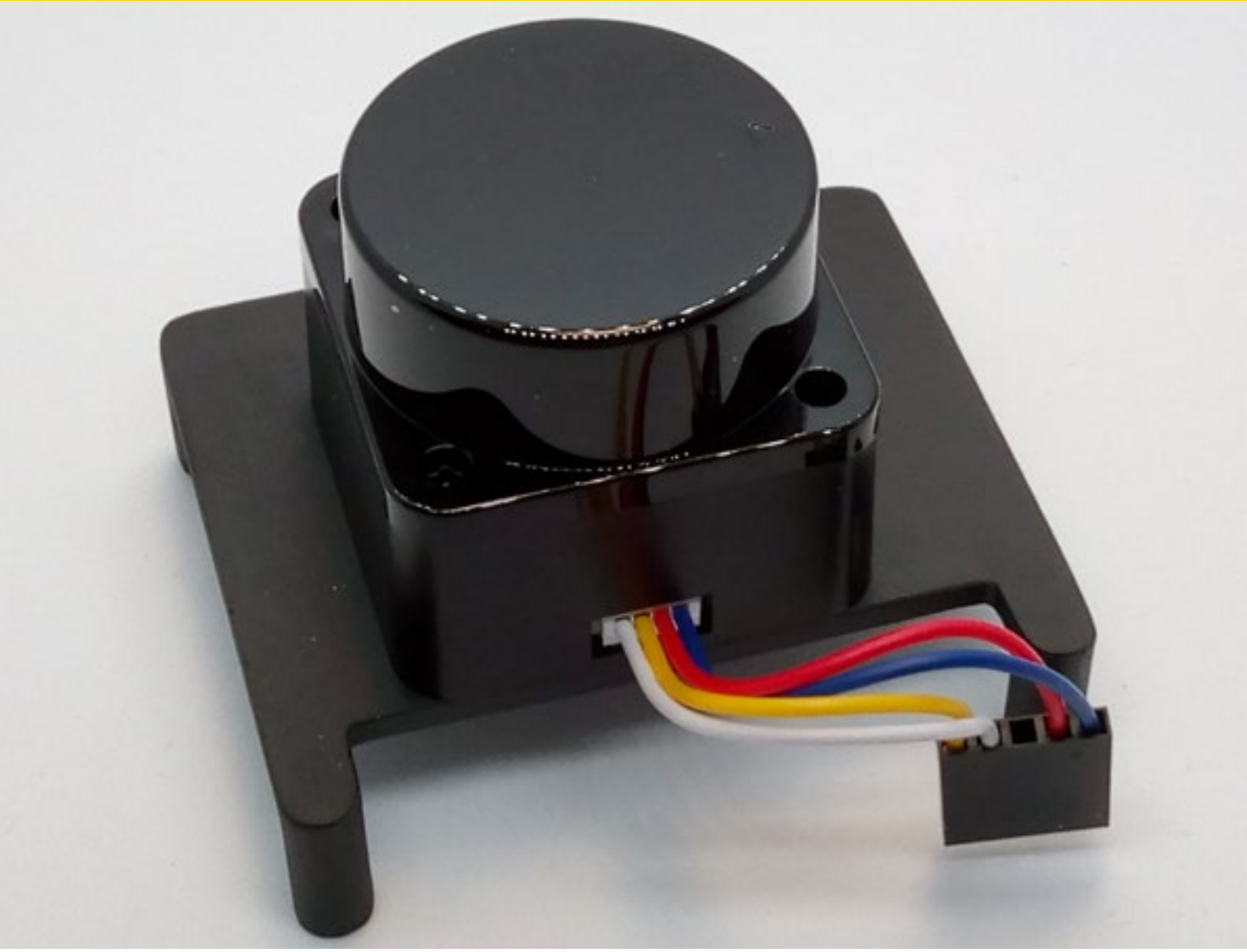
GET STARTED WITH OKDO LIDAR HAT FOR RASPBERRY PI



This guide will take you through setting up your Lidar Hat and configuring it for use with a Raspberry Pi 4B.

The Lidar hat uses a low-powered infrared laser beam which is safe and compliant with Class 1 laser certification. It has a serial interface and the Lidar scanner can be controlled using a PWM signal.

We will show how to install the Robot Operating System (ROS) which the module relies on, using a shell script to simplify the process. This includes setting up the serial interface on the Raspberry Pi, installing the driver and running a 2D visualization of the Lidar scan.
All the scripts used, including a stable version of the driver, are hosted on the OKdo GitHub for your convenience. They can be found here: https://github.com/LetsOKdo/ld19

RASPBERRY PI SET UP

Before fitting the Lidar hat, start by setting up your Raspberry Pi in the usual way. You will need to enable internet connectivity using either ethernet or Wifi. We recommend using the full desktop version of Raspberry Pi OS. If you need help with this you can follow the guide on https://www.okdo.com/getting-started/get-started-with-okdo-pi-4-basic-kit/.
During the Raspberry Pi configuration steps you can skip the OS updates.

ROBOT OPERATING SYSTEM

The Lidar Module relies on the Robot Operating System (ROS) which must be specially installed and configured to run on the Raspberry Pi. As this process is complex and involves running multiple bash commands, we have produced two shell scripts to ease the installation. They can be found on the OKdo GitHub repository: https://github.com/LetsOKdo/ld19

The ROS installation and build script lidar_ros_setup.sh takes about 2:15 hrs to complete.

Open a Terminal and change to the Pi users home dir:

```
cd
```

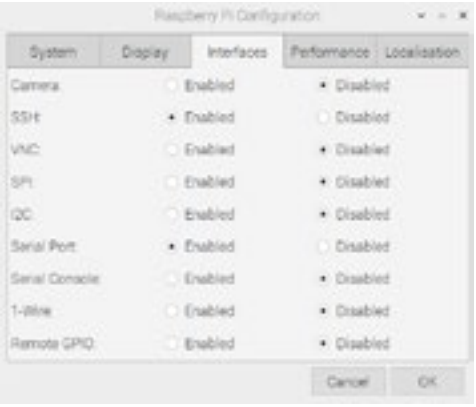
Download the script and execute it.

```
curl https://raw.githubusercontent.com/LetsOKdo/ld19/master/lidar_ros_setup.sh | bash
```

When the script has finished, reboot the Pi and test with the following command in Terminal.
roscore
Use Ctrl + C to exit.
Monitor the build progress by checking the Terminal title eg. (179 of 187)

ENABLE SERIAL

From the main menu click Preferences > Raspberry Pi Configuration.
Select Interfaces tab.
Click Serial Port Enabled button.
Click Serial Console Disabled button.
Select OK and reboot when prompted.
Select Shutdown > Shutdown to safely shutdown the Raspberry Pi.
Disconnect the power supply.



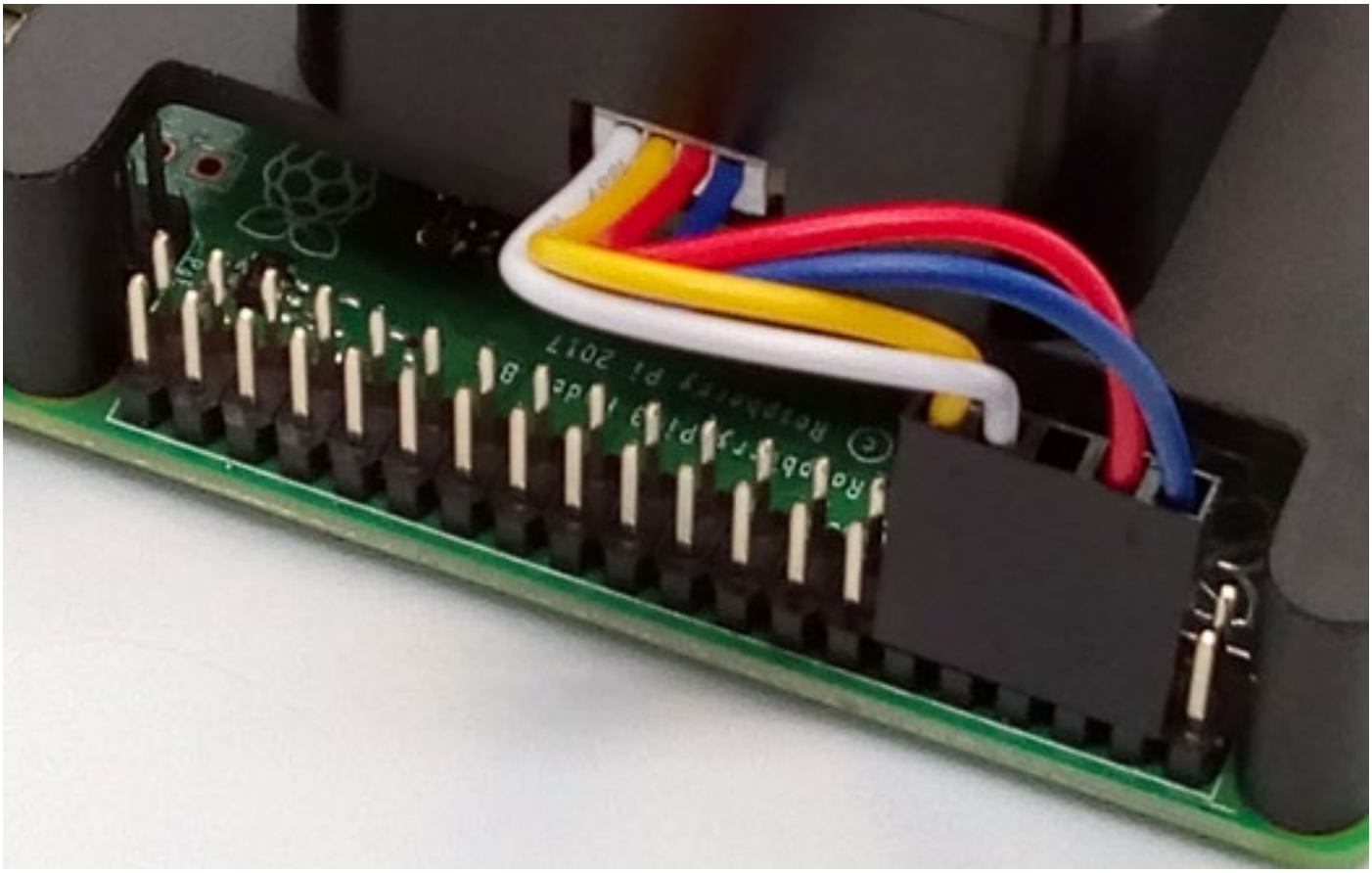
ATTACH LIDAR MODULE

Place the Lidar module onto the support bracket with the connector facing the cutout.
Using two of the screws secure the module to the bracket. Orient the cable connector (it only mates one way round) and connect to the module.

Make sure the Raspberry Pi is powered off.
Orient the Lidar unit so that the cutout is above the GPIO header pins.
Attach the unit using the four remaining screws.
Connect the cable socket to the GPIO pins as below. It does not follow conventional colour coding.

Lidar Pin	Raspberry Pi Pin	Colour	Min	Typical	Max
Pin 1 (TX)	Pin 10 (RXD)	White	0V	3.3V	3.5V
Pin 2 (PWM)	Pin 12 (PWMO)	Yellow	–	–	3.3V
Pin 3 (GND)	Pin 6 (GND)	Red	0V	0V	–
Pin 4 (P5V)	Pin 4 (5V)	Blue	5V	5V	5.5V

Check the connector is aligned correctly before powering the Raspberry Pi



LIDAR DRIVER

A tested version of the Lidar driver is hosted on the OKdo GitHub along with a script lidar_driver_setup.sh to install and build it correctly. You can find it here: https://github.com/LetsOKdo/ld19

Connect the power supply and boot the Raspberry Pi.
The Lidar head should spin up in the housing and a rotating blue led should be visible.
Open a terminal and change to the pi users home dir.

```
cd
```

Download the driver installation script and execute it.

```
curl https://raw.githubusercontent.com/LetsOKdo/ld19/master/lidar_driver_setup.sh | bash
```

When the script has finished, reboot the Pi.
Open a Terminal and test with the following commands:
Change into the driver installation dir.

```
cd ~/ld06
```

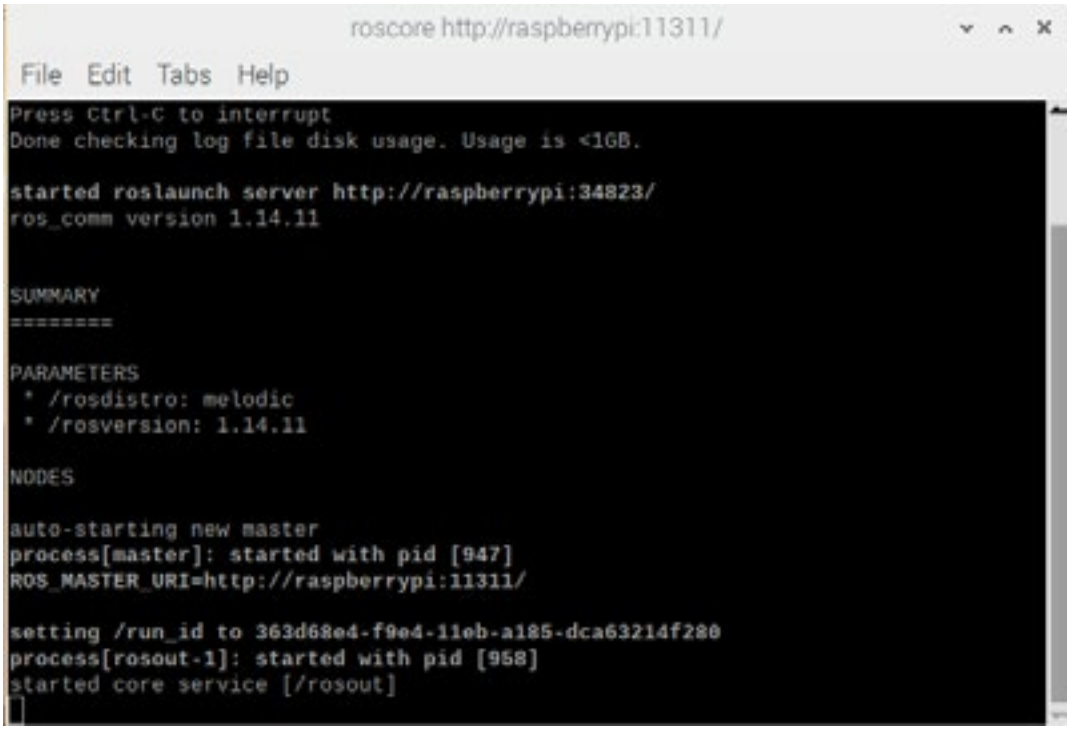
Source the driver environment.

```
source devel/setup.bash
```

Launch the driver.

```
roslaunch ldlidar ld19.launch
```

The output should look something like this screenshot and shows that the driver was started:



Leave the Terminal open and running for the next step.

If you get an error when starting the driver check that the Serial Console is disabled in Raspberry Pi Configuration.

RVIZ

This final step uses RViz visualisation software to show the results of the Lidar scan. It displays the room and obstacles around the Lidar in real-time.

Open another Terminal.
Start RViz with the following command:

```
rosrun rviz rviz
```

The RViz application will open.
From the File menu choose Open Config.
Navigate to /pi/ld06/rviz and select ldlidar.rviz.
The room and the surroundings should now be visualized on the 2D Grid in real-time.

After you have finished experimenting:
Close RViz from the menu.
Use Ctrl + C to shutdown the driver session.
Perform a safe shutdown of the Raspberry Pi.
Disconnect the power supply to stop the Lidar.