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Latest open source project [TinyMaix](#), model infer runtime runs on any MCU, even
runs on 2KiB RAM chip

x

MaixSense-A010

2022-11-18

1. Product description



MaixSense-A010 is an extremely cost-effective 3D sensor module composed of BL702 + OPNOUS 100x100 TOF launched by Sipeed, which supports a maximum resolution of 100x100 and 8-bit precision, and comes with a 240x135 pixel LCD display to preview the depth map after colormap in real time.

Data summary

Hardware information: [Click to download](#)

2. Product unpacking guide

2.1. Preparation

MaixSense-A010 Uses the serial port protocol to provide interfaces and transmit data.

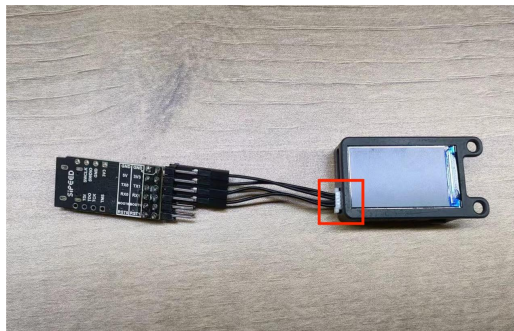
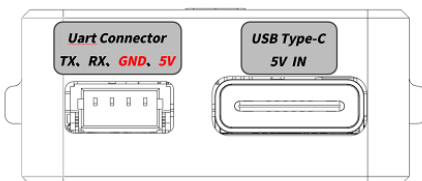
The physical interfaces we provide include type-c (virtual serial port) and 1.0mm 4pin motherboard (UART), which can obtain depth map data for integration.

Product wiring instructions

After connecting to the computer through the type-c interface, it can identify `/dev/ttyUSBx` (Linux) or `COMx` (Windows) .



The usb2ttl module can also be used to connect the 4-PIN bus according to the hardware pin diagram (device screen face down).



MS-A010	TX	RX	GND	5V
usb2ttl 模块	RX	TX	GND	5V

2.2. Power-up preview

Button function: "Next" on the left and "Switch" on the right.

Screen display: the + word in the center of the screen is the ranging point, and the top right will display real-time **xx cm** on behalf of the distance ranging. If there is a large area of objects near the lens, "**block!**" will be displayed on the right of the screen. In other cases **open!**.

After the device is connected to the power supply, you can preview the depth pseudo-color map in real time on the built-in LCD screen of the device.



2.3. PC side preview interaction

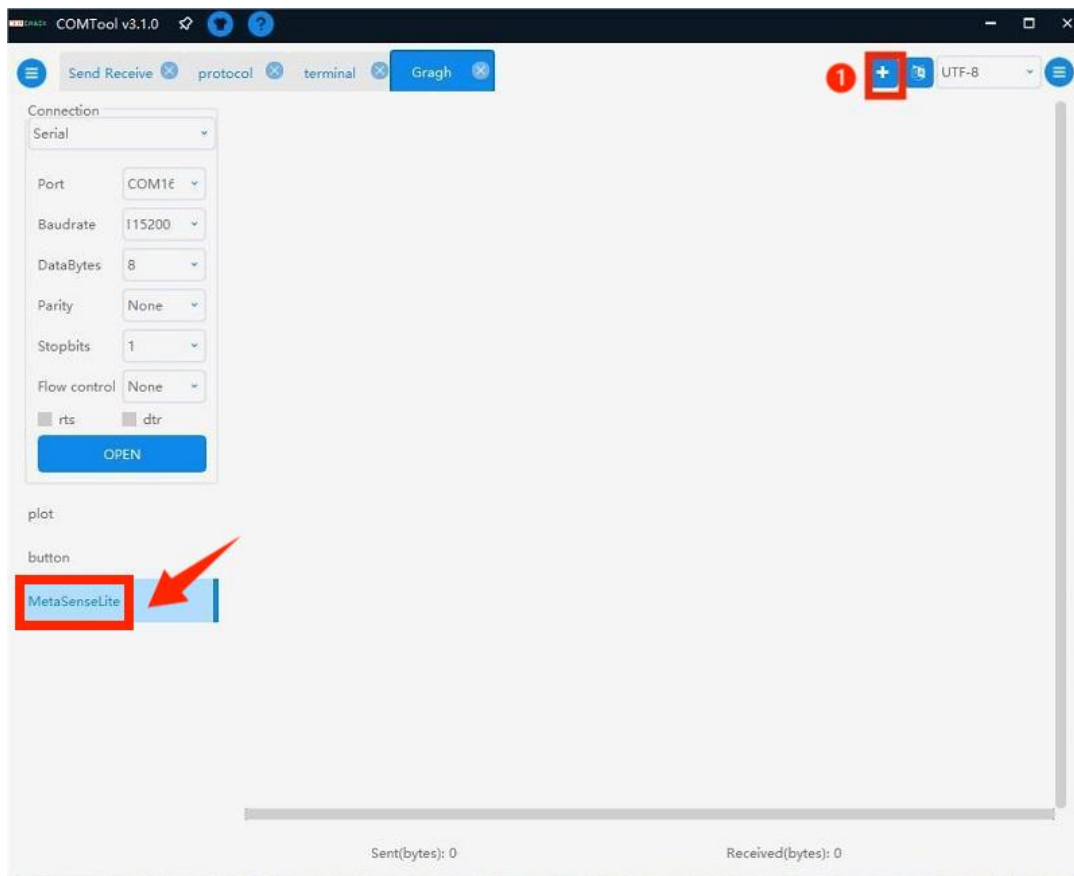
Install COMTOOL on the upper computer before previewing and modifying the Settings on the PC.

Windows system: [Click to download](#)

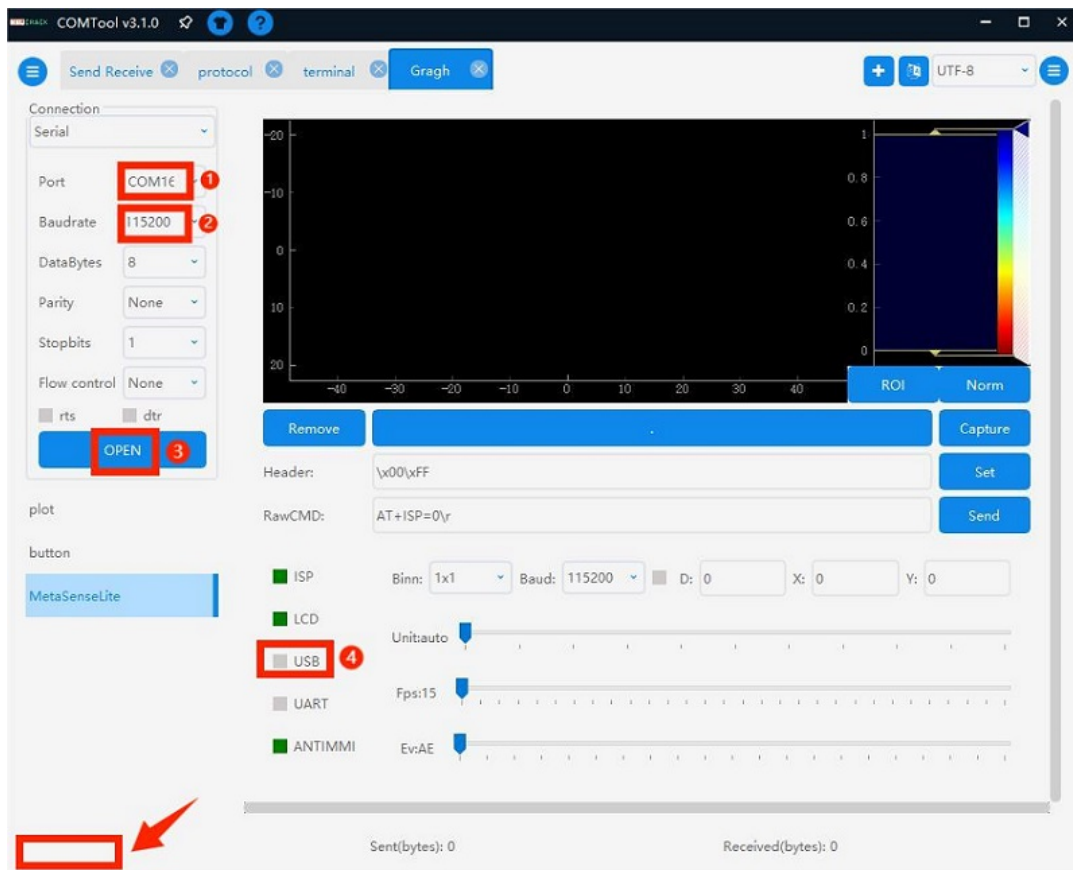
Linux system: Users need to compile/click to jump

Note: Windows 7 and below systems need to install the driver, you can go to the FTDI official website to download.

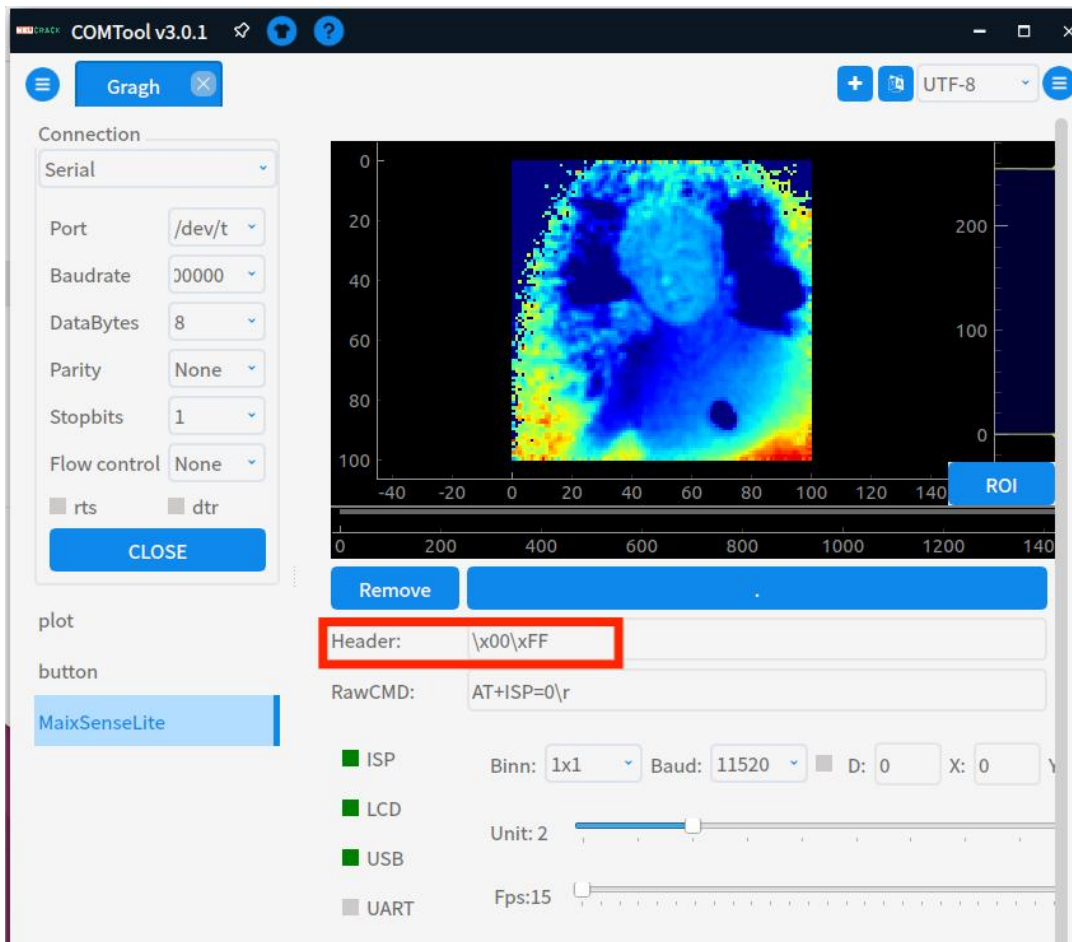
Open the COMTOOL software and select the Graph interface. If there is no Graph above the software, you can add a Graph at the + sign in the upper right corner. If the middle part is blank after creation, double-click MaixSenseLite in the lower left corner



Select a small Port and baud rate in the left port (choose any high baud rate), click open and check USB to receive a large amount of data. Connected will be displayed in the lower left corner.



Set the Header to `\x00\xff` to correctly parse the image data and observe the depth map to intuitively feel the depth on the 2D flat image.



2.4. Comtool configuration instructions

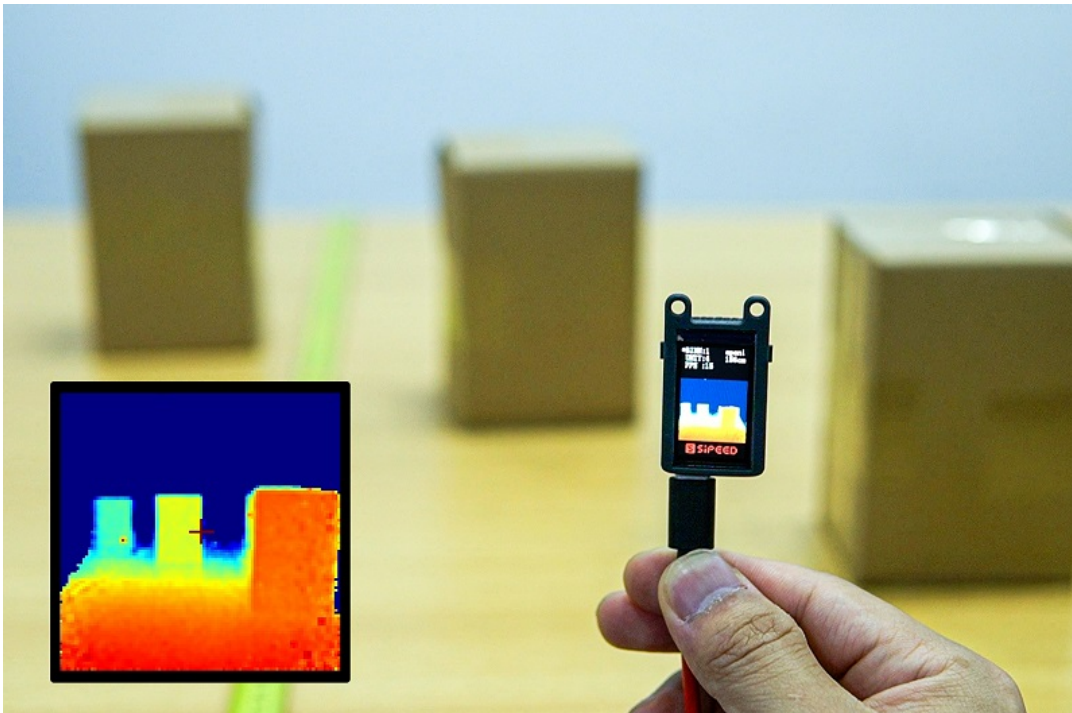
Comtool configuration control description of the host computer

- **Header:** set the identification header.
- **RawCMD:** User can send commands manually (USB and UART serial ports behave the same).
- **ISP:** start stop.
- **LCD:** display the lcd screen on and off.
- **USB:** serial port transmission depth map on and off.
- **UART:** serial port transmission depth map on and off.
- **ANTIMMI:** Automatic anti-multi-machine interference is turned on and off (susceptible to interference, the effect of turning off is better)
- **Binn:** pull down to set BINNING, Baud to set UART baud rate.
- **X, Y:** coordinates: When the checkbox to the left of D is on, the (x,y) distance from the camera is displayed.

- **Unit:**sets the quantization unit:16-bit quantization to 8-bit, the scale is reduced, if the setting is too small, only very close images can be seen clearly.
- **FPS:**Set the output frame rate (it should not be too high, set it reasonably according to the performance of the docking device, reducing the frame rate can reduce the amount of transmitted data)
- **Ev:**Exposure gap control (leftmost represents AE, others are fixed exposure time)

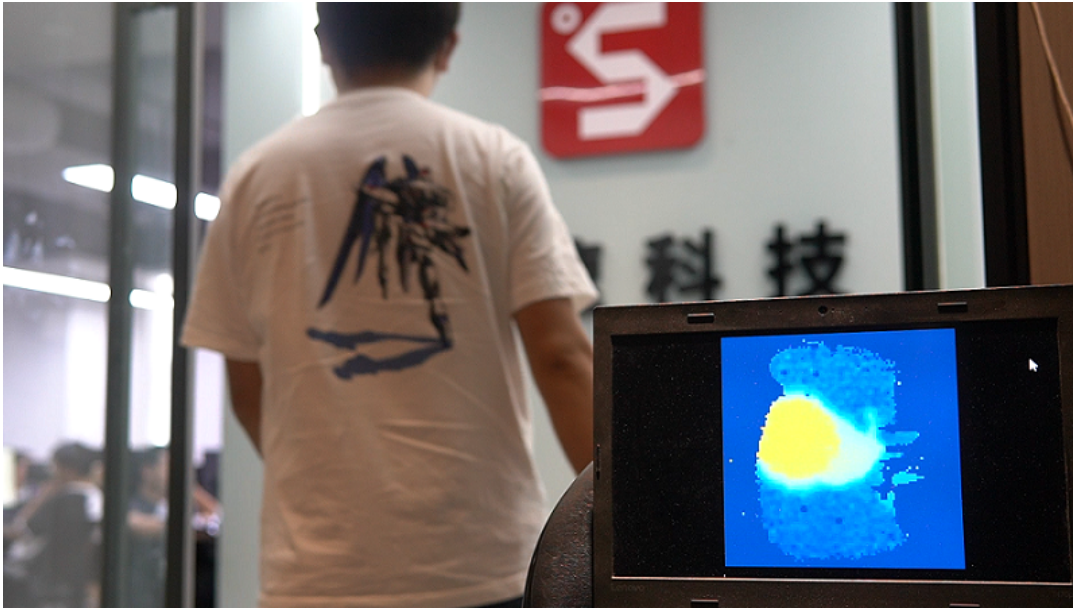
3. Case:Measure Objects Distance

The distance between the objects is placed to form the difference in depth value. After the module captures the difference, it displays a warm and cold color, a warm color when the distance is close, and a cool color when the distance is far.



4. Case:Passengers Flow Statistical

Real-time, high-precision, high-resolution monitoring of human flow and quickly statistical data.



5. Case:Gesture Interaction

Realize super cool keyboard light follow,track the position of the hand in real time,and then map the keyboard light according to the position of the hand.

Related code



6. Case:Connect to MCUs

- MS-A010 has strong compatibility and is based on serial protocol. It can be connected to single-chip development boards such as K210 bit or linux development boards such as Raspberry Pi for secondary development.
- The k210 Bit development board is a member of the sipeed Maix product line. It is an AIOT development board designed based on the edge intelligent computing chip K210 (RISC-V architecture 64-bit dual-core) of Canaan Canzhi Technology.

[Click to learn about K210 Bit](#)

[MS-A010 external K210 bit source code acquisition](#)



7. Secondary development:Serial protocol

Please refer to the above case: **MS-A010 external K210 bit**

MS-A010 Secondary Development Manual: [Click to view](#)

8. Secondary development:Access ROS

8.1. Access ROS1

1. Preparations

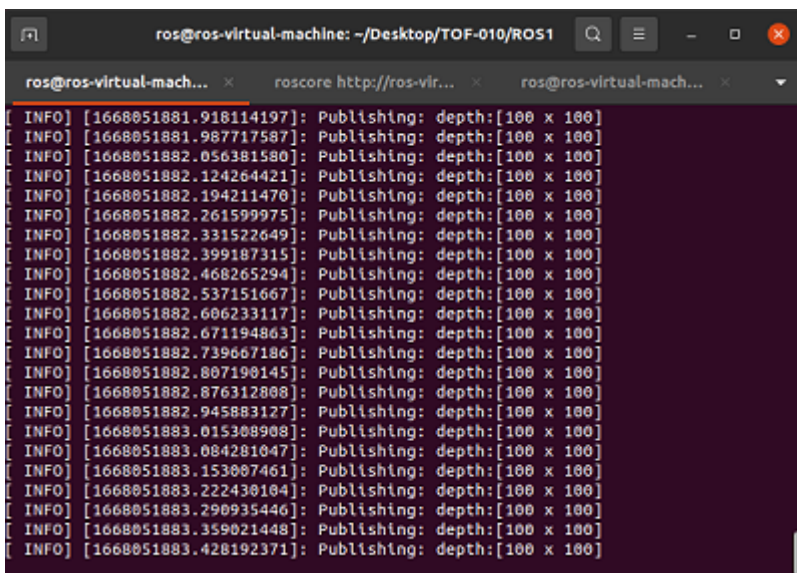
First, prepare the applicable environment: **Linux** system.

You can use the virtual machine **virtual box** or **vmware**.

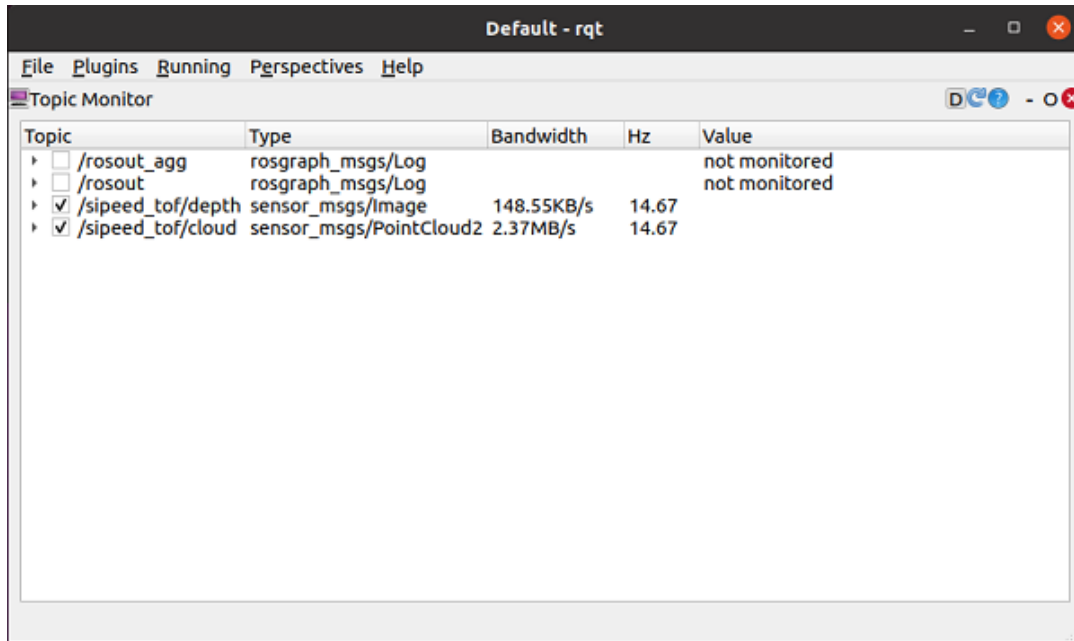
2. Install and run

ROS Access Package: [Click to download](#).

```
1
2 # Unzip sipeed_tof_ms_a010.zip and enter the
  directory
3 cd ros1
4 source /opt/ros/*/setup.sh
5 catkin_make
6 source devel/setup.sh
7 rosrunc sipeed_tof_ms_a010 a010_publisher
  _device="/dev/ttyUSB0"
8 # After that, the terminal will continue to
  refresh and display [sipeed_tof]: Publishing,
  that is, it works normally
```

A screenshot of a terminal window titled 'ros@ros-virtual-machine: ~/Desktop/TOF-010/ROS1'. The terminal shows a series of log messages from a ROS1 publisher. Each message is an INFO log with a timestamp and the text 'Publishing: depth:[100 x 100]'. The messages are numbered sequentially from 1668051881 to 1668051883.428192371. The terminal window has a dark background and a light-colored text. The top of the window shows the terminal title and some window control buttons. The bottom of the window shows the terminal output.

3. You can view the frame rate in RQT



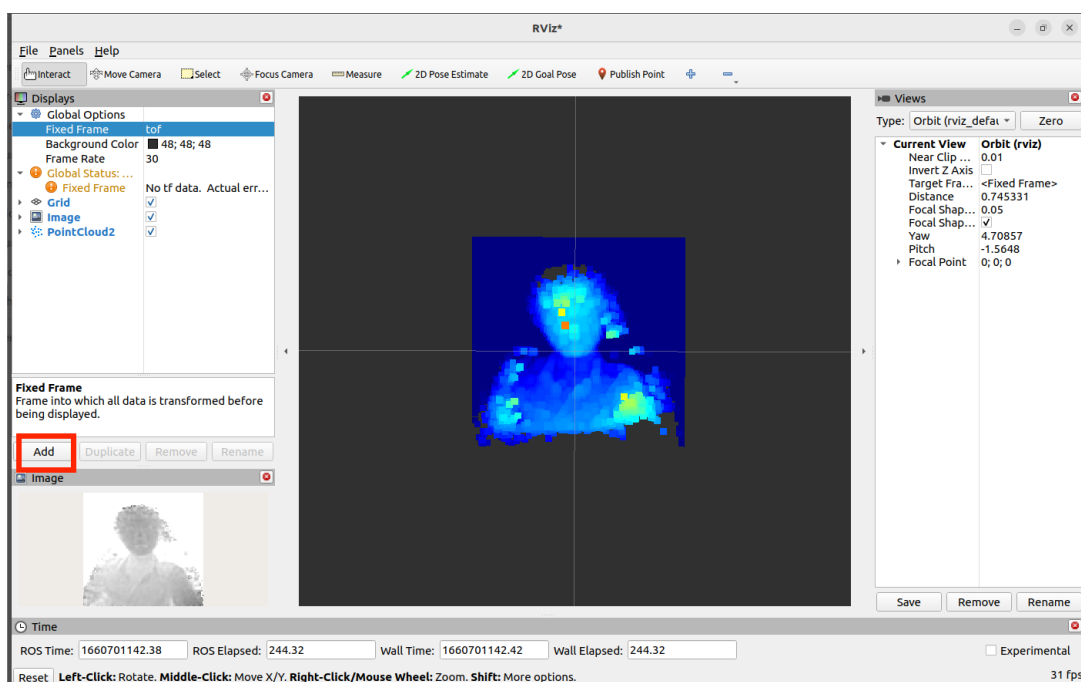
4. RVIZ2 Preview

After opening `rviz2`, in the lower left corner of the interface

Add -> By topic -> PointCloud2 or /depth -> Image Add -

> Display/Global Options/Fixed Frame needs to be modified to

`tof`, the point cloud can be displayed normally. According to the added content, `Image` will be displayed on the left and the point cloud will be displayed in the middle.



8.2. Access ROS2

1. Preparations

First, prepare the applicable environment: **Linux** system.

You can use the virtual machine **virtual box** or **vmware**.

If your environment also has ROS1 installed, ROS2 will need to be used with the correct version.

```
1 | ls /opt/ros
2 | ros@ros-virtual-machine:~/Desktop$ ls /opt/ros
3 | noetic rolling
```

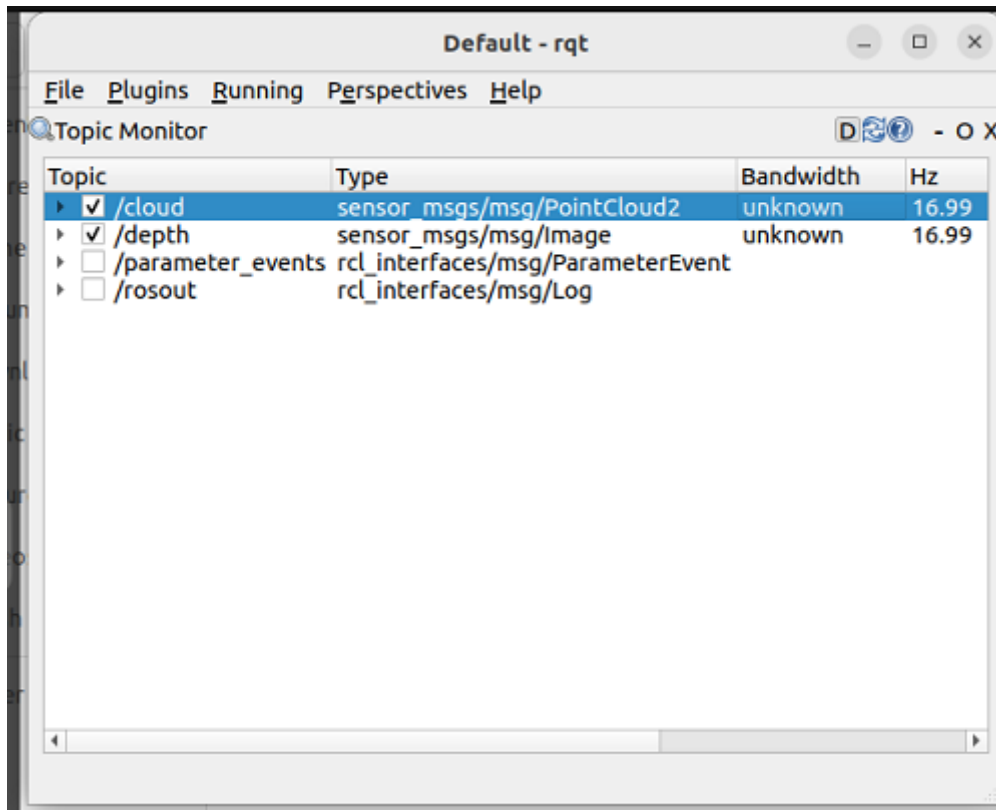
2. Install and run

We provide an access package for ROS2, which users need to compile and install on a system running ROS2.

ROS Access Package: [Click to download](#).

```
1 | #Unzip sipeed_tof_ms_a010.zip and enter the
   | directory
2 | cd ros2
3 | source /opt/ros/*/setup.sh
4 | colcon build #If you are prompted that colcon is
   | missing, you need sudo apt install python3-
   | colcon-ros
5 | source install/setup.sh
6 | ros2 run sipeed_tof_ms_a010 publisher --ros-args
   | -p device:="/dev/ttyUSB0"
7 | # After that, the terminal will continue to
   | refresh and display [sipeed_tof]: Publishing,
   | that is, it works normally
```

3. RQT View frame rate



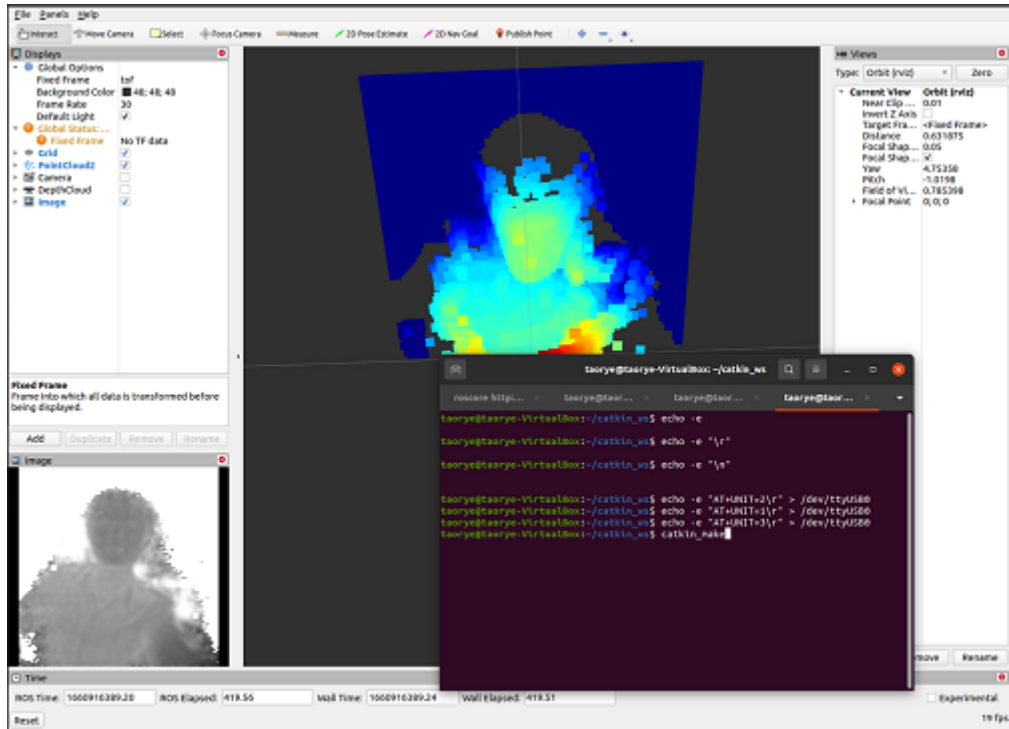
4. RVIZ2 Preview

After opening `rviz2`, in the lower left corner of the interface

Add -> By topic -> PointCloud2 or /depth -> Image Add -

> Display/Global Options/Fixed Frame needs to be modified to

`tof`, the point cloud can be displayed normally. According to the added content, `Image` will be displayed on the left and the point cloud will be displayed in the middle.



Helpful (1)



Not Helpful