

APPLICATION NOTE

```
// Create an instant camera object with the first
Camera_t camera( CT1Factory::GetInstance().Creat

// Register an image event handler that accesses
camera.RegisterImageEventHandler(_new CSampleIma
Ownership_TakeOwnership);

// Open the camera.
camera.Open();
```

How to Build pylon Applications on Raspberry Pi

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1 Introduction

This document explains how pylon applications can be built on a Raspberry Pi ARM board.

The procedures described in this document assume you are using a Raspberry Pi 4 (<https://www.raspberrypi.org/products/raspberry-pi-4-model-b/>) with a Raspbian operating system (<https://www.raspberrypi.org/downloads/>) and a Windows 10 PC (32 or 64 bit). It is also assumed that pylon 6.1 for Windows is already installed on your Windows computer.



The Raspberry Pi 4 has 64-bit CPU, but the default Raspbian operating system is 32 bit.

2 Steps

2.1 Installing the Raspberry Pi Operating System Image on an SD Card

We first recommend downloading and installing the Raspbian operating system image on an SD card on your Windows 10 PC. Basler recommends using at least an 8 GB class 4 SD card. You can find a detailed description on the installation procedure under the following link:

<https://www.raspberrypi.org/documentation/installation/installing-images/README.md>.

2.2 Setting Up the Raspberry Pi

To set up Raspberry Pi:

1. Follow the instructions described under the following link until you get to the Raspbian home screen:

<https://projects.raspberrypi.org/en/projects/raspberry-pi-setting-up>.



2.3 Installing the pylon Software on the Raspberry Pi

To download the current pylon for Linux ARM 32-bit hardfloat version:

1. Connect your Raspberry Pi to the internet (e.g., by using WIFI).
2. Download the current pylon for Linux ARM 32-bit hardfloat version from the Basler website:

<https://www.baslerweb.com/en/sales-support/downloads/software-downloads/>

The downloaded file, e.g., **pylon_6.1.3.20159_armhf_setup.tar.gz**, is now available in your download directory.



In the following steps, mind that the “*” in the code line needs to be replaced by the current pylon version number. In the screenshot below, e.g., the “*” has been replaced by “6.1.3.20159”.

To install the pylon 6 Camera Software Suite in /opt/pylon:

1. Change to the directory that contains the **pylon_*_armhf_setup.tar.gz** archive that you downloaded from the website. This setup file contains the installation **pylon*_armhf.tar.gz** file of the pylon Software and a text file named **INSTALL** as Installation Guide.

2. Extract the **pylon_*_armhf_setup.tar.gz** archive into a directory of your choice (replace **./pylon_setup** if you want to extract into a different directory):

```
mkdir ./pylon_setup
```

```
tar -C ./pylon_setup -xzf ./pylon*_armhf_setup.tar.gz
```

3. Change to the directory into which you extracted the **pylon_*_armhf_setup.tar.gz**:

```
cd ./pylon_setup
```

```

pi@raspberrypi4: ~/Downloads/pylon_setup
File Edit Tabs Help
pi@raspberrypi4:~ $ ls
Desktop Downloads MagPi Pictures pypylon TeamViewer Videos
Documents genicam_xml_cache Music Public Samples Templates
pi@raspberrypi4:~ $ cd Downloads
pi@raspberrypi4:~/Downloads $ ls
pylon_6.1.3.20159_armhf_setup.tar.gz
pi@raspberrypi4:~/Downloads $ tar -C ./pylon_setup -xzf ./pylon_6.1.3.20159_armhf_setup.tar.gz
pi@raspberrypi4:~/Downloads $ ls
pylon_6.1.3.20159_armhf_setup.tar.gz pylon_setup
pi@raspberrypi4:~/Downloads $ cd pylon_setup/
pi@raspberrypi4:~/Downloads/pylon_setup $ ls
INSTALL pylon_6.1.3.20159_armhf.tar.gz
pi@raspberrypi4:~/Downloads/pylon_setup $

```

4. Create a **pylon** directory in the **/opt** folder:

```
sudo mkdir /opt/pylon
```

5. Extract the pylon SDK into **/opt/pylon**:

```
sudo tar -C /opt/pylon -xzf ./pylon*_armhf.tar.gz
```

```

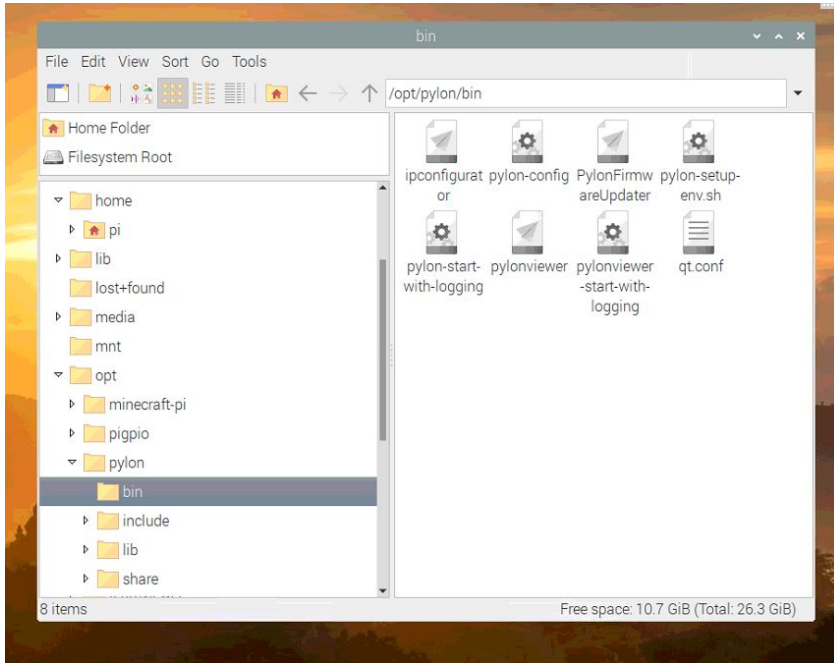
pi@raspberrypi4:~/Downloads/pylon_setup $ sudo tar -C /opt/pylon -xzf ./pylon_6.1.3.20159_armhf.tar.gz
pi@raspberrypi4:~/Downloads/pylon_setup $ sudo chmod 755 /opt/pylon
pi@raspberrypi4:~/Downloads/pylon_setup $

```

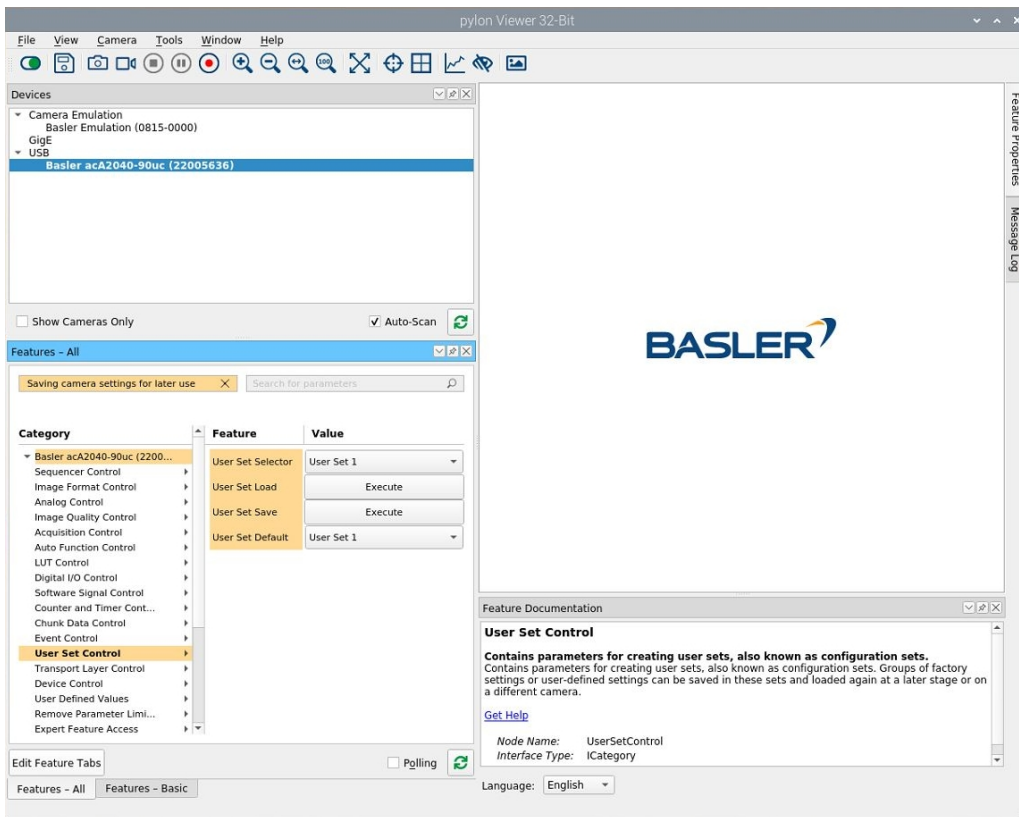
6. Change access rights of the **pylon** folder:

```
sudo chmod 755 /opt/pylon
```

If you choose to install pylon in a different directory, you have to modify the directory name accordingly. Now you find the executable pylon Viewer application in the `/opt/pylon/bin` directory.



The screenshot below shows the home screen of the pylon Viewer once the application has been started. In this case, a USB camera is connected:



2.4 Setting up a GigE Camera

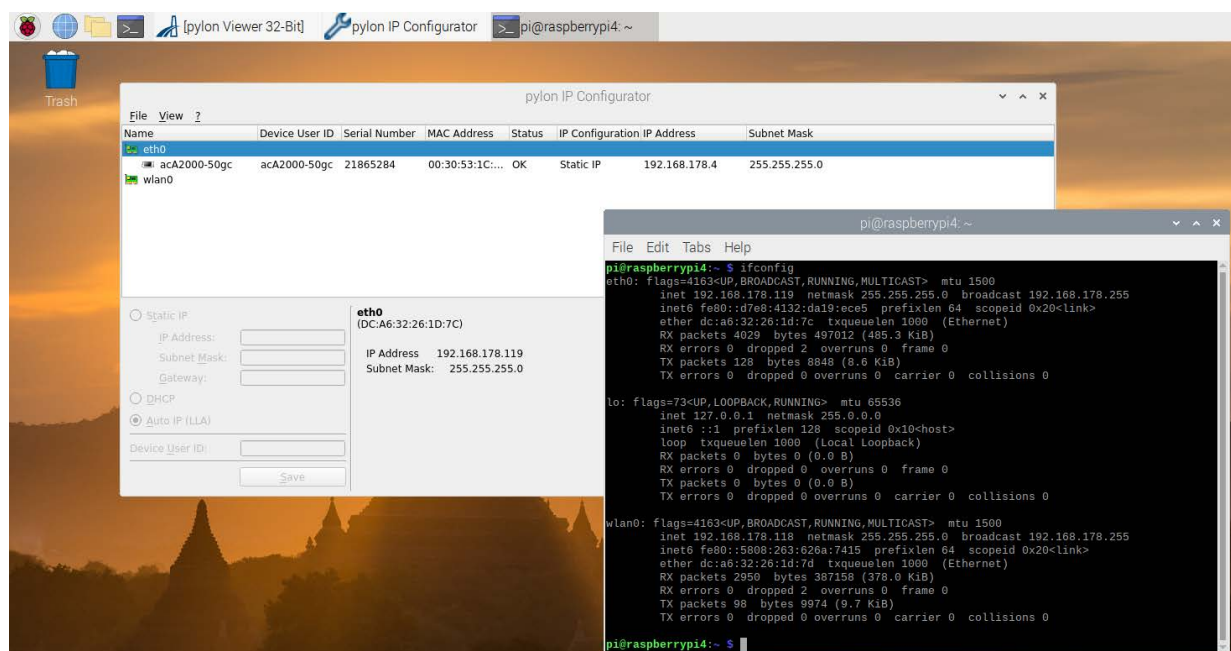
To setup a GigE camera:

1. Use the pylon IP Configurator tool in the pylon Viewer.

The pylon IP Configurator is available in the **Tools** menu.

The screenshot below shows the IP address of the GigE adapter and the IP address of the camera.

- GigE adapter IP address: 192.168.178.119
- Subnet mask: 255.255.255.0
- Camera IP address: 192.168.178.4
- Subnet mask: 255.255.255.0



As the Raspberry Pi Ethernet adapter and the Basler GigE Vision camera have to be within the same subnet in order to establish a valid connection, you may have to change the IP address of the adapter or the camera.

To verify the current IP settings of the network adapter:

1. Execute the following command: `#ifconfig`.

You can change the IP address of the camera with the IP Configurator.

To change the IP address of the network adapter:

1. Execute the following command: `# sudo ifconfig eth0 192.168.178.1 netmask 255.255.255.0`.

To check whether the connection was established successfully:

1. For test purposes, type in the following command line: # ping 192.168.178.4.

As the Raspberry Pi has a maximum packet size (MTU) of 1500, the camera's packet size can't be larger than 1500. Adjust the packet size of the camera using the pylon Viewer.

To adjust the packet size:

1. In the **Features** pane, click the **Transport Layer Control** category and set the **Packet Size** parameter to 1500.

2.4.1 Saving GigE Camera Settings

Basler recommends saving the current configuration in a user set and making it the default startup set in order for your camera to wake up with that configuration after reconnection.

To save the current configuration:

1. Open the **Configuration Sets** category.
2. Set the **Configuration Set Selector** parameter to **User Set 1**.
3. Execute the **User Set Save** command by clicking the **Execute** button.
4. To use this configuration as the default startup set, set the **Default Startup Set** parameter to **User Set 1**.

2.5 Setting up a USB Camera

In order to use USB 3.0 vision cameras, you also need to install the udev-rules to set up permissions for Basler USB cameras.

To set up permissions for Basler USB cameras:

1. Type: `sudo /opt/pylon/share/pylon/setup-usb.sh`.
2. Unplug and replug all USB cameras to get the udev rules applied.


```

pi@raspberrypi: /opt/pylon/share/pylon
File Edit Tabs Help
pi@raspberrypi:/opt/pylon/share $ cd pylon
pi@raspberrypi:/opt/pylon/share/pylon $ ls
69-basler-cameras.rules  doc      licenses  README      Samples
DataPrivacy.txt         licenses log       ReleaseNotes.txt  setup-usb.sh
pi@raspberrypi:/opt/pylon/share/pylon $ sudo /opt/pylon/share/pylon/setup-usb.sh

Welcome to

#####  ##  ##          #####  ##  ##
##  ##  ##  ##  ##      ##  ##  ##  ##
##  ##  #####  ##      ##  ##  ##  ##
#####  ##  ##          ##  ##  ##  ##
##  ##  ##  ##          ##  ##  ##  ##
##  ##  ##  ##          ##  ##  ##  ##
##  ##  #####  #####  ##  ##

This setup configures your system, so that you can use Basler USB cameras with it.
Continue setup? (yes or no [y/n]? ) : y

Installing udev rules to /etc/udev/rules.d/69-basler-cameras.rules

Checking if /usr/share/misc/usb.ids must be updated
Your usb hardware database is up to date. Nothing to do.

For a better experience with many USB3 cameras,
we recommend increasing the limit of open files and USB memory.
Warning: We have to edit your GRUB configuration file to permanently modify the usbfs memory!
Should I do that for you? (yes or no [y/n]? ) : y

Installation successful

pi@raspberrypi:/opt/pylon/share/pylon $

```

2.5.1 Saving USB Camera Settings

Basler recommends saving the current configuration in a user set and making it the default startup set in order for your camera to wake up with that configuration after reconnection.

To save current configurations:

1. Open the **User Set Control** category.
2. Set the **User Set Selector** parameter to **User Set 1**.
3. Execute the **User Set Save** command by clicking the **Execute** button.
4. To use this configuration as the default startup set, set the **Default Startup Set** parameter to **User Set 1**.

2.6 Building pylon SDK Samples on the Raspberry Pi

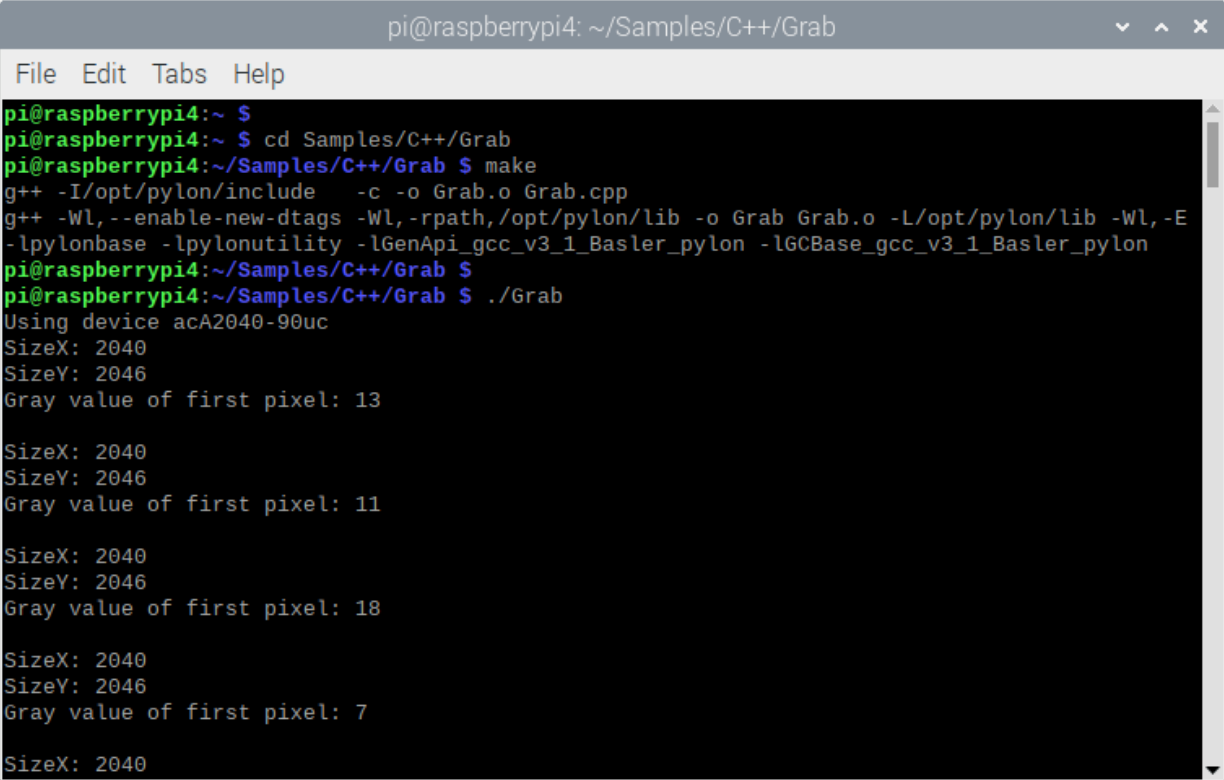
Now you are ready to build pylon SDK samples directly on the Raspberry Pi. We assume that a g++ compiler is already available on the board.

To build pylon SDK samples on the Raspberry Pi:

1. To prevent problems with writing permissions, copy all the samples from the **/opt/pylon/** directory to your **/home/pi/** directory.
2. To test one of the C++ SDK samples, e.g. the Grab sample, move to the directory and compile the sample: `# cd Samples/C++/Grab` and `# make`

Assuming the Ethernet port of the Raspberry Pi and the Basler GigE Vision camera have been configured correctly, you can run the Grab binary now: To run the Grab binary:

1. Type # ./Grab



```
pi@raspberrypi4: ~/Samples/C++/Grab
File Edit Tabs Help
pi@raspberrypi4:~ $
pi@raspberrypi4:~ $ cd Samples/C++/Grab
pi@raspberrypi4:~/Samples/C++/Grab $ make
g++ -I/opt/pylon/include -c -o Grab.o Grab.cpp
g++ -Wl,--enable-new-dtags -Wl,-rpath,/opt/pylon/lib -o Grab Grab.o -L/opt/pylon/lib -Wl,-E
-lpylonbase -lpylonutility -lGenApi_gcc_v3_1_Basler_pylon -lGCBase_gcc_v3_1_Basler_pylon
pi@raspberrypi4:~/Samples/C++/Grab $
pi@raspberrypi4:~/Samples/C++/Grab $ ./Grab
Using device acA2040-90uc
SizeX: 2040
SizeY: 2046
Gray value of first pixel: 13

SizeX: 2040
SizeY: 2046
Gray value of first pixel: 11

SizeX: 2040
SizeY: 2046
Gray value of first pixel: 18

SizeX: 2040
SizeY: 2046
Gray value of first pixel: 7

SizeX: 2040
```

3 Further Information

For further information about how to use the pylon 6 Camera Software Suite and how to configure cameras and the host system, read the README document that will be installed here:

`/opt/pylon/share/pylon/README`

Revision History

Document Number	Date	Changes
-	14 July 2014	Initial release version of this document.
AW00162902000	19 August 2020	Updated Application Note to pylon 6.1 and Raspberry Pi 4.