Raspberry Pi Multi Camera Adapter Module V2.2 User Guide

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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.

WiringPl	GPIO	A Pins an	e not 5\	/ tollerant!		GPIO	WiningPl
8 9 7	SDA1 SCL1 GCLK	3V3 GP1082 (83 GP1082 (85 GP1084 (87 GND	 • •<	5V 5V 6VU 608 GP100 608 GP100 608 GP100 608 GP100	4 TXD 5 RXD		<u>15</u>
0 2 3	GEN2 GEN3	GP1017 11 (0) GP1027 13 (0) GP1022 15 (0) 3V3 (0)	•••	 	28 POMER PWM0 23 24	GEN1 GEN4 GEN5	4
12 13 14	MOSI MISO SCLK	GP1018 19 0 GP1089 21 0 GP1011 23 0	•••	GNL GNL GNL GP102 GP102	25 25 28 SPICE0 27 corCE1	GENG	6
21 22 23 24	Do. not. use this. pin!	ID_SD 27 ID_SD GP1005 29 ID_SD GP1006 51 ID_SD GP1013 53 ID_SD	•••	● 20 Gride ● 28 ID S ● GNU ●	C A Do not use this	. pin! ^①	26
24	PWPLL PLPF3	GP1019 35 0 0 GP1026 37 0 GND 0	•••	 36 GP101 38 GP102 40 GP102 	19 РСМОТИ 11 РСМОТИ		27 28 29

Table	1	- GPIO	Pins	Configuration
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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 multicamera 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.

Camera Selection Configuration	Selection	Enable 1	Enable 2
А	0	0	1
В	1	0	1
С	0	1	0
D	1	1	0
No Camera	Х	1	1
Error	Х	0	0

Table	2 - Camera	Selection	Configuration
Iavic	Z - Camera	Jelection	configuration

(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".

	Ra	spberry Pi Softw	/are Configuration Tool (raspi-config)
P1	Camera	Enable/Disable	connection to the Raspberry Pi Camera
P2	SSH	Enable/Disable	remote command line access to your Pi using
P3	VNC	Enable/Disable	graphical remote access to your Pi using Rea
P4	SPI	Enable/Disable	automatic loading of SPI kernel module
P5	I2C	Enable/Disable	automatic loading of I2C kernel module
P6	Serial	Enable/Disable	shell and kernel messages on the serial conr
P7	1-Wire	Enable/Disable	one-wire interface
P8	Remote GPIO	Enable/Disable	remote access to GPIO pins

• Download the code library

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



- 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

File Edit Tabs Help Beautiful is better than uply. Explicit is better than uplicit. Simple is better than complex. Complex is better than complexet.	Arducam Rpi Multi Cameras Show – D 🗴
Flat is better than nested, percentitive that the dense of the set of the se	
LiBEL warning: GH2: Failed to authentiste More and the second se	

• Press the Ctrl+ C to exit the demo.



• 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/DRIeM5uMyOI