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Overview

This driver is for LI-AR0234CS-STEREO-GMSL2 camera and Nvidia Jetson AGX Xavier Developer kit.
This driver supports four LI-AR0234CS-STEREO-GMSL2 cameras.
This driver supports 1920x1200@30fps.
This driver is based on R32.6.1 (Jetpack 4.6).

Download link

https://www.dropbox.com/sh/0v909zk3mzhsjdl/AAB1UEwae1m4ISZczwIrLWC9a?dl=0

Platform	Camera
Nvidia Jetson AGX Xavier Developer kit	2 x LI-AR0234CS-STEREO-GMSL2
Cable	Adapter/Carrier Board
1 x 4-in-1 Fakra cable	1 x E3653-A03

Revision	SVN version	Release Date	Author	Tested by
2021_08_12	Rev307	08/12/2021	Xingxing Gu	Zeng Yang

Updates

Revision	Description	Release Date
2021_08_12	First Release based on R32.6.1.	08/12/2021

Known bugs

Setup Procedure 1/2

Hardware:

1. Nvidia Jetson AGX Xavier Developer Kit x 1
2. E3653-A03 x 1
3. LI-AR0234CS-STEREO-GMSL2 x 2
4. 4-in-1 Fakra cable x 1
5. USB 3.0 Type-C cable x 1 (for flashing OS image and dtb file)
6. Monitor with HDMI cable x 1
7. Keyboard and Mouse (with USB hub) x 1

Driver installation:

1. Download the R32.6.1 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.

R32.6.1 OS Image: https://www.dropbox.com/sh/qwrwtf1595dva7p/AAB3mRWJYi9A6a-8ldcq7hVva?dl=0

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.

```
yang@ubuntu:~/Downloads/R32.6.1-OS/Linux_for_Tegra$ sudo cp ../tegra194-p2888-0001-p2822-0000.dtb kernel/dtb/
```

4. Under Xavier/Linux_for_Tegra/ do

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

```
yang@ubuntu:~/Downloads/R32.6.1-OS/Linux_for_Tegra$ sudo ./flash.sh -k kernel-dtb jetson-xavier mmcblk0p1
```

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

```
[  24.3806 ] Bootloader version 01.00.0000
[  24.4463 ] Writing partition kernel-dtb with 1_tegra194-p3668-all-p3509-0000_s
igheader.dtb.encrypt
[  24.4466 ] [.............................................] 100%
[  24.5578 ]
[  24.5579 ] Coldbooting the device
[  24.5590 ] tegrarcm_v2 --ismb2
[  24.6305 ]
[  24.6316 ] tegradevflash_v2 --reboot coldboot
[  24.6325 ] Bootloader version 01.00.0000
[  24.7306 ]
*** The [kernel-dtb] has been updated successfully. ***
```

Setup Procedure 2/2

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

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

6. Reboot Xavier kit.
7. Open a terminal and do below commands. The 4 .ko files can be downloaded from the link in first page.

insmod max96712.ko
insmod ar0234.ko
insmod nvs_bmi088_accel.ko
insmod nvs_bmi088_gyro.ko

8. Then do below command to get live video output.

nvgstcapture-1.0

Note: Please make sure two cameras are connected to cable 1 and 2.

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

$ 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/nvca
m/settings/
nvidia@nvidia-desktop:~/Downloads$ sudo chmod 664 /var/nvidia/nvcam/settings/cam
era_overrides.isp
nvidia@nvidia-desktop:~/Downloads$ sudo chown root:root /var/nvidia/nvcam/settin
gs/camera_overrides.isp
nvidia@nvidia-desktop:~/Downloads$
```

10. Try "nvgstcapture-1.0” again. You should be able to see the image with better image quality.

Run Camera

1. Argus software

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

https://www.dropbox.com/s/ik4e6bgprh3sozy/jetson_multimedia_api.tar?dl=0

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 file.

```
tar zxvf jetson_multimedia_api.tgz
```

Under jetson_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
```

Note:
1）The 0 can be changed to 1 ~ 3 to run other cameras.

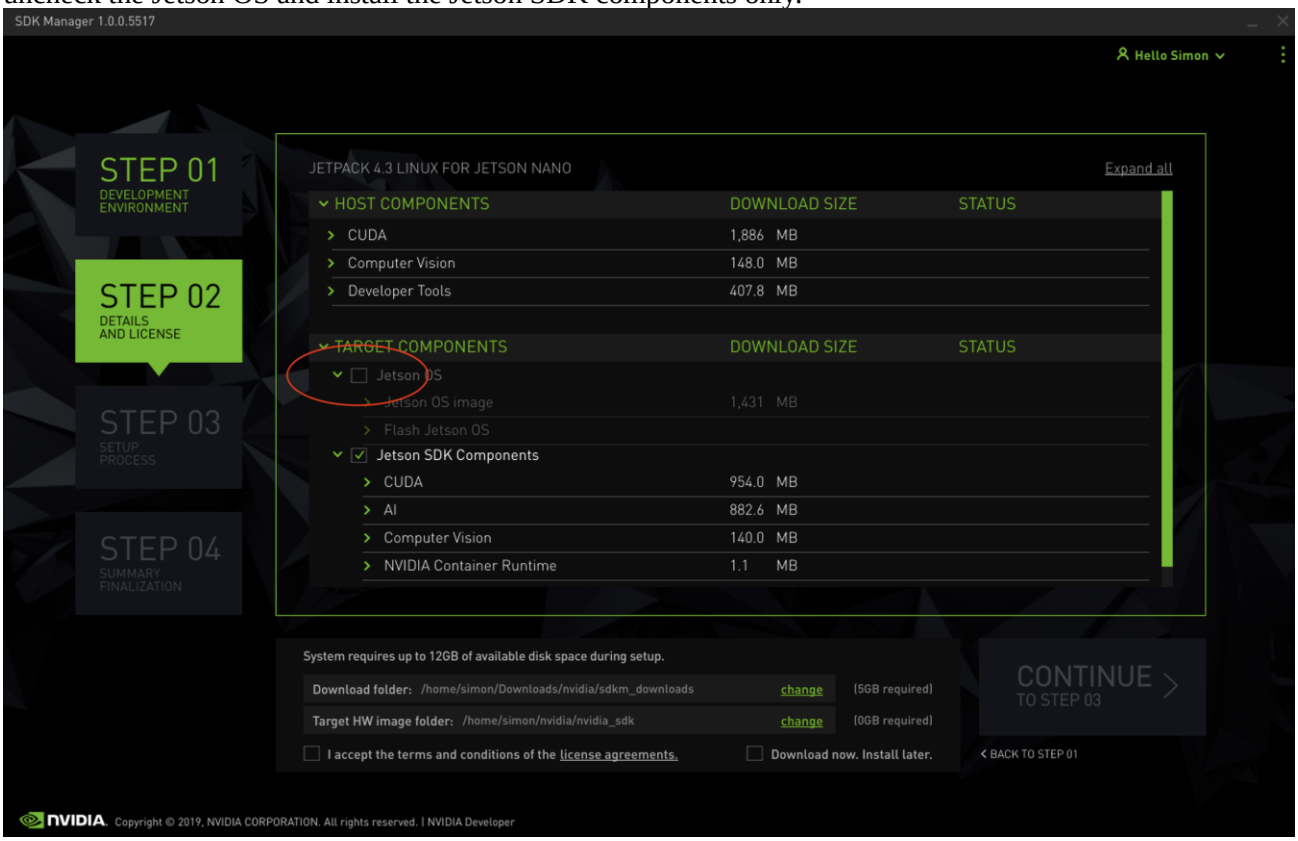
Cable 1 ---- video0 and video1
Cable 2 ---- video2 and video3

2）Please use below commands to install v4l2.

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

Note 1/2

1. If you would like to install the Jetpack 4.6 but don't want to re-flash the whole OS image, you can uncheck the Jetson OS and install the Jetson SDK components only.



Note 2/2

2. 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: https://www.dropbox.com/s/4k9o4zay08szde4/kernel_src_Xavier-NX-TX2_R32.6.1.tbz2?dl=0
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 16.04 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_Xavier-NX-TX2_R32.6.1.tbz2 and two patch files to /usr/src

```
sudo tar xpf kernel_src_Xavier-NX-TX2_R32.6.1.tbz2
sudo chown -R <user_name> kernel
sudo chown -R <user_name> hardware
patch -p0 < AR0234CS-STEREO-GMSL2_32.6.1_Xavier_20210812_dtbs .patch
patch -p0 < AR0234CS-STEREO-GMSL2_32.6.1_Xavier_20210812_kernel.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.