

# OR - Aperitech

NVIDIA Jetson Xavier NX

## Agenda:

- Hands on
  - Caratteristiche
  - Prestazioni
  - Benchmark
  - Cloud Native
- Q&A



**OR** OFFICINE  
ROBOTICHE



**Recensione completa**

<https://www.rnext.it/review/jetson-xavier-nx/>

# Raffaello Bonghi

Qualcosa su di me

- Robotics and control theory engineer
- Website: <https://www.rnext.it>

## Panther



- Robot ROS based
- NVIDIA Jetson AGX Xavier
- Stereolabs ZED2





**OR** OFFICINE  
ROBOTICHE



# NVIDIA Jetson Xavier NX

- Caratteristiche
- Architettura
- Confronto con NVIDIA Jetson Nano



# NVIDIA Jetson Xavier NX

Caratteristiche



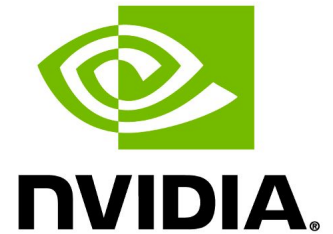
**OR** OFFICINE  
ROBOTICHE



**nVIDIA.**

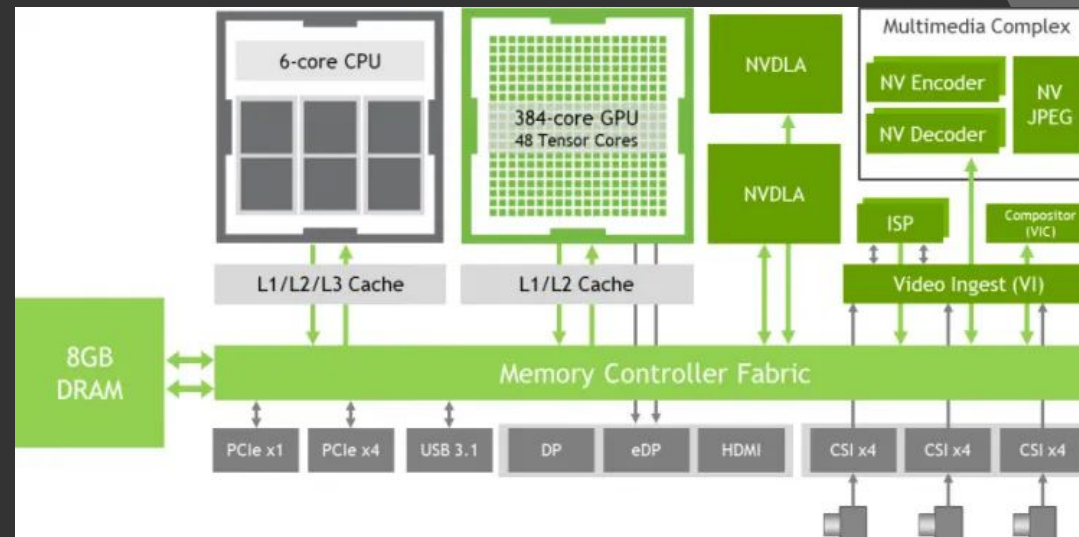
# NVIDIA Jetson Xavier NX

## Architettura



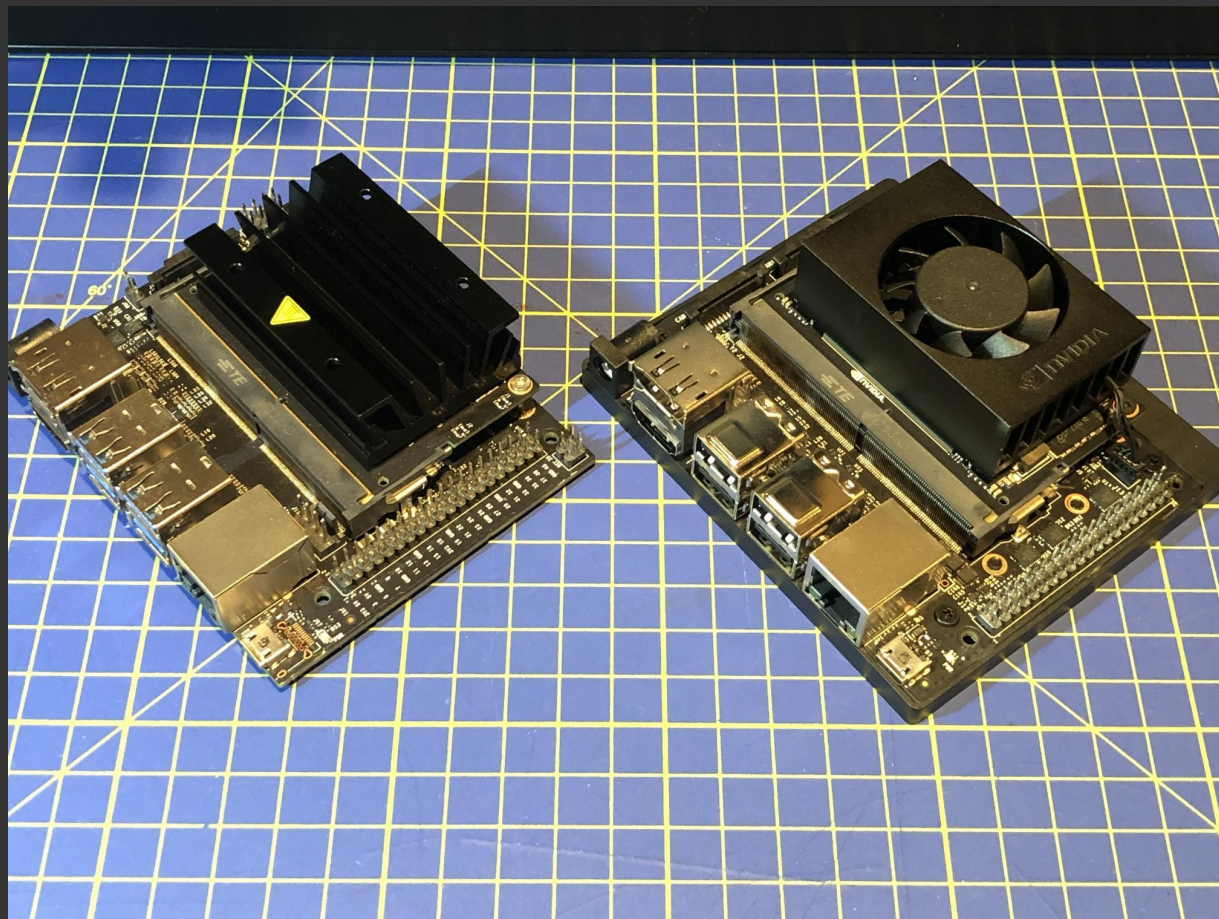
### Developer Kit Technical Specifications

<b>GPU</b>	NVIDIA Volta™ architecture with 384 NVIDIA® CUDA® cores and 48 Tensor cores
<b>CPU</b>	6-core NVIDIA Carmel ARM®v8.2 64-bit CPU 6 MB L2 + 4 MB L3
<b>DLA</b>	2x NVDLA Engines
<b>Vision Accelerator</b>	7-Way VLIW Vision Processor
<b>Memory</b>	8 GB 128-bit LPDDR4x 51.2GB/s
<b>Storage</b>	microSD (Card not included)
<b>Video Encode</b>	2x 4Kp30   6x 1080p 60   14x 1080p30 (H.265/H.264)
<b>Video Decode</b>	2x 4Kp60   4x 4Kp30   12x 1080p60   32x 1080p30 (H.265) 2x 4Kp30   6x 1080p60   16x 1080p30 (H.264)
<b>Camera</b>	2x MIPI CSI-2 D-PHY lanes
<b>Connectivity</b>	Gigabit Ethernet, M.2 Key E (WiFi/BT included), M.2 Key M (NVMe)
<b>Display</b>	HDMI and DP
<b>USB</b>	4x USB 3.1, USB 2.0 Micro-B
<b>Others</b>	GPIOs, I2C, I2S, SPI, UART
<b>Mechanical</b>	103 mm x 90.5 mm x 34 mm



# Confronto

Jetson Nano <-> Jetson Xavier NX



 OFFICINE  
ROBOTICHE



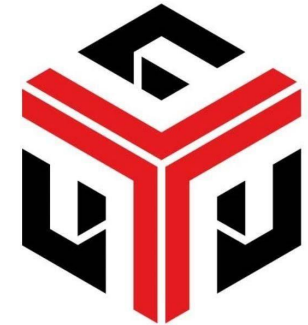
# NVIDIA Jetson Xavier NX

## Tabella Prestazioni

	<b>NVP model</b>		<b>With Jetson Clocks</b>
0	<b>MODE_15W_2CORE</b>	1.2-1.9Ghz	<u>1.9Ghz</u>
1	<b>MODE_15W_4CORE</b>	1.2-1.4Ghz	1.4Ghz
2	<b>MODE_15W_6CORE</b>	1.2-1.4Ghz	1.4Ghz
3	<b>MODE_10W_2CORE</b>	1.2-1.5Ghz	1.5Ghz
4	<b>MODE_10W_4CORE</b>	1.2Ghz	<u>1.2Ghz</u>
CPU frequencies			

	<b>Without Jetson Clocks</b>	<b>10W Jetson Clocks</b>	<b>15W Jetson Clocks</b>
<b>GPU</b>	114Mhz	803Mhz	1.1Ghz
<b>EMC</b>	204Mhz	1.6Ghz	1.6Ghz
GPU frequencies			

 **OFFICINE  
ROBOTICHE**



# NVIDIA Jetson Xavier NX

## Benchmarks

Model Name	FPS	FPS	FPS
	Jetson Nano	Jetson Xavier NX 15W 2 Core With Jetson Clocks	Jetson Xavier NX 15W 6 core With Jetson Clocks
0 inception_v4	10.631948	316.895566	316.478577
1 vgg19_N2	7.692173	65.424157	63.582191
2 super_resolution_bsd500	10.704373	152.186116	159.201983
3 unet-segmentation	11.502981	144.152678	144.005892
4 pose_estimation	10.191128	234.183907	235.400592
5 yolov3-tiny-416	33.927461	570.071398	589.816623
6 ResNet50_224x224	25.933791	845.337518	830.919699
7 ssd-mobilenet-v1	29.884008	884.193146	894.364623

Benchmark compare Jetson nano and Jetson Xavier NX



Potete eseguire questi benchmark eseguendo questo [https://github.com/NVIDIA-AI-IOT/jetson\\_benchmarks](https://github.com/NVIDIA-AI-IOT/jetson_benchmarks)



# jetson-stats (1/2)

jtop - Monitor and control

```
File Edit View Search Terminal Help
NVIDIA Jetson Xavier NX - Jetpack 4.4 DP [L4T 32.4.2]
CPU1 [||||| Schedutil - 26%] 1.4GHz CPU4 [||||||| Schedutil - 100%] 1.4GHz
CPU2 [||| Schedutil - 12%] 1.4GHz CPU5 [||||||| Schedutil - 100%] 1.4GHz
CPU3 [ Schedutil - 1%] 1.4GHz CPU6 [ Schedutil - 3%] 1.4GHz

MTS FG [ 0%] BG [ 0%]
Mem [||||||| 5.1G/7.8GB] (lfb 308x4MB)
Swp [ 0.0GB/3.9GB] (cached 0MB)
EMC [||||||| 72%] 1.6GHz

GPU [||||||| 52%] 1.1GHz
Dsk [##### 12.7GB/58.1GB]

[info] [Sensor] [Temp] [Power/mW] [Cur] [Avr]
UpT: 0 days 0:9:7 AO 36.00C CPU GPU CV 6788 7191
FAN [|||||||100%] Tm=100% AUX 36.50C SOC 1513 1552
Jetson clocks: Running+ CPU 39.00C IN 11673 12226
NV Power[2]: 15W 6CORE GPU 38.50C
[HW engines] thermal 38.00C
APE: 75MHz
NVENC: [OFF] NVDEC: [OFF]
NVJPG: [OFF]

1ALL 2GPU 3CPU 4MEM 5CTRL 6INFO Quit Raffaello Bonghi
```



sudo -H pip install -U jetson-stats

<https://pypi.org/project/jetson-stats/>

# jetson-stats (2/2)

Altri tools inclusi

- jetson\_config
  - Configurazione scheda
- Jetson\_release
  - Informazioni scheda
- Jetson\_swap
  - Abilitazione swap

```
nvidia@jetson-nano: ~  
File Edit View Search Terminal Help  
  
jetson-stats configurator  
NVIDIA Jetson Nano (Developer Kit Version)  
jtop 2.0.0rc4  
  
health Check the status of jetson-stats  
desktop Enable/Disable boot from desktop  
jetson_clocks Enable/Disable jetson_clocks service  
wifi Improve wireless throughput  
update Update this tool to the latest version  
about Information about this configuration tool  
  
<Select> <Finish>
```

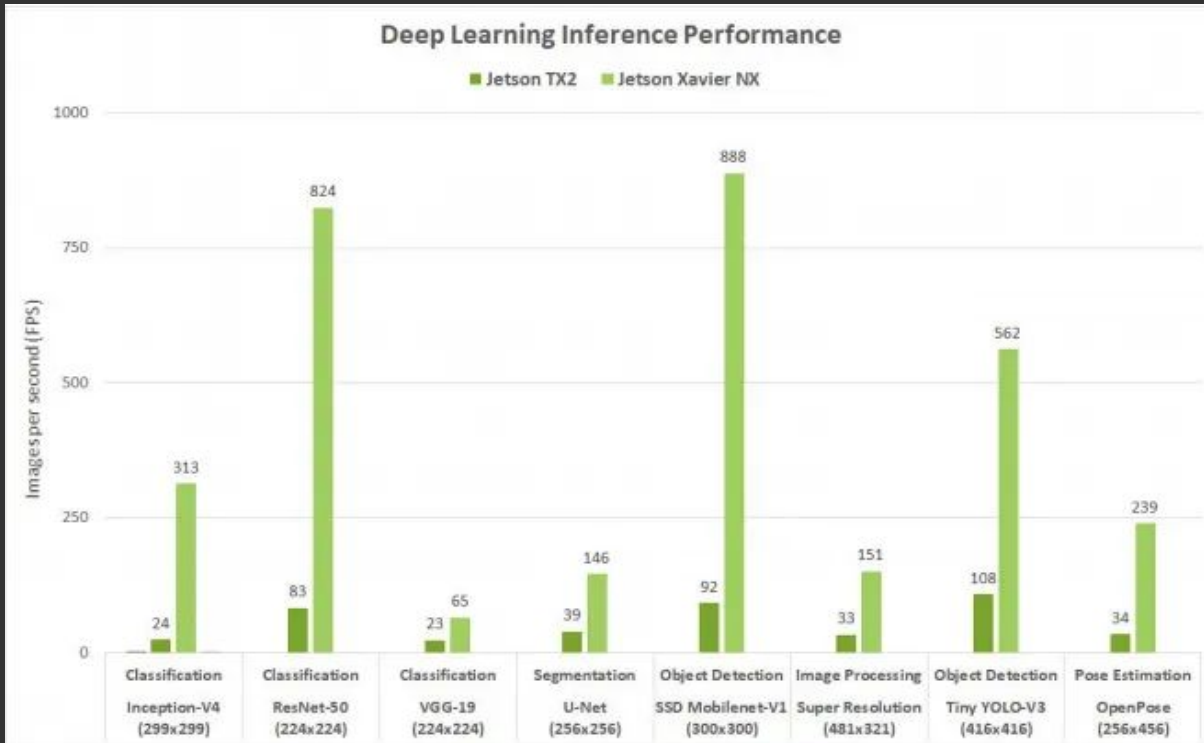
```
nvidia@jetson-nano: ~  
File Edit View Search Terminal Help  
nvidia@jetson-nano:~$ jetson_release -v  
- NVIDIA Jetson Nano (Developer Kit Version)  
* Jetpack 4.2.2 [L4T 32.2.1]  
* NV Power Mode: MAXN - Type: 0  
* jetson_clocks service: active  
- Board info:  
* Nano (Developer Kit Version) - CN: porg  
* SOC Family: tegra210 - ID:33  
* Board(s): P3448-0000 P3449-0000 (3448)  
* CUDA GPU architecture (ARCH_BIN): 5.3  
* Serial Number: 042121902512608003FC  
- Libraries:  
* CUDA: 10.0.326  
* cudNN: 7.5.0.56  
* TensorRT: 5.1.6.1  
* Visionworks: 1.6.0.500n  
* OpenCV: 3.3.1 compiled CUDA: NO  
- jetson-stats:  
* Version 2.0.0  
* Works on Python 3.6.9  
nvidia@jetson-nano:~$
```

```
nvidia@jetson-nano:~/ $ sudo jetson_swap -h  
usage: createSwapFile [[-d directory] [-s size] -a] | [-h] | [--off]  
-d | --dir <directoryname> Directory to place swapfile  
-n | --name <swapname> Name swap file  
-s | --size <gigabytes>  
-a | --auto Enable swap on boot in /etc/fstab  
-t | --status Check if the swap is currently active  
--off Switch off the swap  
-h | --help This message
```



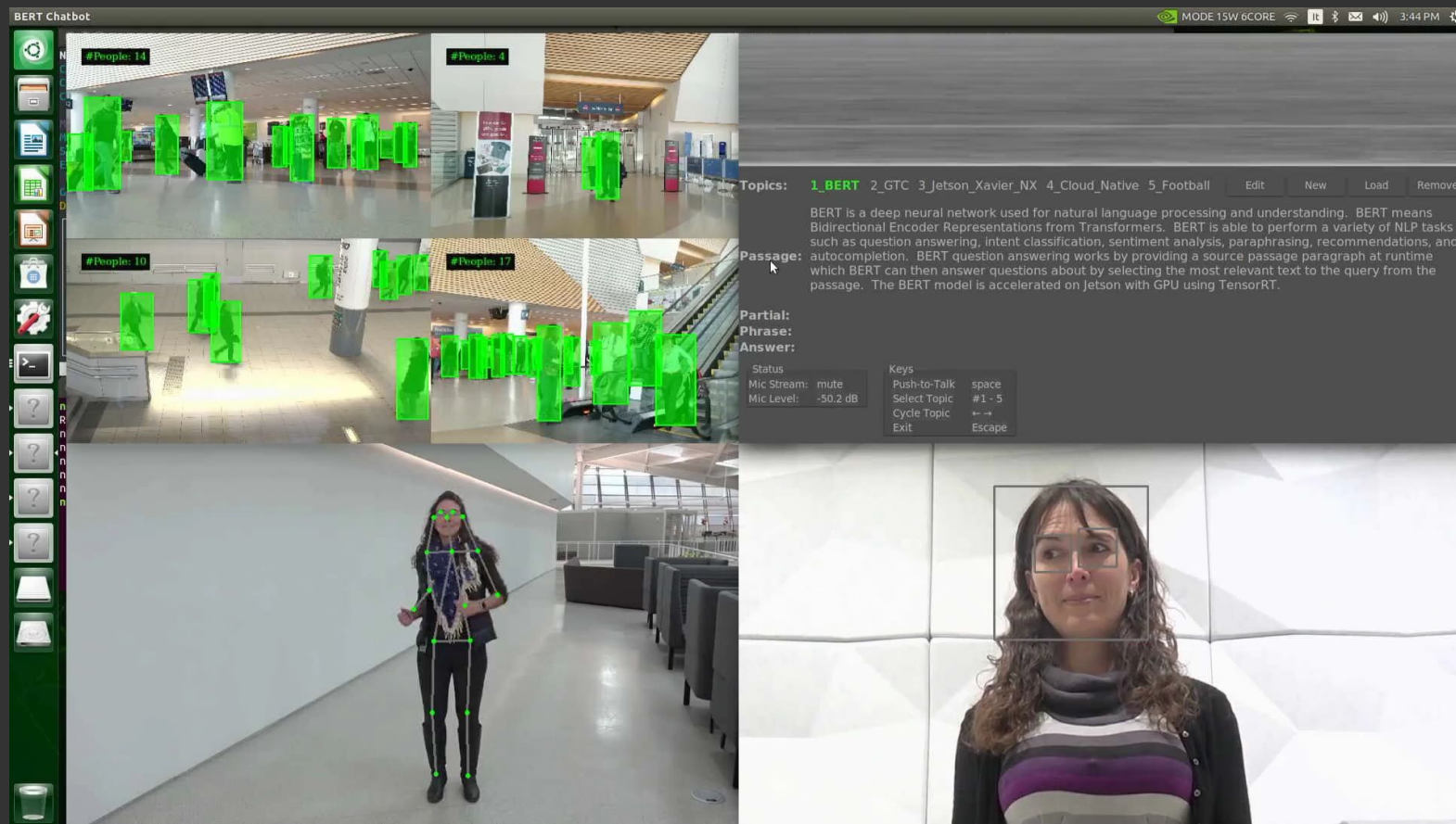
# NVIDIA Jetson Xavier NX

## Deep Learning Inference Performance



# Cloud Native

4 containers attivi nello stesso momento



# Jetson Xavier NX

Costo e dove comprarla

- Jetson Xavier NX
  - 429€
- Jetson Nano
  - 109€



ALUW

Siliconhighway 

 OFFICINE  
ROBOTICHE

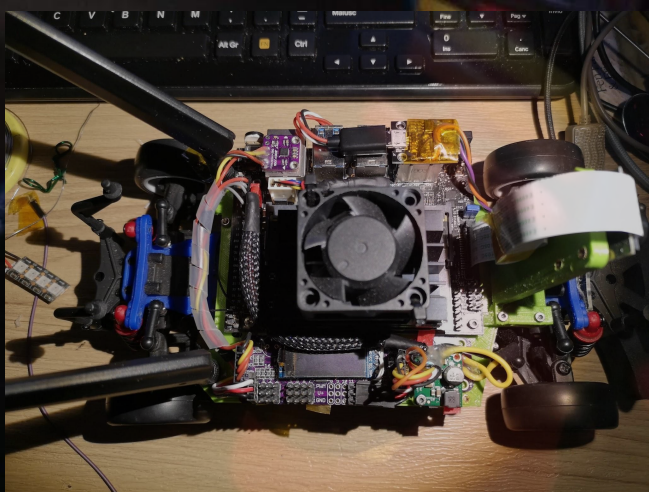


**nVIDIA.**



# OR - Aperitech

JetRacer & DonkeyCar



**OR** OFFICINE  
ROBOTICHE



Alessio  
Morale

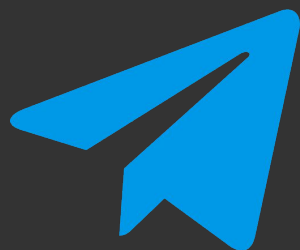
# OR - Aperitech

## Question & Answer

Recensione NVIDIA Jetson Xavier NX

<https://www.rnext.it/review/jetson-xavier-nx>

Canale

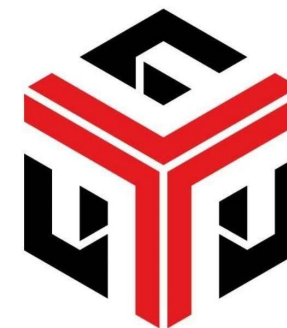


<https://t.me/officinerobotiche>

OR – Aperitech



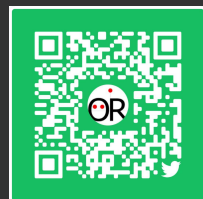
**OR** OFFICINE  
ROBOTICHE



officinerobotiche



@officinerobotic



officinerobotiche



officinerobotiche



officinerobotiche