



DUAL-AR0234-GMSL2_R32.7_Xavier_NV_Driver_Guide

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Overview

This driver is for LI-AR0234CS-STEREO-GMSL2 V1.0 camera kit with Nvidia Jetson AGX Xavier Developer kit.

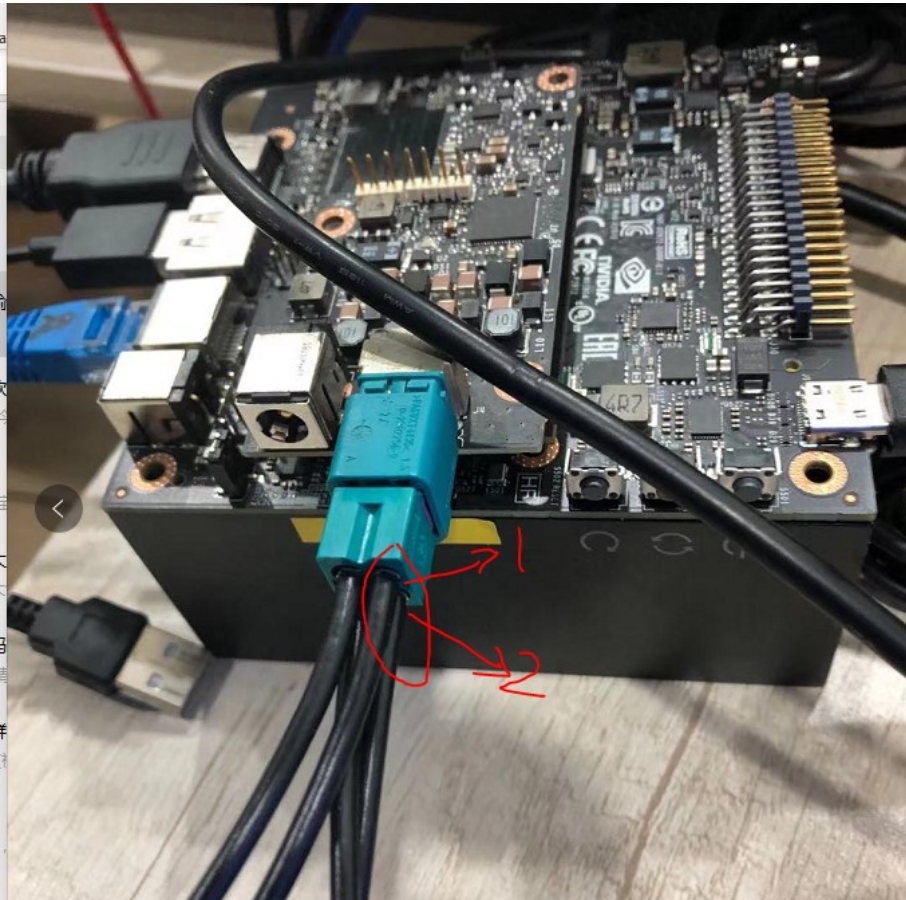
This driver supports two AR0234CS-STEREO-GMSL2 cameras.

This driver supports 1920x1200@30fps, 1920x1200@60fps

This driver is based on R32.7.

Download link

Platform	Camera
Nvidia Jetson AGX Xavier Developer kit	2 ~ LI-AR0234CS-STEREO-GMSL2_V1.0
Cable	Adapter/Carrier Board
1 x FAK-SMZSMZ	1 x NVIDIA max96712 adapt board(E3653-a03). 1 x 19VDC power supply





DUAL-AR0234-GMSL2_R32.7_Xavier_NV_Driver_Guide

Revision	SVN version	Release Date	Author	Tested by
20210414		04/14/2021	Xingxing Gu	
Updates				
Revision	Description			Release Date
20210414	First Release based on R32.5			20210414
20210511	Support NVS imu driver			20210511
20210705	Support autoContext Switch			20210705
20210812	Support 32.6			20210812
20210918	Support NVS			20210918
20220301	Support 60fps			20220301
20220310	Support 32.7 JP4.6.1			20220310
20220316	Fix the one camera issue			20220316
20220318	Fix flicker issue			20220318
Known bugs				
<div>1. The second hawk imu interrupt pin cannot route to deserializer side.</div> <div>2. If you only have one hawk camera, you can only connect port 1</div>				



DUAL-AR0234-GMSL2_R32.7_Xavier_NV_Driver_Guide

Setup Procedure 1/2

Driver installation:

1. Download the R32.7 OS Image (from link below) to your Ubuntu OS on Intel x64 Host PC (we are using Ubuntu 18.04, virtual machine is fine) and follow the [l4t_quick_start_guide](#) to install the Jetpack to Xavier.

R32.7 OS Image:

2. Reboot Xavier and Put your system into "reset recovery mode" by holding down the RECOVER button and press the RESET button once on the Xavier.

3. Copy the tegra194-p2888-0001-p2822-0000.dtb (which was downloaded from the link in first page) and paste it under Xavier/Linux_for_Tegra/kernel/dtb on your **Ubuntu host PC**.

4. Under Xavier/Linux_for_Tegra/ do

```
sudo ./flash.sh -k kernel-dtb jetson-xavier mmcblk0p1
```

```
*** The [kernel-dtb] has been updated successfully. ***
```

```
ubuntu@ubuntu-GA-MA770T-UD3P:~/32.4.2/tx2/Linux_for_Tegra$ sudo ./flash.sh -r -k kernel-dtb jetson-xavier mmcblk0p1
```

If flash the dtb file successfully, the log should be like below.



DUAL-AR0234-GMSL2_R32.7_Xavier_NV_Driver_Guide

Setup Procedure 2/2

5. After boot up Xavier, copy "Image" to /boot on Xavier.

```
nvidia@nvidia-desktop:~/Downloads$ sudo cp Image /boot/
```

6. Plug in 19V power supply to Xavier kit.

7. insmod max96712.ko, ar0234.ko **nvs.ko** nvs_bmi08x.ko orderly.

8. open a terminal and do below command. You will get live video output.

```
$ nvgstcapture
```

8. Use Ctrl+C to close the video and copy camera_overrides.isp to /var/nvidia/nvcam/settings on Xavier and do below two command.

```
$ sudo chmod 664 /var/nvidia/nvcam/settings/camera_overrides.isp
```

```
$ sudo chown root:root /var/nvidia/nvcam/settings/camera_overrides.isp
```

```
nvidia@nvidia-desktop:~/Downloads$ sudo cp camera_overrides.isp /var/nvidia/nvcam/settings/
nvidia@nvidia-desktop:~/Downloads$ sudo chmod 664 /var/nvidia/nvcam/settings/camera_overrides.isp
nvidia@nvidia-desktop:~/Downloads$ sudo chown root:root /var/nvidia/nvcam/settings/camera_overrides.isp
nvidia@nvidia-desktop:~/Downloads$
```



DUAL-AR0234-GMSL2_R32.7_Xavier_NV_Driver_Guide

Run Camera

1. Argus software

Download the Multimedia package from link below and copy it to Xavier.

Open a terminal, do

```
sudo apt-get update
```

```
sudo apt-get install cmake libgtk-3-dev libjpeg-dev libgles2-mesa-dev libgstreamer1.0-dev
```

Uncompress the tgz package,

```
tar zxvf Multimedia_JXAV_R32.7.tgz
```

Under tegra_multimedia_api/argus/cmake, do

```
cmake ..
```

```
make
```

```
sudo make install
```

Do "argus_camera --device=0" to get the video.

2. Gstreamer

```
gst-launch-1.0 nvarguscamerasrc sensor-id=0 ! 'video/x-raw(memory:NVMM), width=(int)1920, height=(int)1200, framerate=30/1' ! nvvidconv flip-method=0 ! 'video/x-raw, format=(string)I420' ! xvimagesink -e
```

3. v4l2-ctl capture raw

```
v4l2-ctl -V --set-fmt-video=width=1920,height=1200,pixelformat=RG10 --set-ctrl bypass_mode=0 --stream-mmap --stream-count=1 --stream-to=ar0234.raw -d /dev/video0
```

Please use below commands to install v4l2.

```
sudo apt-get update
```

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



DUAL-AR0234-GMSL2_R32.7_Xavier_NV_Driver_Guide

Note 1/2

1. If you would like to install the Jetpack 4.5 but don't want to re-flash the whole OS image, you can uncheck the Jetson OS and install the Jetson SDK components only.

SDK Manager 1.0.0.5517

Hello Simon

STEP 01
DEVELOPMENT
ENVIRONMENT

STEP 02
DETAILS
AND LICENSE

STEP 03
SETUP
PROCESS

STEP 04
SUMMARY
FINALIZATION

JETPACK 4.3 LINUX FOR JETSON NANO [Expand all](#)

HOST COMPONENTS	DOWNLOAD SIZE	STATUS
> CUDA	1,886 MB	
> Computer Vision	148.0 MB	
> Developer Tools	407.8 MB	

TARGET COMPONENTS	DOWNLOAD SIZE	STATUS
> <input type="checkbox"/> Jetson OS	1,431 MB	
> Jetson OS image		
> Flash Jetson OS		
> <input checked="" type="checkbox"/> Jetson SDK Components	954.0 MB	
> CUDA	954.0 MB	
> AI	882.6 MB	
> Computer Vision	140.0 MB	
> NVIDIA Container Runtime	1.1 MB	

System requires up to 12GB of available disk space during setup.

Download folder: /home/simon/Downloads/nvidia/sdcm_downloads [change](#) (5GB required)

Target HW image folder: /home/simon/nvidia/nvidia_sdk [change](#) (0GB required)

☐ I accept the terms and conditions of the [license agreements](#). ☐ Download now. Install later.

[CONTINUE TO STEP 03](#)

[BACK TO STEP 01](#)

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DUAL-AR0234-GMSL2_R32.7_Xavier_NV_Driver_Guide

Note 2/2

4. Compile the driver

If you would like to re-compile the driver, please follow below steps.
Download the driver code and Tool chain from links below.

Kernel code:

GCC ToolChain: <https://www.dropbox.com/sh/f21qck6f29h3n20/AABP8B1b4DgmUgO2MYO32Nyza?dl=0>

Compile the kernel under 64 bit Ubuntu OS on Intel x64 PC. (Virtual machine is fine. We are using Ubuntu 18.04 64 bit OS)

1) Copy compile tool gcc-linaro-7.3.1-2018.05-x86_64_aarch64-linux-gnu.tar.xz to /opt, and unzip it

```
sudo tar xpf gcc-linaro-7.3.1-2018.05-x86_64_aarch64-linux-gnu.tar.xz
```

2) Copy kernel_src_JXAV_R32.5.tbz2 and two patch files to /usr/src

```
sudo tar xpf kernel_src_JXAV_R32.7.tbz2
```

```
sudo chown -R <user_name> kernel
```

```
sudo chown -R <user_name> hardware
```

```
patch -p1 < streaming_AR0234CS-STEREO-  
GMSL2_base32.5_Xavier_kernel_dts_20210206.patch
```

Note: <user_name> is the user name of your Ubuntu OS. For example: sudo chown -R leopard kernel

3) Copy xavier.sh to /usr/src/kernel.

under /usr/src/kernel, do

```
source xavier.sh
```

4) Create a work folder under /home:

```
sudo mkdir /home/work
```

```
sudo chown -R <user_name> /home/work
```

5) In "kernel/kernel-4.9" folder, run:

```
make O=$TEGRA_KERNEL_OUT tegra_defconfig
```

```
make O=$TEGRA_KERNEL_OUT zImage
```

```
make O=$TEGRA_KERNEL_OUT dtbs
```

You will get **Image** under /home/work/Xavier/kernel/kernel_out/arch/arm64/boot and **tegra194-p2888-0001-p2822-0000.dtb** under /home/work/Xavier/kernel/kernel_out/arch/arm64/boot/dts.



DUAL-AR0234-GMSL2_R32.7_Xavier_NV_Driver_Guide

Special software configuration

1. Enable/disable the autoContextSwitch function

```
echo 2 > test_mode ----enable  
echo 0 > test_mode ----disable
```

```
test_mode  
root@ubuntu-desktop:/sys/module/ar0234/parameters# echo 0 > test_mode  
root@ubuntu-desktop:/sys/module/ar0234/parameters# ^C  
root@ubuntu-desktop:/sys/module/ar0234/parameters# echo 2 > test_mode
```

2. How to access imu data in NVS driver(kernel/nvidia/drivers/misc/nv).

```
1.cd /sys/devices/3180000.i2c/i2c-2/i2c-30/30-0069/iio:device2  
2.cd scan_elements  
3.echo 1 > in_accel_x_en  
echo 1 > in_accel_y_en  
echo 1 > in_accel_z_en  
echo 1 > in_timestamp_en  
cd ../buffer  
echo 1 > enable  
cd ..  
echo 1 > enable  
echo 1 > in_accel_flush  
cat in_accel_x_raw  
cat in_accel_y_raw  
cat in_accel_z_raw
```