Raspberry Pi Multi Camera Adapter Module V2.2 User Guide

Rev 1.0 Nov. 2019

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1 Introduction

Compared to previous multi-camera adapter module which can only support 5MP RPI cameras, the new multi-camera adapter module V2.2 is designed for connecting maximum four 5MP/8MP/other Arducam MIPI cameras to a single CSI camera port on a Raspberry Pi board. Considering that the high speed CSI camera MIPI signal integrity is sensitive to long cable connection, this adapter board does not support stacking and can only connect 4 cameras at maximum. Because It covers most of the use cases like 360 degree view photography and surveillance, adding more cameras will degrading the camera performance.

Please note that Raspberry Pi multi-camera adapter board is a nascent product that may have some stability issues and limitations because of the cable's signal integrity and RPi's closed source video core libraries, so use it at your own risk.

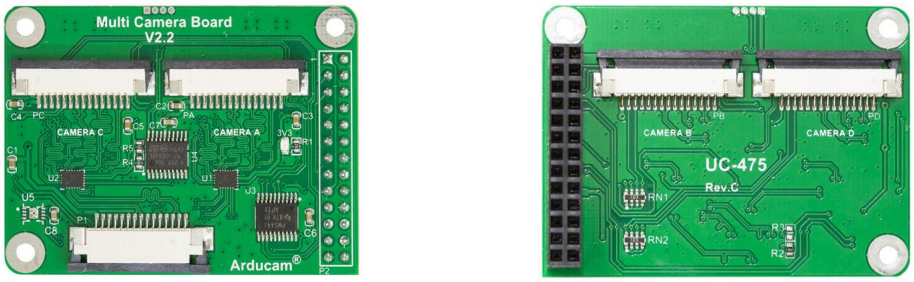


Figure 1. Multi-camera Adapter Module

2 Application

- IoT cameras
- Robot cameras
- Wildlife cameras
- 360° camera

3 Features

- Accommodate 4 Raspberry Pi cameras on a single RPi board
- Support 5MP OV5647 or 8MP IMX219 camera or other Arducam MIPI cameras, no mixing allowed
- 3 GPIOs required for multiplexing
- Cameras work in sequential, not simultaneously
- Low resolution, low frame rate video surveillance demo with 4 cameras
- High resolution still image photography demo
- Optional 3D printed enclosure and tripod for official pi camera board
- Support Raspberry Pi A/B/B+ and Pi 2/3/3B+.

4 Hardware Assembly

Multi-camera adapter module hardware assembly is fairly easy by connecting 4 camera to the input ports A, B, C, D and connecting the output port to RPI board's camera CSI connector. Then plug the multi-camera adapter module into the RPI board pin header connector with aligning the pin 1 correctly.

Multi-camera adapter board requires 3 GPIOs to switch between cameras, these pins are using the WiringPi naming convention, see Table 1.

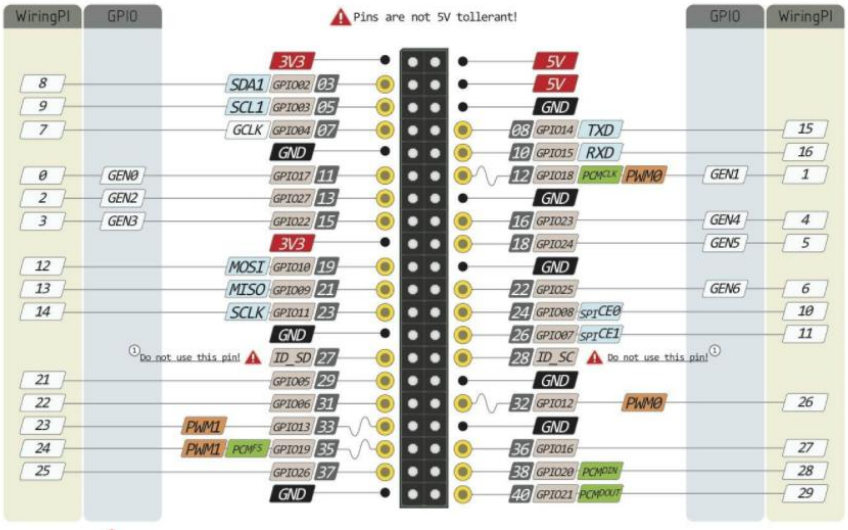


Table 1 - GPIO Pins Configuration

GPIO Naming	Selection	Enable 1	Enable 2
WiringPi	7	11	12

5 Software Operation

For proper operation, only one camera should be enabled at a time. In case of only one multi-camera adapter board is used, driving Pin 12 HIGH and driving Pin 11, Pin 7 to LOW to enable camera A on the adapter module. Enable camera B, C, and D;, please refer the Table 2 for camera selection configuration. To disable all cameras on one adapter module, Enable 1 and Enable 2 signals should be toggled HIGH. Care should be taken that it is not allowed to drive the Enable 1 and Enable 2 LOW at the same time.

Table 2 - Camera Selection Configuration

Camera Selection Configuration	Selection	Enable 1	Enable 2
A	0	0	1
B	1	0	1
C	0	1	0
D	1	1	0
No Camera	X	1	1
Error	X	0	0

(X: don't care)

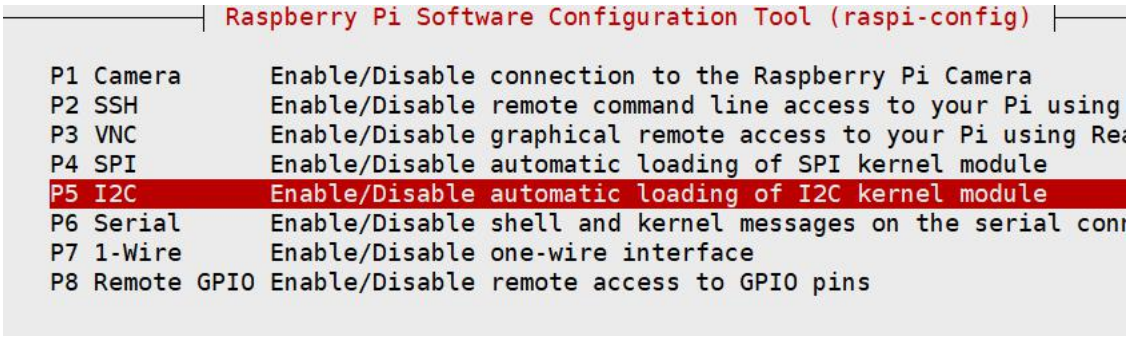
6 Quick Start Guide

Before running the demo, the following pre-request software packages need to be installed.

- **Run the below command to install the PyQt5 module**
  sudo apt-get install python-pyqt5

- **Run the below command to install the cv2 module**
  sudo apt-get install python-opencv

- **Run the below command to enable the i2c only for once.**
  sudo raspi-config
  then choose "Interfacing Options" , choose "P5 I2C", choose "Yes".



- **Download the code library**

  git clone *https://github.com/ArduCAM/RaspberryPi.git*

```
pi@raspberrypi:~ $ git clone https://github.com/ArduCAM/RaspberryPi.git
Cloning into 'RaspberryPi'...
remote: Enumerating objects: 71, done.
remote: Counting objects: 100% (71/71), done.
remote: Compressing objects: 100% (70/70), done.
remote: Total 223 (delta 38), reused 0 (delta 0), pack-reused 152
Receiving objects: 100% (223/223), 5.93 MiB | 1.23 MiB/s, done.
Resolving deltas: 100% (90/90), done.
pi@raspberrypi:~ $
```

- **Navigate to the Multi_Camera_Adapter_V2.2 folder**

```
pi@raspberrypi:~ $ cd RaspberryPi/Multi_Camera_Adapter/Multi_Camera_Adapter_V2.2/
pi@raspberrypi:~/RaspberryPi/Multi_Camera_Adapter/Multi_Camera_Adapter_V2.2 $
```

- **Run the below command to initialize the camera every time after reboot**

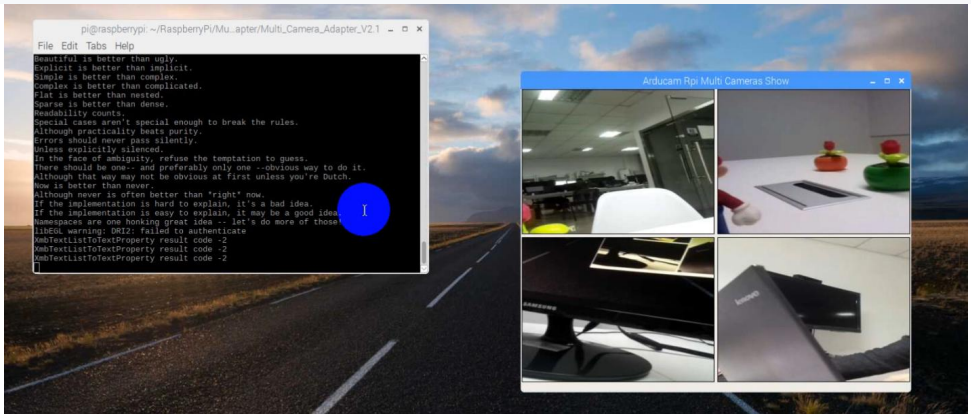
sudo chmod +x init_camra.sh

sudo ./init_camera.sh

```
pi@raspberrypi:~/RaspberryPi/Multi_Camera_Adapter/Multi_Camera_Adapter_V2.2 $ sudo ./init_camera.sh
camera init OK.
pi@raspberrypi:~/RaspberryPi/Multi_Camera_Adapter/Multi_Camera_Adapter_V2.2 $
```

- **Run the following command to start the preview demo. This demo supports previewing four cameras' images at the same time.**

sudo python 4cam_cv2.py



- **Press the Ctrl+ C to exit the demo.**

```
    def update_photo(self, index, qimg):
KeyboardInterrupt
Aborted
pi@raspberrypi:~/RaspberryPi/Multi_Camera_Adapter/Multi_Camera_Adapter_V2.2 $
```

- **Run the below command to start the snapshot demo. This demo supports snapshot and save the image to the current directory.**

sudo python snapshot.py

```
pi@raspberrypi:~/RaspberryPi/Multi_Camera_Adapter/Multi_Camera_Adapter_V2.2 $ sudo python snapshot.py
```

7 Optional Accessories

If you are interested in using the multi-camera adapter board like us, here is some optional accessories you can choose.

Arducam Multi Camera Adapter Module Accessories Kit

SKU: **U6048**

Package including:

- 3D printed case - to accommodate up to 4 standard Raspberry Pi camera modules
- Tripod - to hold the cameras steady and adjust the height

You also can watch an installation video of those accessories from our YouTube channel:
https://youtu.be/DRIeM5uMy0I