SOFTWARE

1. Driver Installation

```bash
eget -O install_pivariety_pkgs.sh https://github.com/Arducam/Arducam-Pivariety-V4L2-Developer/releases/download/install_script/install_pivariety_pkgs.sh

chmod +x install_pivariety_pkgs.sh

./install_pivariety_pkgs.sh -p kernel_driver
dmesg | grep arducam
```

Press f to reboot

**NOTE:** The kernel driver installation only supported by the latest version 5.10. For other kernel versions, please go to our Doc page: [https://www.arducam.com/docs/cameras-for-raspberry-pi/pivariety/how-to-install-kernel-driver-for-pivariety-camera](https://www.arducam.com/docs/cameras-for-raspberry-pi/pivariety/how-to-install-kernel-driver-for-pivariety-camera).

You can also visit this doc page to refer to the hardware connection: [https://www.arducam.com/docs/cameras-for-raspberry-pi/pivariety/21mp-imx230-pivariety-motorized-focus-camera-module/](https://www.arducam.com/docs/cameras-for-raspberry-pi/pivariety/21mp-imx230-pivariety-motorized-focus-camera-module/)

2. Test the Driver and Camera

After you've finished the hardware assembly and driver installation, you can test whether the camera is detected and working.

```
sudo apt update

sudo apt install -y gstreamer1.0-tools

gst-launch-1.0 libcamerasrc ! video/x-yuv, width=1920, height=1080, ! videoconvert ! autodev- osink
```

**View the Status of Driver and Camera**

```bash
dmesg | grep arducam
```

It will display `arducam-pivariety` if driver installed successfully and firmware version if the camera can be detected. The display should be probe failed if the camera can't be detected, you might have to check the ribbon connection, then reboot the Raspberry Pi.

**View the Video Node**

The Pivariety camera modules are emulated as the standard video device under `/dev/video*` node, so you can use the command for listing the contents in the `/dev` folder.

```bash
ls /dev/video*
```

Since the camera module is V4L2 compliant, you can use the V4L2 controls to list the supported color space, resolution, and frame rates.

```bash
devctl -l formats-ext
```

**NOTE:** Although V4L2 interface is supported, only RAW format images can be obtained, without ISP support.

3. Official Libcamera App Installation

```bash
./install_pivariety_pkgs.sh -p libcamera_dev

./install_pivariety_pkgs.sh -p libcamera_apps
```

**4. Capture Image and Record Video**

**Capture image**

For example, preview for 5s and save the image named `test.jpg`

```bash
libcamera-still -t 5000 -o test.jpg
```

**Record video**

For example, record a H.264 10s video with the frame size 1920W × 1080H

```bash
libcamera-vd -t 10000 -width 1920 -height 1080 -o test.h264
```

**NOTE:** H.264 format only supports 1920×1080 and below resolution.

**Plugin gstreamer installation**

Install gstreamer

```bash
sudo apt update

sudo apt install -y gstreamer1.0-tools
```

4. View the Video Node

```bash
gst-launch-1.0 libcamera src ! video/x- raw, width=1920, height=1080 ! videocrop ! autodev-osink
```

5. Control the Focusing Manually

**Control via v4l2-ctl**

```bash
v4l2-ctl -c focus_absolute=300
```

**Control via script**

```bash
git clone https://github.com/Arducam/Arducam-Pivariety-V4L2-Developer.git
cd Arducam-Pivariety-V4L2-Developer
python3 FocuserExample.py
```

Now you can use the up and down on the keyboard to control the focus position

6. Automatically Control the Focusing

**Focus once**

```bash
libcamera-still -t 0 -autofocus
```

**Enable autofocus using F**

```bash
libcamera-still -t 0 -keypress press f to trigger autofocus
```

**NOTE:** Please install the Arducam latest version of libcamera-dev and libcamera-apps, and update the firmware of Pivariety(contacting Arducam: support@arducam.com) if the camera can not autofocus.

TROUBLESHOOT

1. Cannot Allocate Memory

```bash
[3:45:35.833444358] [1014] INFO libcamera_api.cpp:538: Sensor: /dev/video5 detached for sensor
```

**ERROR:** Failed to start camera

Edit `config/.cmdline.txt` and add `cma=400M` at the end


2. The Image Displays Color Dots

Add code `--denoise cden_off` at the end of command

More details: [https://github.com/raspberrypi/libcamera- apps/issues/19](https://github.com/raspberrypi/libcamera- apps/issues/19)

3. Failed to Install the Driver

Please check the kernel version, we only provide the driver for the latest official kernel version image when this Pivariety camera released. You can follow Arducam Doc page [https://www.arducam.com/docs/cameras-for-raspberry-pi/pivariety/](https://www.arducam.com/docs/cameras-for-raspberry-pi/pivariety/) to get the drivers for other kernel versions.

If you have any other problems, please feel free to contact us via support@arducam.com.