the scanning system and reduce the life of the YD lidar. Avoid use in high temperature (>40 degrees Celsius) and low temperature (<0 degrees Celsius) conditions.

Ambient lighting

The ideal working environment for the Lidar is indoor, indoor lighting (including no light) will not affect it work. Don't using a strong light source (such as a high-power laser) to directly illuminate the lidar's vision system.

If you need to use it outdoors, please avoid that the its vision system is directly facing the sun. This may cause permanent damage to the vision system's sensor chip, thus invalidating the distance measurement.

Please note that the Lidar standard version is subject to interference in outdoor strong sunlight reflection environments.

Power demand

During the development process, since the drive current of the USB interface of each platform or the USB interface of the computer may be too low to drive the YDLIDAR, the external power supply of the +5V to the YDLIDAR needs to be provided through the USB_PWR interface of the USB interface board. It is not recommended to use a mobile phone power bank because the voltage ripple of some brands of power banks is too large.