Nimbus 3D – user manual

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1 Safety instructions

Follow the instructions for safe use provided by the raspberry pi foundation, see
https://static.raspberrypi.org/files/legacy/qsg.pdf
The camera emits strong, almost invisible IR light. Don't look straight into the LEDs from a short distance.

2 Functions and features

Nimbus 3D is a time of flight sensor measuring the distance between the device and the nearest object/surface. Nimbus 3D illuminates the scene with a modulated infrared light source. The distance is calculated by the phase shift between the illumination unit and the reflected light. Nimbus 3D only works with a raspberry pi 3B and higher, which is not part of the product.

The measured data is available via Ethernet and can be evaluated by the user.

The nimbus 3D sensor may only be used under the operating conditions specified by the raspberry pi foundation, see
https://static.raspberrypi.org/files/legacy/qsg.pdf.

Nimbus 3D is designed for **indoor** use only.

3 Items supplied

- nimbus 3D
- safety instructions (get a copy here https://tinyurl.com/yykf6bc4)
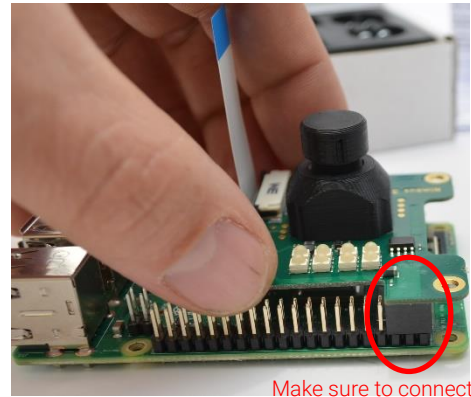- FFC jumper cable
- 2x spacers with screws

4 Mounting

The following images illustrate the mounting process of nimbus 3D. The device must be powered off, while mounting the camera.
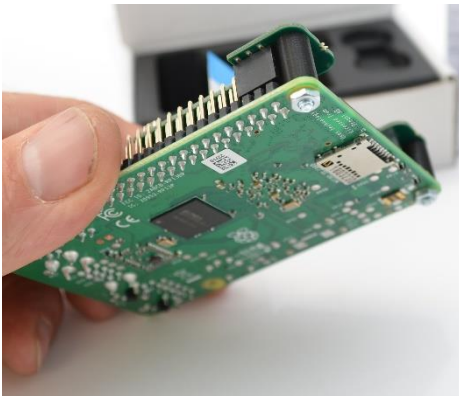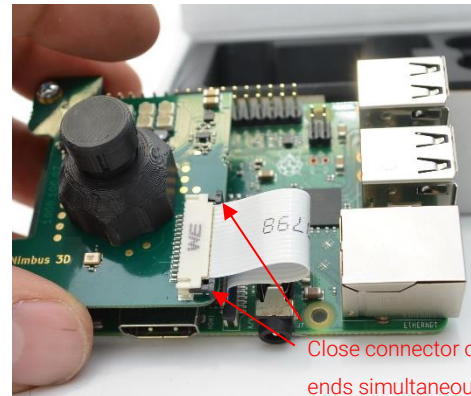
1. Mount FFC cable on raspberry

2. Connect to pinheader

Make sure to connect on pin 1-6

3. Mount spacers

4. Mount FFC cable on raspberry

Close connector on both ends simultaneously.

5 Operation

Follow these two fundamental rules in order to get optimal performance:

- Use a strong power supply (minimum 2.5A). The quality of onboard illumination highly depends on the supply (we recommend to use the official power supply)
- Use a gigabit ethernet cable (cat6 and higher).

5.1 Set-up

Follow these steps to set-up nimbus 3D:

- Download the raspberry pi image (nimbus_rpi3_vx.x.x_xxxxxxxx.img.gz) from our cloud at https://cloud.pieye.org/index.php/s/c2QSa6P4wBtSJ4K
- Unpack the file (e.g. with https://www.7-zip.de/)
- Write the unpacked file nimbus_rpi3_vx.x.x_xxxxxxxx.img to a SD card (with at least 8GB size). On windows you can use https://sourceforge.net/projects/win32diskimager/
- Mount the nimbus 3D camera on the raspberry pin header, as described in chapter 0.
- Switch on the power supply, using an official raspberry pi supply and let the raspberry boot twice (on first boot, the file system is expanded).
  - If you have a point-to-point ethernet connection, open a web browser and type 192.168.0.69 in the address bar (make sure, that your computer is part of the 192.168.0.xxx network)
  - You can also connect your raspberry to a DHCP server via an ethernet cable (a fritzbox or similar routers). Type the dhcp address of the raspberry in the address bar of the browser
- Watch the live image in the browser to get familiar with the camera, you can also change the illumination time.

5.2 Interfacing

Currently, we only support receiving data on a desktop machine over network. Use our python bindings from https://github.com/pieye/nimbus-python and follow the instructions there.

You can also use our websources if you are rather interested in javascript bindings, see https://github.com/pieye/nimbus-web.

The image data has the following meaning:

Matrix	Explanation
amplitude	signal strength of each pixel
radial	radial distance of each pixel to the camera center
x,y,z	3D point cloud
confidence	confidence information of each pixel (valid=0, underexposured=1, saturated=2, asymmetric=3)

Table 1: image data explanation

6   Technical data

Resolution	352 x 288
Measurement range	0,1 – 5 m
Viewing angle	66° x 54° (H x V)
Framerate	up to 30fps
Interface	CSI2, I2C, 5V
Output	• amplitude • radial • confidence • point cloud
Size	44mm x 56mm x 23mm
Imager	Infineon Real3 IRS1125A
Power supply	Min. 2.5 A
Network connection	Gigabit ethernet cable cat6 or higher

Table 2: nimbus 3D technical data

7 Licensing

All nimbus 3D software is distributed under GPLv3, see https://www.gnu.org/licenses/gpl-3.0.en.html

Nimbus 3D software uses other 3rd party libraries, see our README.md files (chapter 3rd party libraries) at our github repositores https://github.com/pieye/nimbus-python, https://github.com/pieye/nimbus-web and https://github.com/pieye/nimbus-userland for more details.

8 Compliance information

Nimbus 3D complies with the relevant provisions of the RoHS Directive for the European Union. In common with all Electrical and Electronic Equipment (EEE) Nimbus 3D should not be disposed of as household waste. Alternative arrangements may apply in other jurisdictions.