

seed studio



PARTNER

Robotics & Logistic

seedstudio.com/nvidia.html

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cogniteam

Cogniteam

Cogniteam is a technology start-up, it brings standout software solutions for autonomous robots.

Nimbus by Cogniteam is cloud-based ecosystem for robot fleet configuration, testing, deployment, and operations management. Nimbus makes your ROS journey intuitive using drag and drop tools and a rich set of ready-made AI algorithms that are ROS1/2 compatible. [Find our partner >>> cogniteam.com](#)

Application:

Robotics Development

Device Support:

All Seeed's NVIDIA compatible carrier boards and devices, Official NVIDIA dev kit

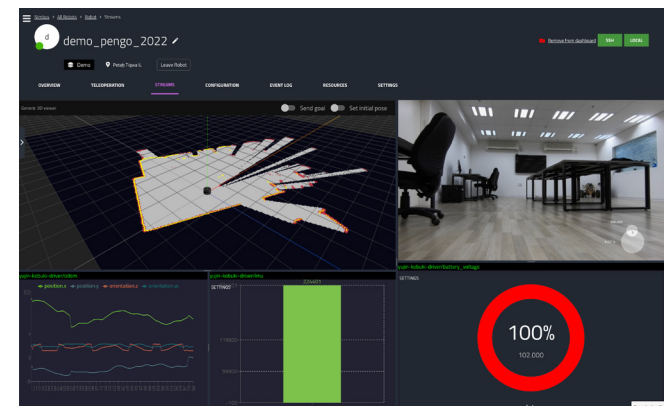
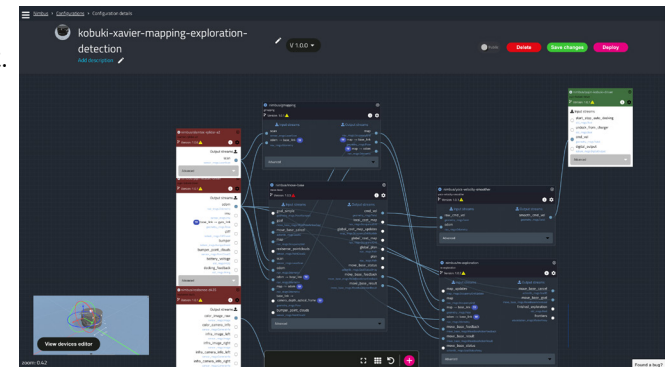
Seeed partners with Cogniteam to bring the drag and drop robotics development and deployable solutions for NVIDIA Jetson Platform

Robotics is a field of integrations, not merely development. You need to choose the correct computing power; you need to choose the right sensors, not develop them. It comes down to software integrations. With Nimbus, Cogniteam's cloud-based solution for robot developers and operations, all the above becomes simpler.

We are glad to partner with Cogniteam, aiming at delivering the easiest ever robot development process, from prototyping to production, including configuration, testing, deployment, and operations management.

Nimbus supports Seeed made Jetson powered platform carrier boards and min PCs, attach sensors such as RPLidar and cameras to build your robotic application from scratch.

You can also seamlessly connect your existing ROS projects to Nimbus. Based on the open-source Robot Operating System (ROS), Nimbus is truly a 'plug and play' solution.



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KEISUUGIKEN

KEISUUGIKEN is a research and development location where advanced technology specialists from various countries gather together. They are working to expand products and services such as robots, artificial intelligence, and VR in collaboration with overseas companies and researchers.

Find our partner >>> keisuu.co.jp

Industry:

Industry 4.0

Application:

Warehouse Towing Robot

Edge Device Used:

Jetson Sub Mini PC powered by Xavier NX

Meet PITAKURU, an Autonomous towing robot capable of towing loads in the warehouse

Challenge:

Moving businesses online becomes new mainstream trends, making delivery services the new normal. In line with the growth of the online business, the demand for courier services that help deliver the ordered packages has risen significantly. Accordingly, the burden it has on the workers also increased.

Solution:

In face of this new challenge, **KEISUUGIKEN** and Seeed came together to provide an autonomous towing robot called "PITAKURU". "PITAKURU" has the ability to track humans while towing heavy objects and can be operated indoors and outdoors. It uses laser tracking, enabling to follow individuals without being affected by external light, and there is no need to install accessories such as tracking beacons. These features enable "PITAKURU" to be used anywhere with easy access, even if the users are unfamiliar with the use of towing technologies.

Result:

By introducing "PITAKURU", the amount of cargo that can be handled by one worker will increase up to two to three times more, and the time needed to move packages around the warehouse, enhancing visibility of traffic.



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Your Solutions Partner Since 1972

Armitage

Established since 1972, Armitage is one of the leading IT services providers in HK and PRC. Over 150 IT professionals, they have 50 years experience and proven track records in delivering quality solutions to various sectors public /private sectors.

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Industry:

Smart City

Application:

Patrol Robot

Hardware used:

- A206 Carrier Board
- reComputer J2011 for NVIDIA Jetson Xavier NX

Hardware used:

- Deepstream
- PaddleOCR

Robot Security Guard Patrols Hong Kong Parking Lot

Patrol Robot is a new milestone in the development of security systems - an emerging stage of technological development that has brought the industry to a new standard of best practices for safeguarding people and property. Autonomous mobile robots designed for patrolling could reduce, over time, completely eliminate the need for human workers to keep large Armitage's Patrol Robot solution brings 24/7 peace of mind to Hong Kong's underground parking lot with fully automatic robotic security guards without operator supervision.

- License Plate Recognition System (LPRS)
- Operate 24/7 without human intercession
- Facial recognition, people counting
- Fire and smoke alarm

Benefits:

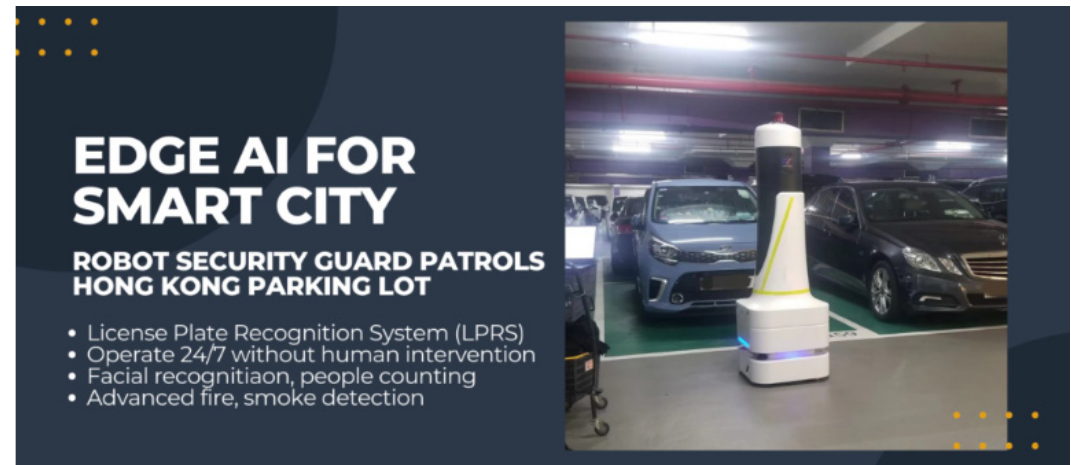
Reliable 24/7 security monitoring, day or night, in any weather.

Capable of identifying various types of objects/situations.

Real-time video and transmission.

Significant savings in manpower and filling the loophole after staff's patrol each time.

Reduced driving, walking, idling, and unnecessary effort in finding a space.



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SMART OCEAN SYSTEMS
 Laboratory

Smart Ocean Systems Laboratory

The SOS lab is found in October 2018 by the Principle Investigator, Mingxi Zhou. The lab is located at beautiful Narragansett Bay Campus, University of Rhode Island. The lab has various types of marine robotic platforms and a full suite of sensors for conducting research.

Industry:

Ocean Research

Application:

Robotics, ROV

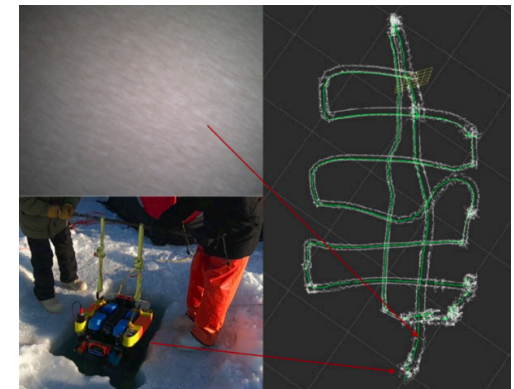
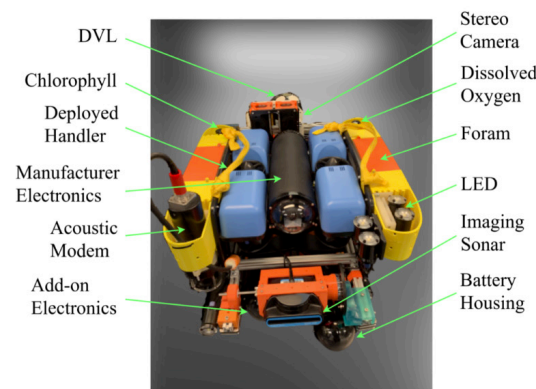
Hardware used:

- BlueROV2
- Add-on sensors
- Jetson Sub Blue mini PC based on NVIDIA Jetson Xavier NX

Towards Under-ice Sensing using a Portable ROV

From 2020, **Smart Ocean Systems Laboratory** from the **University of Rhode Island** is working on the project of **Navigating Unmanned Underwater Vehicles (UUVs) at the Ice-water Boundary**. The project team reported their progress in using a portable ROV for under-ice sensing, and demonstrate the feasibility of using small ROVs (0.7m long and 0.5m wide) to sample the under-ice environment near the coast. The recent field trials were conducted in Utqiagvik, Alaska in March 2022.

Field tests were conducted in March 2022 in Utqiagvik, Alaska on a flat landfast ice about several hundred meters off the coast. The ice thickness was about 1.5 meters. As shown in pic, ROV was lowered through a rectangle ice hole using straps with hooks at the end. The recovery was done by manually driving the ROV to the hole, then the straps will hook onto the ROV for lifting.



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Transform Your Business Delivering Real-World AI Together

Integrate your unique AI technique into our current hardware: **resell or co-brand licensed devices** at our channels.

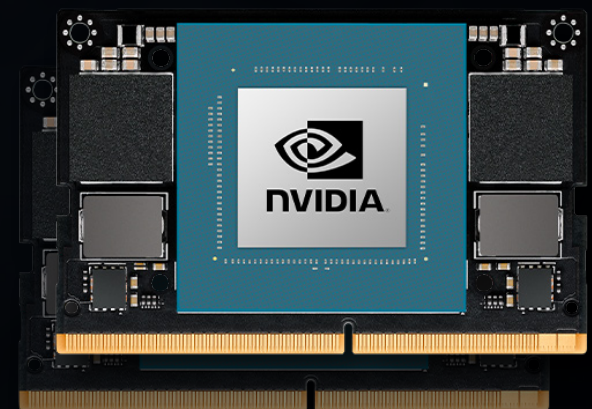
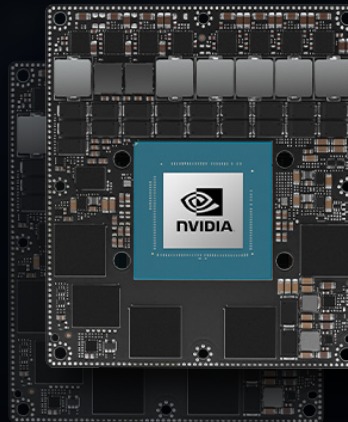
Build your next-gen AI product powered by the NVIDIA Jetson module and bring your product concept to the market with Seeed's **Agile Manufacturing 0-∞**



Edge AI Partner Program

Seed Edge AI Partner Program is free to apply anytime. We are aiming at becoming the most reliable hardware platform and empowering everyone to achieve their digital transformation goals. Seed's Edge AI platform provides devices, carrier boards, peripherals, software tools and ML solutions. If you are working on AI products based on NVIDIA Jetson Platform, including Jetson Nano/Xavier NX/Orin NX/AGX Xavier/AGX Orin, we are looking for global AI partners to join us as:

- Enterprise AI software partner
- AI solution integrator
- Community co-inventor



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PARTNER

reComputer Series for Jetson

Hand-size Edge AI Device Built with NVIDIA
Advanced AI Embedded Systems

Official Dev Kit Alternative

Pre-installed Jetpack

Jetson Nano/Xavier NX/Orin NX



Introduction

reComputer series for Jetson are compact edge computers built with NVIDIA advanced AI embedded systems: J10 (Jetson Nano 4GB) and J20 (Jetson Xavier NX 8GB and Jetson Xavier 16GB). With rich extension modules, industrial peripherals, and thermal management, reComputer for Jetson is ready to help users accelerate and scale the next-gen AI product by deploying popular DNN models and ML frameworks to the edge and inferencing with high performance.

Module Embedded

Jetson Nano, Jetson Xavier NX 8GB/16GB, (Coming soon) Jetson Orin NX 8GB/16GB

Dimension

130mm*120mm*50mm

Features

- Edge AI box fit into anywhere
- Embedded Jetson Module
- Pre-installed software for click-to-deploy
- Rich set of I/Os
- Stackable and expandable



Product Overview

Versions Available:

reComputer J1010

- Jetson Nano
- 1xUSB 3.0, 2x USB 2.0
- M.2 key E
- Micro SD Card (CLK Frequency 48MHz)
(Available from July 15th)

SKU: 110061362

Certification*:     

reComputer J1020

Upcoming updated version is reComputer J1010

- Jetson Nano
- 4xUSB 3.0
- M.2 key M

SKU: 110061361

Certification*:   

Coming Soon:

- reComputer J4011 (Orini NX 8GB)
- reComputer J4012 (Orin NX 16GB)

reComputer J2011

- Jetson Xavier NX
- 4xUSB 3.0
- M.2 key M, M.2 key E
- Upcoming New Version reComputer J2021
will change to 4xUSB 3.1

SKU: 110061363

Certification:   

reComputer J2012

- Jetson Xavier NX 16GB
- 4xUSB 3.0
- M.2 key M, M.2 key E

SKU: 110061401

Certification:   

reComputer J2021

- Upcoming New Version will change to 4xUSB 3.1

SKU 110061402

Certification*:     

Optional accessories:

- 128GB NVMe M.2 PCIe Gen3x4 2280 Internal SSD
- 256GB NVMe M.2 PCIe Gen3x4 2280 Internal SSD
- 512GB NVMe M.2 PCIe Gen3x4 2280 Internal SSD

*All certification is on going

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PARTNER

reServer for Jetson

Inference center for the edge

Jetson Xavier NX/Orin NX/AGX Orin



reServer Jetson

- Portable Edge AI center with up to 275 TOPS AI performance
Built with Jetson Xavier NX/ AGX Orin
- Chill 24/7 with Vapor Chamber heatsink (AGX Orin only)
40% more effective thermal performance
- Rapid network access:
2.5GbE/10GbE
- Hybrid connectivity:
Support 4G, 5G, LoRa, BLE and WiFi (modules not included)
- Support NVIDIA Triton Inference Server, pre-installed Jetpack
Built-in storage for multiple concurrent AI application
- Rich IOs ready for AIoT
USB 3.2 Type-A port, USB 2.0 Type-A port, HDMI port and DP port

Certification*



reServer J2032

- Xavier NX 16GB Module
- Two 3.5" SATA drives

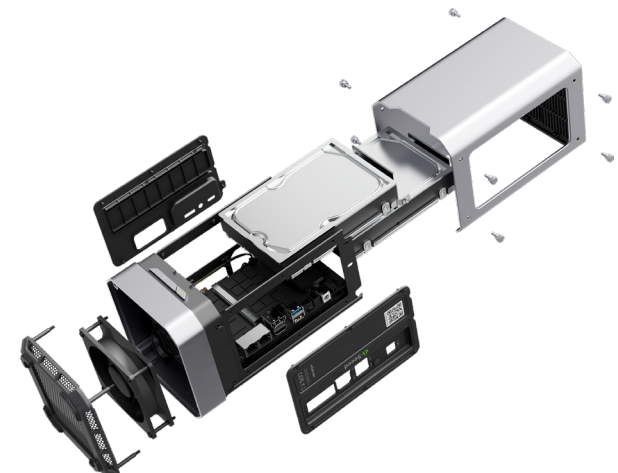
SKU: 110061403

reServer J5014

- Jetson AGX Orin 64GB Module
- Vapor chamber heatsink
- NVME SSDs, two 3.5" SATA drives
- 10GbE Ethernet Port

SKU: 110061404

- reServer for Orin NX(In development)



*All certification is on going

NVIDIA® Jetson Module Powered Devices Comparison

Module	Jetson Nano		
Photo			
Product Name	reComputer J1010	reComputer J1020	NVIDIA® Jetson Nano Developer Kit-B01
SKU	110061362	110061361	102110417
Built-in carrier board	J101	A206	NVIDIA® Jetson Nano Reference carrier board
AI Performance	472 GFLOPS		
GPU	NVIDIA Maxwell TM architecture with 128 NVIDIA CUDA® cores		
CPU	Quad-Core Arm® Cortex®-A57 MPCore processor		
Memory	4 GB 64-bit LPDDR4 25.6GB/s		
Storage	16 GB eMMC 5.1		microSD (card not included)
Video Encode	1*4K30 2*1080p60 4*1080p30 4*720p60 9*720p30 (H.265 & H.264)		1*4K30 4*1080p30 9*720p30 (H.264/H.265)
Video Decode	1*4K60 2*4K30 4*1080p60 8*1080p30 9*720p60 (H.265 & H.264)		1*4K60 2*4Kp30 8*1080p30 18*720p30 (H.264/H.265)
Networking	1*RJ45 Gigabit Ethernet Connector (10/100/1000)		
USB	1*USB 3.0 Type A; 2*USB 2.0 Type A; 1*USB Type C for device mode; 1*USB Type C for 5V power input	4*USB 3.0 Type-A; 1*Micro-USB port for device mode	4*USB 3.0 Type-A; 1*Micro-USB port for Device mode for device mode
CSI Camera	2*CSI Cameras (15 pos, 1mm pitch, MIPI CSI-2)		
Display	1*HDMI 2.0 Type A	1*HDMI 2.0 Type A; 1*DP	1*HDMI Type A; 1*DP
Fan Connector	1*Fan (5V PWM)		
M.2 KEY E	1*M.2 Key E	1*M.2 Key E (disabled)	1*M.2 Key E
M.2 KEY M	-	1*M.2 Key M	-
Multifunctional port	1*40-Pin header		
Power Adapter	USB Type-C 5V/3A	DC Jack 12V/2A	DC Jack 5V/4A Micro-USB 5V/2A
Power	5W 10W		
Mechanical	130mmx120mmx50mm (with case)	130mmx120mmx50mm (with case)	100mmx80mmx29mm

NVIDIA® Jetson Module Powered Devices Comparison

Module	Jetson AGX Xavier		Jetson AGX Orin	
Photo				
Product Name	Jetson AGX Xavier H01 Kit	NVIDIA® Jetson AGX Xavier Dev Kit	reServer J5014	NVIDIA® AGX Orin Dev Kit
SKU	110991666	102110406	110061404	110991725
Built-in carrier board	Seed Carrier board for AGX Xavier	NVIDIA® Jetson AGX Xavier Reference carrier board	Seed Carrier board for AGX Orin	NVIDIA® Jetson AGX Orin Reference carrier board
AI Performance	32 TOPS		275 TOPS	275 TOPS
GPU	NVIDIA Volta™ architecture with 512 NVIDIA® CUDA® cores and 64 Tensor cores		NVIDIA Ampere architecture with 2048 NVIDIA® CUDA® cores and 64 Tensor Cores	
CPU	8-core NVIDIA Carmel Arm®v8.2 64-bit CPU 8MB L2 + 4MB L3		12-core Arm® Cortex®-A78AE v8.2 64-bit CPU 3MB L2 + 6MB L3	
Memory	32 GB 256-bit LPDDR4x 136.5GB/s		64GB 256-bit LPDDR5 204.8 GB/s	
Storage	32 GB eMMC 5.1		64GB eMMC 5.1	
Video Encode	4*4K60 8*4K30 16*1080p60 32*1080p30 (H.265) 4*4K60 8*4K30 14*1080p60 30*1080p30 (H.264)	2*4Kp60 HEVC/2*4Kp60 12-Bit Support	2x 4K60 4x 4K30 8x 1080p60 16x 1080p30 (H.265) H.264, AV1	
Video Decode	2*8K30 6*4K60 12*4K30 26*1080p60 52*1080p30 (H.265) 4*4K60 8*4K30 16*1080p60 32*1080p30 (H.264)	2*4Kp60 HEVC/2*4Kp60 12-Bit Support	1x 8K30 3x 4K60 7x 4K30 11x 1080p60 22x 1080p30 (H.265) H.264, VP9, AV1	
Networking	1*RJ45 Gigabit Ethernet Connector (10/100/1000)		1*RJ45 10 Gigabit Ethernet Connector	
USB	20PIN 0.5mm ZIF FPC (achieve USB-C 3.0 with corresponding convert ports)	2*USB 3.1 DP (Optional) PD (Optional) Close-System Debug and Flashing Support on 1 Port	4*USB 3.2 Type A 2*USB 3.2 Type C 1*USB 2.0 Micro B for debug	
CSI Camera	(16x) CSI-2 Lanes		16 lanes MIPI CSI-2 connector	
Display	3 multi-mode DP 1.4/ eDP 1.4/HDMI 2.0 No DSI support	HDMI 2.0 Type-A connector, 2xDP routed to Type-C connectors	1*DP	
Fan Connector	1*12V Fan (Fan included)	-	1*Fan (5V PWM)	4-Pin Fan header
M.2 KEY E	PCIe+UART+I2S/ PCM	PCIe x1 + USB 2.0 + UART (for Wi-Fi/ LTE) / I2S / PCM	1*M.2 Key E (Wi-Fi/BT included)	
M.2 KEY M	1*M.2 Key M		2*M.2 Key M	1*M.2 Key M
Multifunctional port	1*40-Pin header			
Power Adapter	DC Jack 19V 4.74A (MAX 90W)		DC Jack 24V	USB Type-C 20V/4.5A
Power	10W 15W 30W		15W - 60W	15W - 40W
Mechanical	130mmx105mmx77mm (with case)	105mmx105mmx65mm	132mmx124mmx233mm	110mmx110mmx71.65mm

NVIDIA® Jetson Module Powered Devices Comparison

Module	Jetson Orin NX	
Photo		
Product Name	reComputer J4011	reComputer J4012
SKU	TBD	TBD
Built-in carrier board	Seeed Carrier board for Orin NX	Seeed Carrier board for Orin NX
AI Performance	70 TOPS	100 TOPS
GPU	NVIDIA Ampere architecture with 1024 NVIDIA® CUDA® cores and 32 tensor cores	
CPU	6-core Arm® Cortex®-A78AE v8.2 64-bit CPU 1.5MB L2 + 4MB L3	8-core Arm® Cortex®-A78AE v8.2 64-bit CPU 2MB L2 + 4MB L3
Memory	8GB 128-bit LPDDR5 102.4 GB/s	16GB 128-bit LPDDR5 102.4 GB/s
Storage	Supports external NVMe	Supports external NVMe
Video Encode	1*4K60 3*4K30 6*1080p60 12*1080p30 (H.265) H.264, H.265, AV1	
Video Decode	1*8K30 2*4K60 4*4K30 9*1080p60 18*1080p30 (H.265) H.264, H.265, VP9, AV1	
Networking	1*RJ45 Gigabit Ethernet Connector (10/100/1000)	
USB	4*USB 3.2 Type-A 1*USB Type C for device mode	
CSI Camera	2*CSI Cameras (15 pos, 1mm pitch, MIPI CSI-2)	
Display	1*DP	
Fan Connector	1* Fan(5V PWM) (Fan included)	
M.2 KEY E	1*M.2 Key E	
M.2 KEY M	1*M.2 Key M(128GB NVMe SSD included)	
Multifunctional port	1*40-Pin header	
Power Adapter	DC Jack 19V 4.74A (MAX 90W)	
Power	10W - 20W	10W - 25W
Mechanical	130mmx120mmx50mm (with case)	

NVIDIA® Jetson Module Powered Devices Comparison

Moduel	Jetson Xavier NX							
Photo								
Product Name	reComputer J2011	reComputer J2021	reComputer J2012	Jetson SUB Mini-PC Black	reServer J2032	NVIDIA® Jetson Xavier NX Developer Kit	Jetson SUB Mini PC-blue	Jetson SUB Mini PC-Silver
SKU	110061363	110061381	110061401	102110641	110061403	102110427	102110637	102110642
Built-in carrier board	A206	J202	A206	A205	Seed Carrier board for Xavier NX	NVIDIA® Jetson Xavier NX Reference carrier board	A206	
AI Performance	21 TOPS							
GPU	NVIDIA Volta TM architecture with 384 NVIDIA CUDA® cores and 48 Tensor cores							
CPU	6-core NVIDIA Carmel ARM®v8.2 64-bit CPU 6 MB L2 + 4 MB L3							
Memory	8 GB 128-bit LPDDR4x 59.7GB/s	8 GB 128-bit LPDDR4x 59.7GB/s	16 GB 128-bit LPDDR4x 59.7GB/s	8 GB 128-bit LPDDR4x 59.7GB/s	8 GB 128-bit LPDDR4x 51.2GB/s			
Storage	16 GB eMMC 5.1			16 GB eMMC 5.1 5*SATA (256GB SATA included)	16 GB eMMC 5.1	microSD (card not included)	16 GB eMMC 5.1	
Video Encode	2*4K60 4*4K30 10*1080p60 22*1080p30 (H.265) 2*4K60 4*4K30 10*1080p60 20*108p30 (H.264)				2x 4K60 4x 4K30 10x 1080p60 22x 1080p30 (H.265) 2x 4K60 4x 4K30 1 0x 1080p60 20x 1080p30 (H.264)	2*4K30 6*1080p60 14x1080p30 (H.265/H.264)	2x 4K60 4x 4K30 10x 1080p60 22x 1080p30 (H.265) 2x 4K60 4x 4K30 10x 1080p60 20x 1080p30 (H.264)	
Video Decode	2*8K30 6*4K60 12*4K30 22*1080p60 44*1080p30 (H.265) 2*4K60 6*4K30 10*1080p60 22*1080p30 (H.264)				2x 8K30 6x 4K60 12x 4K30 22x 1080p60 44x 1080p30 (H.265) 2x 4K60 6x 4K30 10x 1080p60 22x 1080p30 (H.264)	2*4K60 4*4K30 12*1080p60 32*1080p30 (H.265) 2*4K30 6x1080p60 16x1080p30 (H.264)	2x 8K30 6x 4K60 12x 4K30 22x 1080p60 44x 1080p30 (H.265) 2x 4K60 6x 4K30 10x 1080p60 22x 1080p30 (H.264)	
Networking	1*RJ45 Gigabit Ethernet Connector (10/100/1000)			2*RJ45 Gigabit Ethernet Connector (10/100/1000)	1000M Ethernet Port 2.5G Ethernet Port	1*RJ45 Gigabit Ethernet Connector (10/100/1000)	10/100/1000 BASE-T Ethernet	
USB	4*USB 3.0 Type A Connector 1*Micro-USB port for Device mode	4 * USB 3.1 Type A Connector; 1* USB Type-C (Device mode)	4*USB 3.0 Type A Connector 1*Micro-USB port for Device mode	4*USB3.0 (USB 2.0 Integrated) 1*USB Type-C	2* USB3.1 GNE2 Interface USB TYPE-C Connector for NX Device Mode USB TYPE-C Connector for Coprocessor RP2040	4*USB 3.1 Type A Connector 1*Micro-USB port for Device mode	4x USB3.0(USB 2.0 Integrated) 1x Micro USB 1x USB2.0	4x USB3.0(USB 2.0 Integrated) 1x Micro USB
CSI Camera	2*CSI Cameras (15 pos, 1mm pitch, MIPI CSI-2)			6*CSI Cameras (15 pos, 1mm pitch, MIPI CSI-2)	-	2*CSI Cameras (15 pos, 1mm pitch, MIPI CSI-2)	2*CSI Camera (15 pos, 1mm pitch, MIPI CSI-2)	
Display	1*HDMI 2.0 Type A 1*DP			2*HDMI 2.0 Type A	1* DP1.4 1*HDMI 2.0	1*HDMI 2.0 Type A 1*DP	2 multi-mode DP 1.4/eDP 1.4/HDMI 2.0	
Fan Connector	1* Fan (5V PWM) (Fan included)			2* Fan (12V/5V) 1*Fan(5V PWM)	1* Jetson Xavier NX Fan Connector (5V PWM) 1* Main Fan Connector (12V)	1* Fan (5V PWM)(Fan included)	1*Picoblade Header	
M.2 KEY E	1*M.2 Key E			1*M.2 Key E(WiFi/BT included)	-	1*M.2 Key E(WiFi/BT included)	Pre-installed Wifi module (802.11ac, Dual Band, 80MHz, MU-MIMO & Bluetooth 4.2)	
M.2 KEY M	1*M.2 Key M			-	-	1*M.2 Key M	1*M.2 Key MPre-installed 128GB NVME SSD	
Multifunctional port	1*40-Pin header				-	1*40-Pin header	1*40-Pin header	
Power Adapter	DC Jack 19V 4.74A (MAX 90W)	12V/5A(Barrel Jack 5.5/21mm)	DC Jack 19V 4.74A (MAX 90W)	DC Jack 19V 4.74A (MAX 90W)	DC Jack 12V @5A	DC Jack 19V 4.74A (MAX 90W)	DC Jack 19V 4.74A (MAX 90W)	
Power	10W 15W 20W				-	10W 15W 20W	10W 15W 20W	
Mechanical	130mmx120mmx50mm (with case)			205mmx130mmx65mm		103mmx90.5mmx31mm	130mmx120mmx50mm	130mmx90mmx60mm

NVIDIA® Jetson Module Compatible Carrier Boards Comparison

Carrier board	 reComputer J101 carrier board for NVIDIA® Jetson™ Nano/NX/TX2 NX	 reComputer J202 carrier board for NVIDIA® Jetson™ Nano/NX/TX2 NX	 Coming soon reComputer J401 carrier board for NVIDIA® Jetson™ Orin NX	 A206 carrier board for NVIDIA® Jetson™ Nano/NX/TX2 NX	 A203 V2 carrier board for NVIDIA® Jetson™ Nano/NX/TX2 NX	 A205 carrier board for NVIDIA® Jetson™ Nano/NX/TX2 NX
Module Compatibility	NVIDIA® Jetson™ Nano	NVIDIA® Jetson™ Nano/ Xavier NX/TX2 NX	NVIDIA® Jetson™ Orin NX	NVIDIA® Jetson™ Nano/ Xavier NX/TX2 NX	NVIDIA® Jetson™ Nano/ Xavier NX/TX2 NX	NVIDIA® Jetson™ Nano/ Xavier NX/TX2 NX
PCB Size / Overall Size	100mm*80mm	100mm*80mm	100mm*80mm	100mm*80mm	87mm*52mm	170mm*100mm
Display	1*HDMI	1*HDMI+1*DP	1*DP	1*HDMI+1*DP	1*HDMI	2*HDMI
CSI Camera	2*CSI	2*CSI	2*CSI	2*CSI	1*CSI	6*CSI
Ethernet	1x Gigabit Ethernet (10/100/1000M)	1x Gigabit Ethernet (10/100/1000M)	1x Gigabit Ethernet (10/100/1000M)	1x Gigabit Ethernet (10/100/1000M)	1x Gigabit Ethernet (10/100/1000M)	2x Gigabit Ethernet (10/100/1000M)
USB	\	\	\	\	1* USB 3.0 0.5mm pitch 20Pin ZIF	\
	1* USB 3.0 Type-A 2* USB 2.0 Type-A	4* USB 3.1 Type-A (Integrated USB 2.0)	4* USB 3.2 Type-A (Integrated USB 2.0)	4* USB 3.0 Type-A (Integrated USB 2.0)	2* USB 3.0 Type-A (Integrated USB 2.0)	4* USB 3.0 Type-A (Integrated USB 2.0)
	1* USB Type C (Not support power input)	1* USB Type C (Not support power input)	1* USB Type C (Not support power input)	1* USB Micro B (Not support power input)	1* USB Micro B (Not support power input)	1* USB 2.0 Type C (Support OTG)
Storage Expansion	\	1*M.2 Key M	1*M.2 Key M	1*M.2 Key M	1*M.2 Key M	5*SATA
M.2 Key E	1*M.2 Key E	1*M.2 Key E	1*M.2 Key E	1*M.2 Key E	1*M.2 Key E	1*M.2 Key E
TF_Card	1* TF_Card (CLK Frequency 48Mhz)	\	\	\	1* TF_Card	1* TF_Card
USB WIFI Mode	\	\	\	\	\	1* Standard USB WIFI Mode (4 pin interface)
Audio	\	\	\	\	\	1* Audio Jack
	\	\	\	\	\	2* Microphone interface
	\	\	\	\	\	2* Speaker interface
SPI Bus	2* SPI Bus(+3.3V Level)	2* SPI Bus(+3.3V Level)	2* SPI Bus(+3.3V Level)	2* SPI Bus(+3.3V Level)	2* SPI Bus(+3.3V Level)	2* SPI Bus(+3.3V Level)
Fan Connector	1* Fan(5V PWM)	1* Fan(5V PWM)	1* Fan(5V PWM)	1* Fan(5V PWM)	1* Fan(5V PWM)	2* Fan(12V/5V) 1* Fan(5V PWM)
CAN	\	1* CAN	1* CAN	1* CAN	1* CAN	1* CAN
Multifunctional port	1* 40-Pin	1* 40-Pin	1* 40-Pin	1* 40-Pin	1* 40-Pin	1* 40-Pin
RTC	Battery not included	Battery not included	Battery not included	Battery not included	Battery not included	Battery not included
Power supply	USB Type C 5V/3A (not include a power cord)	12V/5A power cord only	19V/4.74A power cord only	19V/4.74A power cord only	19V/4.74A power cord only	19V/4.74A power cord only
Operating Temperature	0°C ~ 60°C	0°C ~ 60°C	0°C ~ 60°C	-25°C ~ 70°C	-25°C ~ 65°C	-25°C ~ 80°C

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Robotics & Logistic
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