Helpdesk XIMEA

NVIDIA Jetson Xavier NX benchmarks

Support SK - 2023-10-19 - in ARM support

https://www.ximea.com/support/projects/apis/wiki/jetson_xavier_nx_benchmarks

NVIDIA Jetson Xavier NX benchmarks¶

Fig.1. Jetson Xavier NX Developer Kit

The NVIDIA® Jetson Xavier NX™ Developer Kit is a power-efficient, compact module ideally suitable for AI edge applications and devices.

The additional benefits come from new cloud-native support that is accelerating the NVIDIA software stack in just 10 W with more than 10x the performance of its popular predecessor Jetson TX2.

To speed up the creation of breakthrough products, the Jetson Xavier NX Developer Kit delivers the capability to develop small form factor solutions with accurate, multi-modal AI inference.

The XIMEA team used the tools provided by the dev kit to test various cameras with the results listed below.

Image processing on NVIDIA Jetson NX¶

Equipment and software¶

- NVIDIA Jetson Xavier NX developer kit
- Remote host computer with NVIDIA GPU
- MRTech software for Jetson module and host computer
- XIMEA MC031CG-SY camera: 3.1 MP, 2064 x 1544, Color model with USB3 interface

or second camera model version

- FireFly to M.2 adapter to connect PCIe FF camera
- XIMEA MX089CG-SY-X2GX-FF camera: 8.9 MP, 4112 x 2176, Color model with PCIe interface and FireFly connector

Dragonfly application¶

Dragonfly application was designed by MRTech SK to receive RAW images from one or more USB3/PCIe cameras and stream the processed images via the network to a remote computer.
The application can run on NVIDIA Jetson modules, embedded or desktop computers with NVIDIA GPU.
The application is currently being used in several projects in aerial, ground drones, on vehicles, as well as in medical devices.
Dragonfly image processing pipeline on Jetson NX:

- 8/12-bit image acquisition
- black level
- histogram 4bayer256Int
- auto exposure
- auto white balance
- demosaicing 5x5 or L7 (7x7)
- gamma
- conversion to YV12 BT709
- 8-bit H.265 encoding that runs on NVIDIA HEVC hardware encoder
- streaming to remote host

Remote host processing¶

Image processing on the remote host:

- receiving stream
- decoding
- render on a 140 Hz screen

Xavier NX test results¶

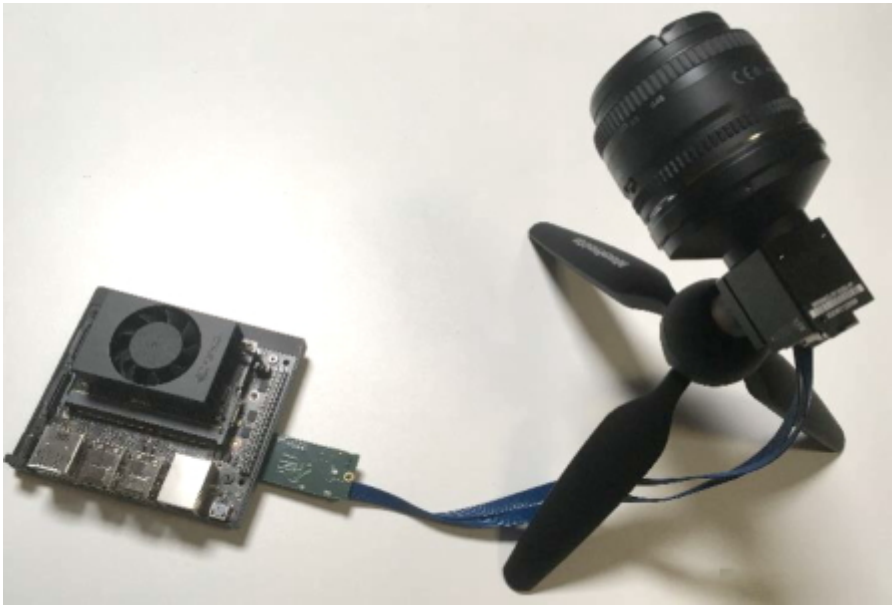

Fig.2. Jetson Xavier NX with XIMEA MX089CG-SY-X2G2-FF camera

MC031 camera model¶

Operating results for Full HD 1920 x 1080 images - ROI on the camera:

Bit depth	Frame rate	Processing time on Jetson	DGPU utilization	Encoding bitrate	G2G latency
8-bit	60 fps	12.5 ms	13%	9760 kbps	60 ms
12-bit	60 fps	13.7 ms	17%	9790 kbps	70 ms

MX089 camera model¶

Full HD, 1920 x 1080, 2.1 MP images (ROI on the camera)

- Working frame rate: 30 fps / 60 fps
- Image processing time: 12.2 – 13.7 ms (pp. 3-10 from processing pipeline)
- Memory utilization: 38% of 8 GB
- GPU utilization: 10-20%
- CPU utilization: ~15%
- Encoding bitrate: 9800 Kbps
- Glass-to-glass (G2G) latency: 50-70 ms

For reference: Maximum frame rate: 188 fps (Full HD ROI)

4K UHD, 3840 x 2160, 8.3 MP images (ROI on the camera)

- Working frame rate: 30 fps / 60 fps

- Image processing time: 35.8 – 42.2 ms (pp. 3-10 from processing pipeline)
- Memory utilization: 45% of 8 GB
- GPU utilization: 40-70%
- CPU utilization: ~20%
- Encoding bitrate: 9800 Kbps
- G2G latency: 90-110 ms