SENSING SG8A-ORIN-GMSL2 adapter board use Q&A

1. Driver package download?

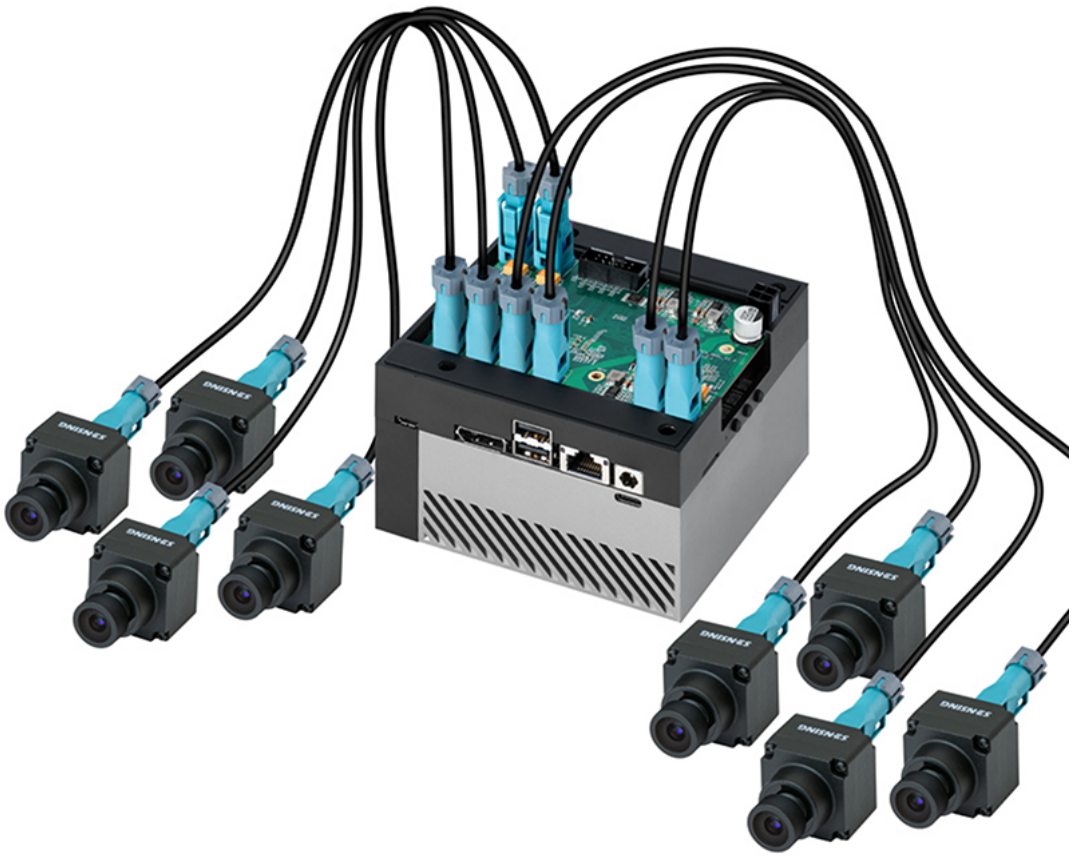
	Model of SENSING camera used	JP version for customer NVIDIA devices	Driver package download link	Driver package download method: copy the previous "Driver Package Download Link" into the web box below, and click to download	Remarks
Driver package	Camera connected to GMSL (YUV format) (Example: SG2-AR0231C-0202-GMSL-Hxxx)	JP5.1.2 (Recommended use)	https://github.com/SENSING-Technology/nvidia-jetson-camera-drivers/tree/main/Jetson%20AGX%20Orin%20Devkit/SG8A-ORIN-GMSL2-F/JetPack5.1.2/SG8A_ORIN_GMSL2-F_V2_AGX_Orin_YUV_GMSL1_JP5.1.2_L4TR35.4.1	https://minhaskamal.github.io/DownGit/#/home	
		JP6.0	https://github.com/SENSING-Technology/nvidia-jetson-camera-drivers/tree/main/Jetson%20AGX%20Orin%20Devkit/SG8A-ORIN-GMSL2-F/JetPack6.0/SG8A_ORIN_GMSL2-F_V2_AGX_Orin_YUV_GMSL1_JP6.0_L4TR36.3.0		
	Camera connected	JP5.1.2	https://github.com/SENSING-Technology/nvidia-		General package:

	to GMSL2 (G2A) (YUV format) (Example: SG3S-ISX031C-GMSL2 - Hxxx)	(Recommended use)	jetson-camera-drivers/tree/main/Jetson%20AGX%20Orin%20Devkit/SG8A-ORIN-GMSL2-F/JetPack5.1.2/SG8A_ORIN_GMSL2-F_V2_AGX_Orin_YUV_JP5.1.2_L4TR35.4.1		1. Only YUV format cameras can be lit, RAW format cameras are not supported. 2. Can light up 8 channels of GMSL2F.
		JP6.0	https://github.com/SENSING-Technology/nvidia-jetson-camera-drivers/tree/main/Jetson%20AGX%20Orin%20Devkit/SG8A-ORIN-GMSL2-F/JetPack6.0/SG8A_ORIN_GMSL2-F_V2_AGX_Orin_YUV_JP6.0_L4TR36.3.0		
	Camera connected to GMSL2 (G2A) (RAW format) (Example: SG2-AR0233C-GMSL2-Hxxx)	JP5.1.2 (Recommended use)	https://github.com/SENSING-Technology/nvidia-jetson-camera-drivers/tree/main/Jetson%20AGX%20Orin%20Devkit/SG8A-ORIN-GMSL2-F/JetPack5.1.2/SG8A_ORIN_GMSL2-F_V2_AGX_Orin_RAW_JP5.1.2_L4T35.4.1		
		JP6.0	https://github.com/SENSING-Technology/nvidia-jetson-camera-drivers/tree/main/Jetson%20AGX%20Orin%20Devkit/SG8A-ORIN-GMSL2-F/JetPack6.0/SG8A_ORIN_GMSL2-F_V2_AGX_Orin_RAW_JP6.0_L4TR36.3.0		
Other dedicated camera	SG5-OX05BC-4000-GMSL2-	JP5.1.2	https://github.com/SENSING-Technology/nvidia-jetson-camera-drivers/tree/main/Jetson		

driver packages	Hxxx (AA Frame Mode)		%20AGX%20Orin%20Devkit/SG8A-ORIN-GMSL2-F/JetPack5.1.2/SG8A_ORIN_GMSL2-F_V2_AGX_Orin_YUV_OX05B-AA_JP5.1.2_L4TR35.4.1		
	SG5-OX05BC-4000-GMSL2-Hxxx (AB Frame Mode)	JP5.1.2	https://github.com/SENSING-Technology/nvidia-jetson-camera-drivers/tree/main/Jetson%20AGX%20Orin%20Devkit/SG8A-ORIN-GMSL2-F/JetPack5.1.2/SG8A_ORIN_GMSL2-F_V2_AGX_Orin_YUV_OX05B-AB_JP5.1.2_L4TR35.4.1		

2. How to install SG8A-ORIN-GMSL2 main board?

A: SG8A-ORIN-GMSL2安装视频.mp4



Simplified method 1: You can directly plug and press the adapter board intermediate connector with the connector in the middle of the NVIDIA AGX Orin kit. At the same time, the adapter board needs to be connected to the shipping matching "power connection cable" and "12V power supply" for separate power supply .

3. Confirm the Jetson Orin system version

3.1 JP version

If the above driver package does not correspond to the JP version, you need to flash the machine first and update it to the JP version corresponding to the driver package. The corresponding JP versions are as follows:

SG8A_ORIN_GMSL2 - F_V2_AGX_Orin_YUV_JP5. 2_L4TR35.4.1.zip corresponds to: Jetpack5.1.2-L4TR35.4.1

SG8A_ORIN_GMSL2 - F_V2_AGX_Orin_YUV_JP6. 0_L4TR36.3.zip corresponds to: Jetpack6.0-L4TR36.3. .

3.2 Flashing method

You can refer to the documentation in the driver package and follow the instructions on the NVIDIA official website for flashing updates.

4. Product manual

SG8A-ORIN-GMSL2 User Manual for Adapter BoardV1.0-en.pdf

5. Adaptation list

SG8A-ORIN-GMSL2适配相机清单

	Model number	Pixel	Number	Remarks
1	SG8S-AR0820C-5300-G2A-Hxxx	8M	Cannot be 8 at the same time	
2	SG5-IMX490C-5300-GMSL2-Hxxx	5M	Cannot be 8 at the same time	

3	SG3S-ISX031C-GMSL2F-Hxxx	3M	Eight simultaneously	Verified

6. Use of external triggers

SENSING SG8A_ORIN_GMSL2-F External Trigger synchronization Settings

7. After running seven cameras together for dozens of seconds, how many cameras will freeze? What is the reason?

Answer: Lighting up and displaying images requires GPU resources, just like the logic of playing games. If you want to display all of them, it will definitely lag, and in actual use, it is not for lighting up, just for data processing.

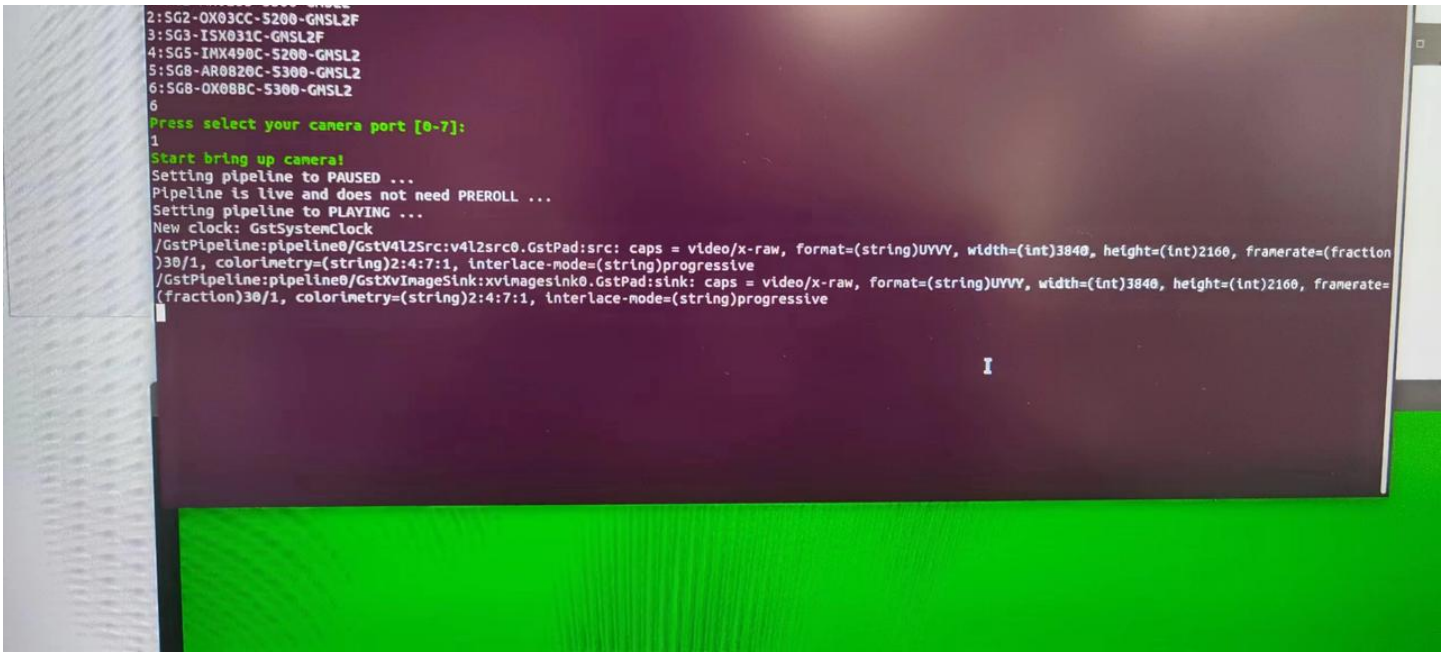
8. Is there an application example of v4l-ctl?

Answer: The following OpenCV demos can be referred to:

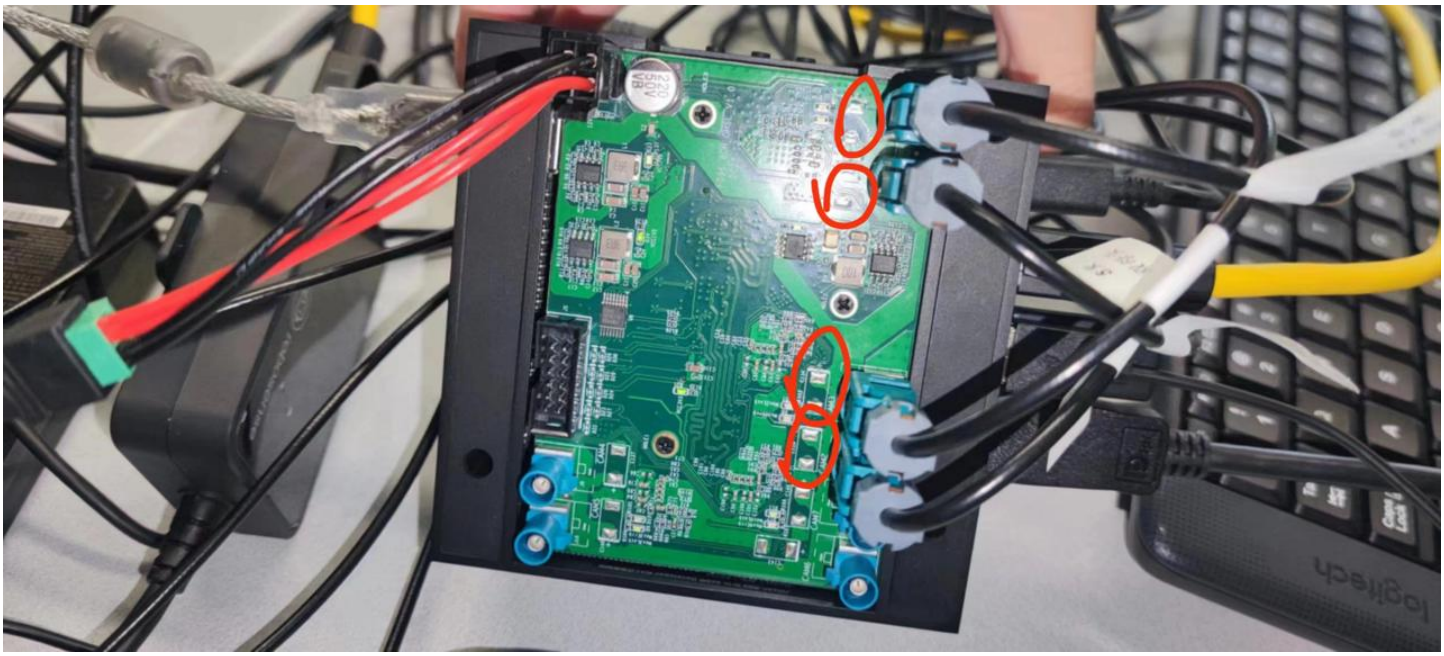
https://gitee.com/fangzhutech/jetson_cam_app

9. The main board cannot display the image after loading the driver?

The phenomenon is as follows:



1. Confirm that the main board power supply is normal, and the normal is about 10V. Below 9V is not normal . **Main board power supply test points:**



2. If the power supply is normal, you need to check the trig_mode settings of the script; change the tiger_mode to 0 or delete it.

```
    gst-launch-1.0 v4l2src device=/dev/video${port}  ! xvimagesink -ev
elif [ ${cam_mode} -eq 2 ];then  #For yuv_gmsl2 mode
    if [ ${yuv_cam_type} == 0 ];then
        v4l2-ctl -d /dev/video${port} -c sensor_mode=0,trig_pin=0xffff0007
    elif [ ${yuv_cam_type} == 1 ];then
        v4l2-ctl -d /dev/video${port} -c sensor_mode=0,trig_pin=0xffff0007
    elif [ ${yuv_cam_type} == 2 ];then
        v4l2-ctl -d /dev/video${port} -c sensor_mode=0,trig_pin=0xffff0007
    elif [ ${yuv_cam_type} == 3 ];then
        v4l2-ctl -d /dev/video${port} -c sensor_mode=1,trig_pin=0xffff0007
    elif [ ${yuv_cam_type} == 4 ];then
        v4l2-ctl -d /dev/video${port} -c sensor_mode=2,trig_pin=0xffff0008,trig_mode=1
    elif [ ${yuv_cam_type} == 5 ];then
        v4l2-ctl -d /dev/video${port} -c sensor_mode=3,trig_pin=0xffff0008,trig_mode=3
    elif [ ${yuv_cam_type} == 6 ];then
        v4l2-ctl -d /dev/video${port} -c sensor_mode=3,trig_pin=0xffff0008,trig_mode=3
    elif [ ${yuv_cam_type} == 7 ];then
        v4l2-ctl -d /dev/video${port} -c sensor_mode=1,trig_pin=0xffff0007
    fi

    gst-launch-1.0 v4l2src device=/dev/video${port}  ! xvimagesink -ev
else #for raw camera
    nvgstcapture-1.0 --sensor-id=${port}
```

10. How to obtain timestamps with multiple cameras:

Reference link: Jetson Orin 相机v4l2_buffer时间戳和系统Unix时间戳对齐方法

The premise is that the corresponding trigger signal needs to be given by the orin platform.

V4l_buf Read to camera timestamp: **v4l2-ctl --stream-mmap --stream-count = 0 -d /dev/video0 --verbose**

After timestamp alignment, the camera time is still 2 seconds different from the system time: **change to use CLOCK_MONOTONIC_RAW to calculate off**

11. Loading the driver displays the following error "ctrl Gain range update failed":

```
sgx-yuv-gmsl2 30-001b: tegracam sensor driver:sgx-yuv-gmsl2-0_v2.0.6
sgx-yuv-gmsl2 30-001b: ctrl Gain range update failed
sgx-yuv-gmsl2 30-001b: Error -34 updating mode specific control ranges
sgx-yuv-gmsl2 30-001b: Error -34 updating control ranges
sgx-yuv-gmsl2 30-001b: Failed to init ctrls sgx-yuv-gmsl2-0
sgx-yuv-gmsl2 30-001b: tegra camera subdev registration failed
sgx-yuv-gmsl2: probe of 30-001b failed with error -34
sgx-yuv-gmsl2 30-001c: tegracam sensor driver:sgx-yuv-gmsl2-1_v2.0.6
max9296 30-0048: max9296_sdev_register: serdes csi link is in use
sgx-yuv-gmsl2 30-001c: gmsl deserializer register failed
sgx-yuv-gmsl2: probe of 30-001c failed with error -22
```

Exposure gain error in the device tree, check the device tree of the sensor.

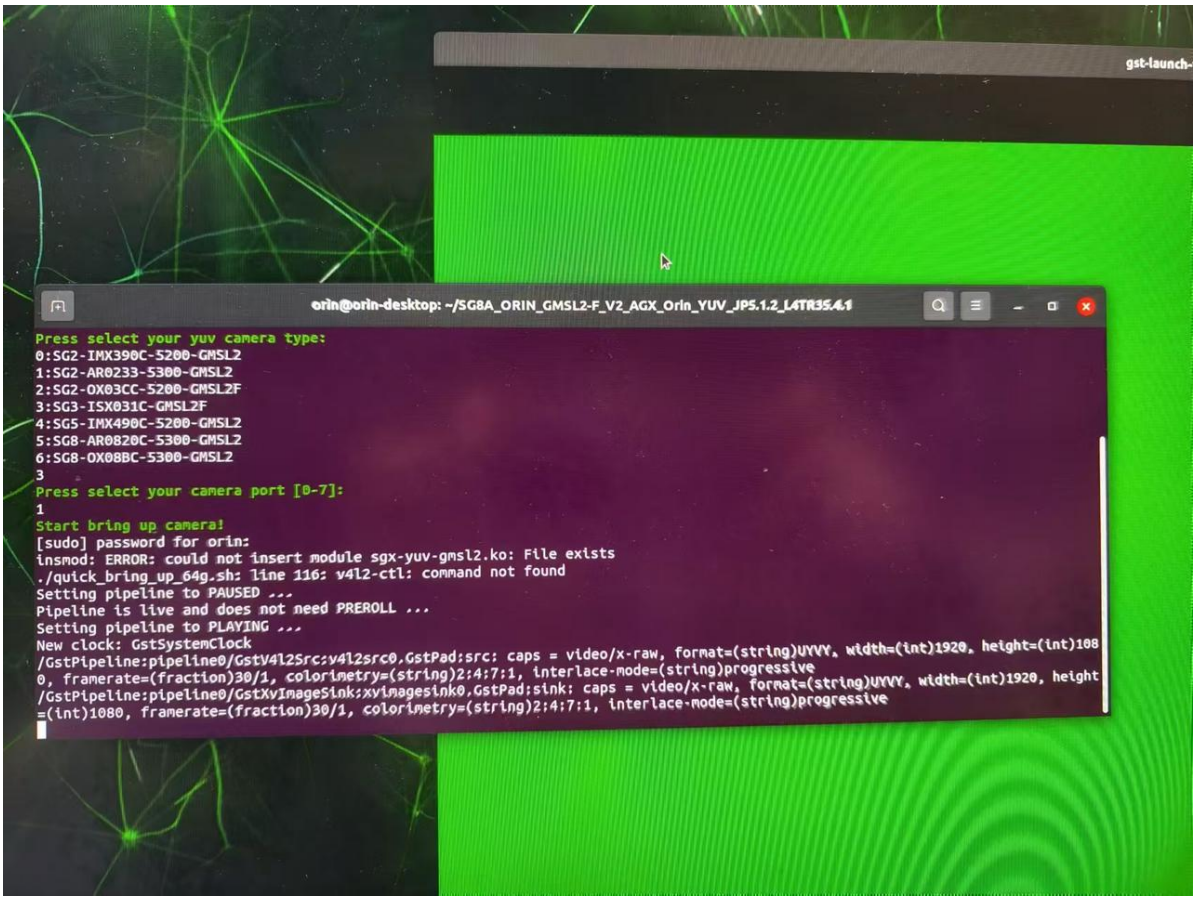
12. How is the i2c device address of the device mapped?

```
nvidia@linux:~$ sudo i2cdetect  -r -y 30
[sudo] password for nvidia:
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- UU UU -- -- --
20: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: UU -- -- -- -- -- -- -- UU -- -- -- -- -- -- --
50: -- 51 -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: UU -- UU -- -- -- -- -- -- -- -- -- -- 6d -- --
70: UU -- -- -- -- -- -- --
nvidia@linux:~$
```

max9296 bus	max9296 adder	max9295 adder	EEPROM adder	Video Port mapping
30	0x48	A:0x60 B:0x62	0x51	Cam0 and Cam1
31	0x48	A:0x60 B:0x62	0x51	Cam2 and Cam3
32	0x48	A:0x60 B:0x62	0x51	Cam4 and Cam5
33	0x48	A:0x60 B:0x62	0x51	Cam7 and Cam8

Update: The above is for 35.x.x. After 36.x.x, the i2C bus becomes 9~ 12.

13. How to deal with the following error?



A: You need to install the v4l-utils tool and execute the following command

```
sudo apt-get install v4l-utils
```

14. What is the specification of the power adapter connector corresponding to the power connection cable of the adapter board?

Answer: DC5-2.5, that is, the DC head is 5.5mm * 2.5mm.

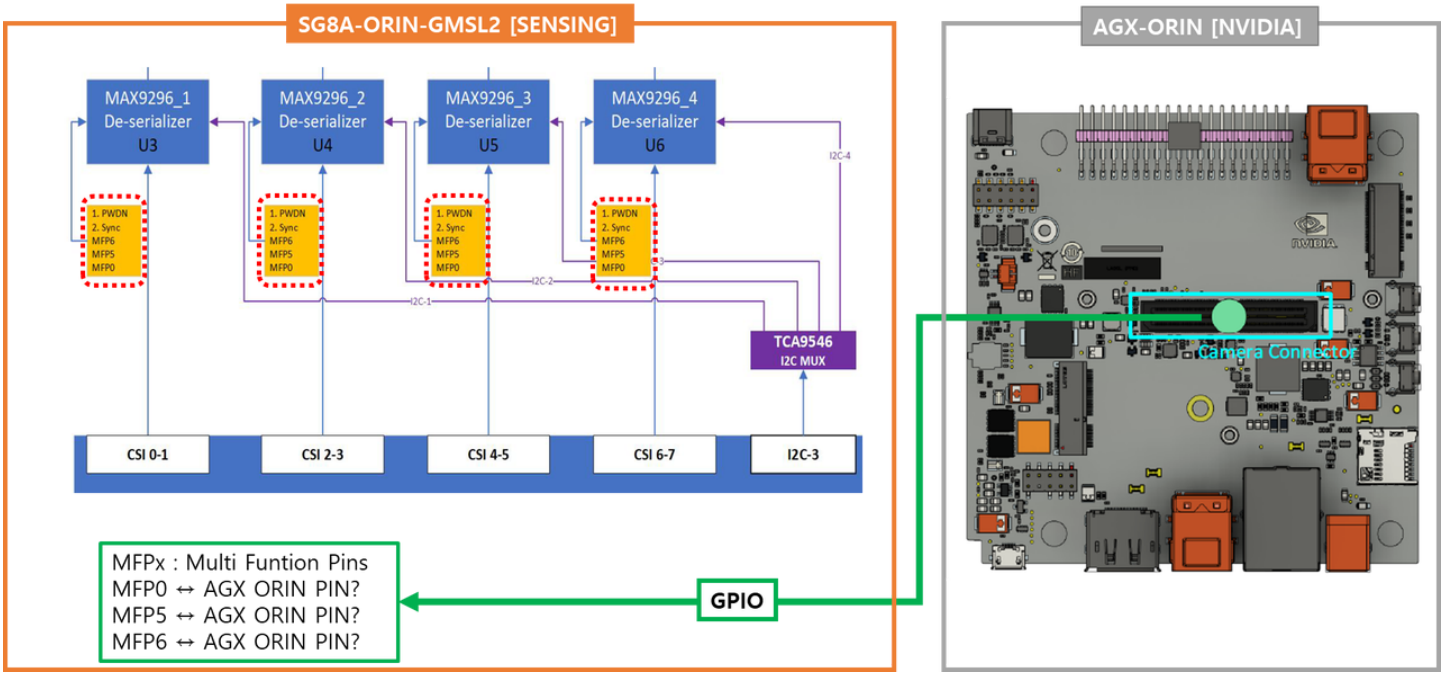
15. How to save the camera's stream as an mp4 format video and save it locally?

Command:

```
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-
raw,format=UYVY,width=1920,height=1080,framerate=30/1 ! nvvidconv !
nvv4l2h264enc ! h264parse ! qtmux ! filesink location=video0.mp4 -ev
```

Pay attention to changing the resolution of the camera and the name of the video saved locally.

16. Which (GPIO) pins of the AGX ORIN camera connector are the following three PINs connected to respectively?



- MFP6/MAX_ALL_CAM_SYNC ==PIN:117 CAM_INT1
- MFP5/MAX1_CSI1_SYNC== PIN85: CAM_FRSYNC1
- MFP0/MAX1_CSI0_SYNC== PIN97:CAM_FRSYNC3
-

17. In JP6.2 version YUV driver package, how can GMSL2F camera and GMSL2 camera be compatible and both be lit up?

The quick_bring_up.sh script can only support one mode of operation after the first execution. For the second mode, the commands in the following figure need to be manually executed to turn on the camera.

For example: The SG5-IMX490-5300-GMSL2 camera was lit up for the first time. For the second time, manual commands need to be executed to operate and light up the SG3S-ISX031C-GMSL2F camera of the video6 node：

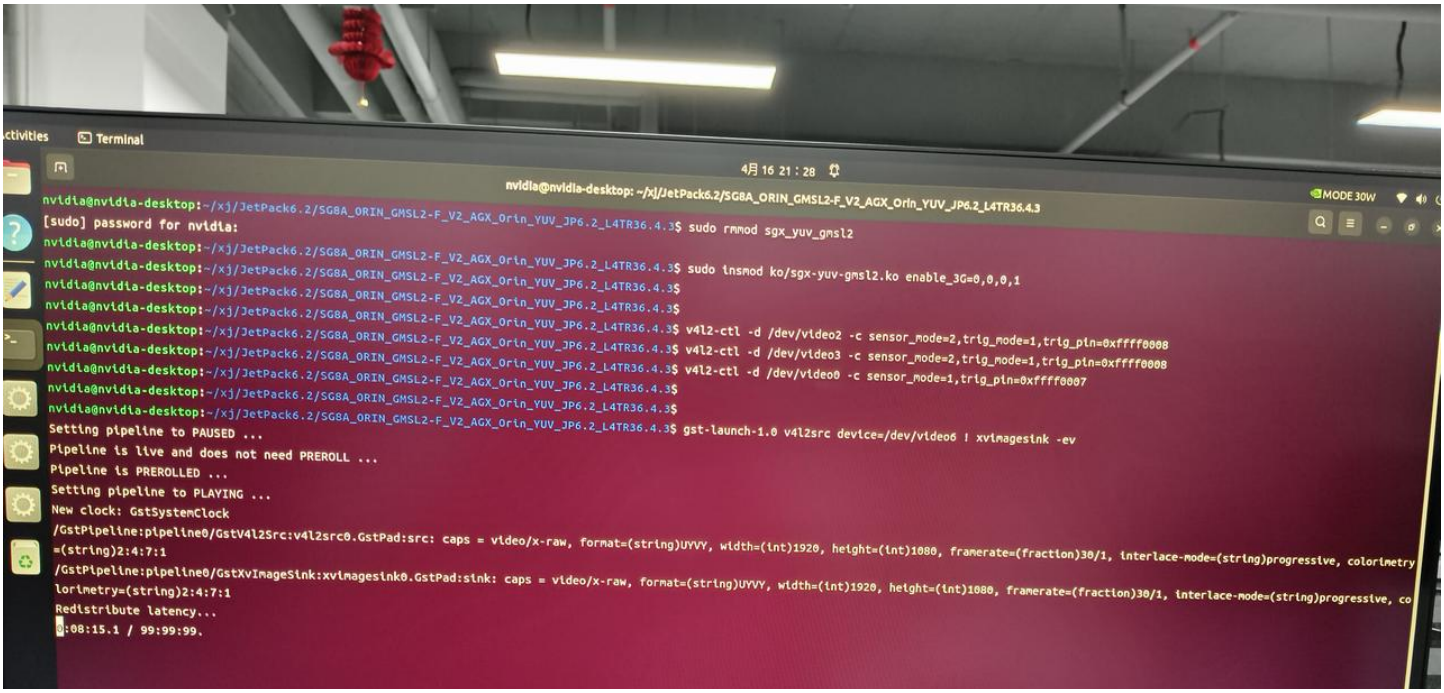
代码块

```
sudo rmnod sgx_yuv_gmsl2
sudo insmod ko/sgx-yuv-gnsl2.ko enable_3G-0,0,0,1
v4l2-ctl -d /dev/video6 -c sensor_mode=1,trig_pin=0xffff0007
```

```
4   gst-launch-1.0 v4l2src device,/dev/video6 ! xvinagesink -ev
```

🎉 enable_3G-0,0,0,1 Explanation: enable_3G-0,0,0,1: Here, 0,0,0,1 represents setting the working modes of four max9296. 0 means not enabling the 3G mode, and 1 means enabling the chip to be in the 3G mode.

"0,0,0,1" from left to right represents: video0/video1, video2/video3, video4/video5, video6/video7.



V4L2-CTL setting table:

sensor_mode	*Resolution*	Camera Part Number	trig_mode	trig_pin(low_16bits)	trig_pin(high_16bits)
0	1920*1080	SG2-IMX390C-5200-GMSL2	0:Rise edge	7:mfp7	/
		SG2-AR0233-5300-GMSL2	0:Rise edge	7:mfp7	/
1	1920*1536	SG3-ISX031C-GMSL2F	0:Rise edge	7:mfp7	/
2	2880*1860	SG2-IMX490C-5200-GMSL2	1:Fall edge	8:mfp8	/
3	3840*2160	SG8-AR0820C-5300-GMSL2	3:Auto Trigger	8:mfp8	/
3	3840*2160		3:Auto Trigger	8:mfp8	/

		SG8-OX08BC-5300-GMSL2			
3	3840*2160	SG8-OX08BC-5300-GMSL2	2:external Trigger	8:mfp8	6:mfp6

- The lower 16 bits of parameter trig_pin are the trigger pins of the serializer, and the upper 16 bits are the trigger pins of the deserializer.
- The parameter trig_mode corresponds to four trigger modes.
- The parameter sensor_mode corresponds to different resolutions.