Allied Vision

Scope of this document

The default settings of NVIDIA® Jetson SOMs (System on Modules) provide low power consumption and medium performance. This document describes how to optimize the settings for high performance with Allied Vision cameras.

Recommended preparations

Upgrading JetPack
Gige and USB cameras: We recommend using the latest JetPack version. JetPack and its Install Guide are available at:
https://developer.nvidia.com/embedded/jetpack

When the JetPack installation is finished, update and upgrade your system:

```
sudo apt-get update && sudo apt-get upgrade
```

CSI-2 cameras: Please install the JetPack version supported by our camera driver provided at:
https://github.com/alliedvision

Installing Vimba X for ARM
We recommend installing our Vimba X for ARM SDK.

Vimba X is available at: https://www.alliedvision.com/en/products/software/vimba-x-sdk/
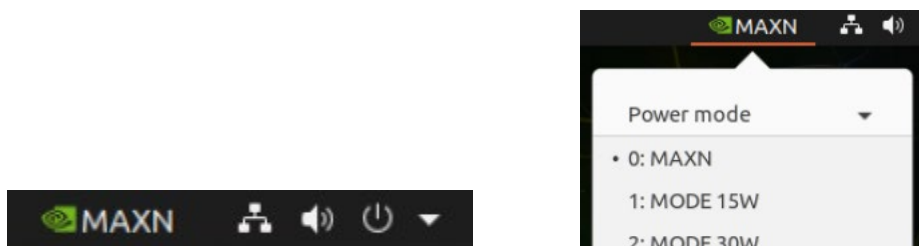
Optimizing CPU usage and power management

nvpmodel GUI

All Jetson boards and all L4T versions:
With the nvpmodel GUI, NVIDIA provides easy access to power-related functionality and information.

To optimize CPU usage and power management for best performance, select a power mode and run jetson_clocks.sh.

In most cases, power mode 0: MAXN provides the best performance. On Xavier NX, power mode 2: 20W 6Core provides best performance in most cases. The location and available options of jetson_clocks.sh depend on the L4T version and the Jetson board. On most boards, the script is located at /usr/bin/jetson_clocks. You can find detailed information in NVIDIA's documentation mentioned above.

L4T versions < 34.0:
NVIDIA provides detailed information on clock and power management in the *NVIDIA Jetson Linux Developer Guide*. For the documentation of the latest L4T version, go to:
https://docs.nvidia.com/jetson/l4t/index.html.

To find the documentation of previous L4T versions (for example, L4T32.5.1), go to:
https://docs.nvidia.com/jetson/archives/l4t-archived/l4t-3251/index.html (or replace 3251 with your L4T version).

In the Developer Guide for your L4T version, go to:
- Clock Frequency and Power Management
- Power Management for … (select the chapter for your Jetson board)
- Clock and Voltage Management

L4T versions 34.x and higher:
NVIDIA provides detailed information on clock and power management in the *NVIDIA Jetson Linux Developer Guide*. For the documentation of the latest L4T version, go to:
https://docs.nvidia.com/jetson/l4t/index.html.

To find the documentation of other L4T versions, go to:
https://docs.nvidia.com/jetson/archives/r34.1/DeveloperGuide/

and replace 34.1 with your L4T version.

In the Developer Guide for your L4T version, go to:
- Platform Power and Performance
- Select the section for your Jetson board (recommendation: open it in a new tab)
- Clock and Voltage Management
- Maximizing <board name> Performance

Optimizing the settings for USB cameras

Increasing the USBFS buffer size

By default, the USBFS buffer size is 16 MB. This value is too low for image sizes > 2 MB or high frame rates.

Check the USBFS buffer size:
```
cat /sys/module/usbcore/parameters/usbfs_memory_mb
```

Increase the USBFS buffer size until the next reboot (here: example value 1000)**:**
```
sudo sh -c 'echo 1000 > /sys/module/usbcore/parameters/usbfs_memory_mb'
```

Increase the USBFS buffer size permanently:

To increase the buffer size permanently, add the kernel parameter `usbcore.usbfs_memory_mb=1000` the bootloader configuration. If and how this is possible depends on the bootloader on your system.

*** Before changing the bootloader configuration, create a backup of your system.***

A faulty bootloader may cause that your system doesn't start up. A fix might require an external boot media or reinstallation of the system. Note that changing the bootloader configuration is at your own risk.

Syslinux:

Edit /boot/extlinux/extlinux.conf, add `usbcore.usbfs_memory_mb=1000` to the APPEND line, and reboot the system.

If you have installed GRUB 2:

1. Open /etc/default/grub. Replace: GRUB_CMDLINE_LINUX_DEFAULT="quiet splash" (or other contents within the quotation marks depending on your system) with:
   GRUB_CMDLINE_LINUX_DEFAULT="quiet splash usbcore.usbfs_memory_mb=1000"
2. Update grub: `sudo update-grub` and reboot the system.

Other bootloaders:

To configure additional kernel parameters of other bootloaders, please see the manual of your bootloader.

Optimizing the settings for GigE cameras

Setting the MTU of the internal host adapter

Note for Orin users:

For best possible performance with 5GigE cameras, we recommend using an external NIC.

Set the MTU of the internal host adapter, assuming the camera is connected to Ethernet port eth0:

```
sudo ip link set eth0 down
sudo ip link set eth0 mtu 9000
sudo ip link set eth0 up
```

Additionally, set the feature *GVSPBurstSize* to 32 or higher for usage with 5GigE cameras.

On earlier boards or earlier L4T versions, you can use ifconfig. Set the MTU of the internal host adapter, assuming the camera is connected to Ethernet port eth0:

`sudo ifconfig eth0 mtu 9000`

Increasing the OS receive buffer size

If your use case requires high bandwidth, we recommend increasing the OS receive buffer size (these settings affect all types of connections on the system):

```
sudo sysctl -w net.core.rmem_max=33554432
sudo sysctl -w net.core.wmem_max=33554432
sudo sysctl -w net.core.rmem_default=33554432
sudo sysctl -w net.core.wmem_default=33554432
```

Now your system is set up for best performance.

Recommendation

For monitoring and controlling the performance of your Jetson board, we recommend this package:

https://github.com/rbonghi/jetson_stats

Optimizing camera features

The optimal settings for the camera features depend on the camera model and use case. You are welcome to contact our Technical Support team, we are happy to assist you.