Industry 4.0

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MALAMUTE

Malamute

Malamute's mission is to enable efficient communication in the toughest environments. Founded in 2020, the Malamute team sought to combine the industrial communication world with the power of AI, creating the next generation of communication workflow. Malamute has partnered with multiple industry leaders to bring human-centric assisted reality to the front lines.
Find our partner ››› malamute.us

Industry:
Industry 4.0

Application:
Industrial Communications

Edge Device Used:
NVIDIA Jetson AGX Orin Dev Kit, reServer J5014

Software:
RIVA SDK

NLP simplifies industrial communications and improves manufacturing productivity

Challenge:

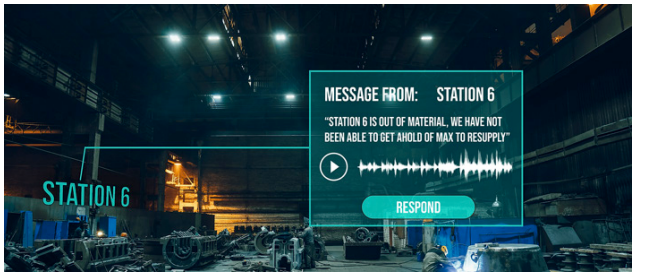
In the industrial manufacturing workplace, workers are constantly having to leave their stations to communicate information. Having to manually locate individuals throughout the facility or use a tedious data input solution prevents workers from completing their jobs. Is there any way we can optimize the workflow of asynchronous communications to benefit both the worker and the workplace?

Solution:

Malamute uses natural language processing(NLP) and spatial computing to help improve workplace productivity and process traceability. Powered by NVIDIA Jetson Orin and AGX Xavier and working with NVIDIA Riva, Malamute's AI-layered audio communication network empowers industrial workers with the right data at the right time. The NLP-powered communication system helps improve overall equipment efficiency by keeping workers focused on their jobs and at their stations. Employees can record voice messages regarding operational situations and processes which get sent to the intended audience. This allows for effortless and efficient communications compared to a Walkie-Talkie, phone call, or email.

Result:

Minimizes worker travel for communications, Maximizes worker productivity, Improve workplace efficiency.



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EDGE IMPULSE

Edge Impulse

Edge Impulse is the leading development platform for machine learning on edge devices, free for developers and trusted by enterprises. Edge Impulse made ML development easier, accelerate ML solution development using low-code to advanced integrations with the support from an expert.

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Application:

Embedded Machine Learning
Cpmputer Vision

Industry:

Industry 4.0, Manfacturing, Retail

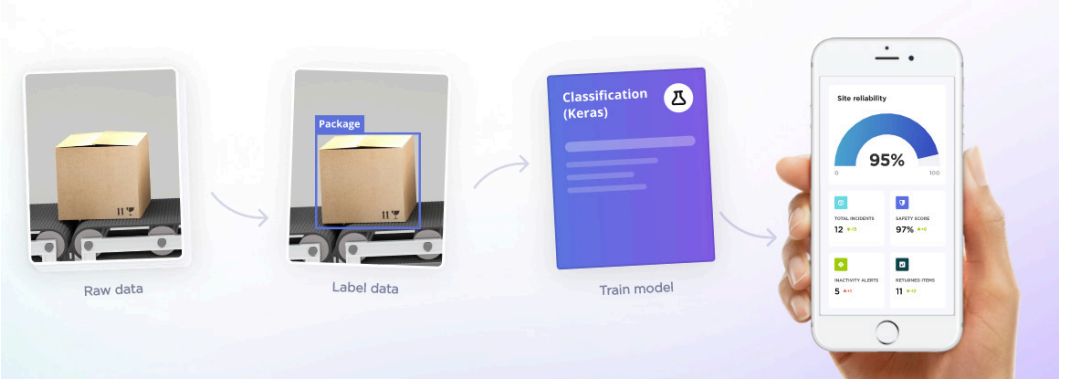
Supported Hardware

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

Build ML pipeline for deploying audio, image classification, and object detection applications at the edge

Users of Edge Impulse can leverage the power of the Jetson Nano for their embedded machine learning applications that demand higher performance, alongside the industry's tleading embedded ML platform that offers:

- The easiest-to-use embedded machine learning pipeline for deploying audio, image classification, and object detection applications at the edge with zero dependencies on the cloud
- Streamlined acquisition of critical environmental sensor data, previously discarded or only sent to the cloud, for empowering sensor fusion at the edge.



Deploy hard hat detection for enforcing workplace safety

Use Edge Impulse for end to end machine learning workflow: upload dataset, acquire custom data, visualize the data, train the machine learning model and validate the inference results. With Edge Impulse, you can easily deploy an automated real-time detection for hardhat-wearing compliance, along with the alert at the workspace. PPE compliance also includes gloves, masks, goggles, etc. You can also build custom model training for the full PPE detection pipeline.

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tryo·labs

Troylabs

Expert team of engineers and advisors focused on making an impact with AI-powered solutions.
Machine Learning consulting services: Predictive Analytics, Computer Vision, and Natural Language Processing.

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Software:

YOLOV5, DeepStream SDK, NVIDIA Metropolis

Industry:

Industry 4.0

Application:

Machine Learning

Device Support:

reComputer J2011/J2022 Powered by NVIDIA Jetson Xavier NX

Detecting safety helmets in realtime

Personal Protective Equipment (PPE) has made its way into mandatory requirements of construction sites due to its importance to workers'safety. Tryolabs leverages Seeed's reComputer edge devices built with Jetson Xavier NX 8GB module develop a computer vision analytics solution that tackles a c hallenging task in today's industry 4.0 eld - detecting safety helmets in real-time.

YOLOv5 vastly outperformed Faster R-CNN, obtaining better metrics in a much shorter time. In terms of inference time, both models performed similarly, taking around 0.08 seconds for each image on the edge device (12.5 FPS). By leveraging DeepStream SDK,the inference time wasboostedtoa staggering 0.012 seconds for each image (82.8FPS)onthe same NVIDIA Jetson Xavier NX.

* Source: GDUT-Hardhat Wearing Detection (GDUT-HWD)

* Source: GDUT-Hardhat Wearing Detection (GDUT-HWD)

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Transform Your Business Delivering Real-World AI Together

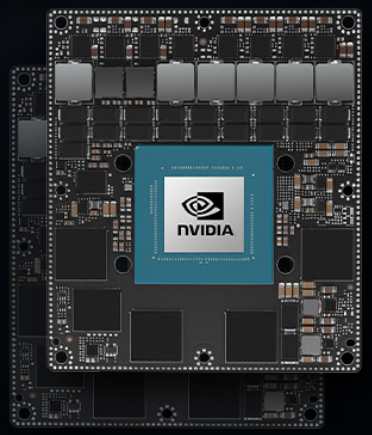
Integrate your unique AI technique into our current hardwares: **resell or co-brand licensed devices** at our channels.

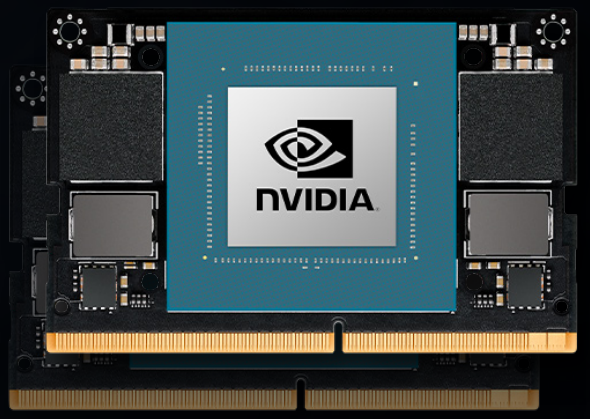
Build your next-gen AI product powered by the NVIDIA Jetson module and bring your product concept to the market with Seeed's **Agile Manufacturing 0-∞**

Edge AI Partner Program

Seeed 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. Seeed'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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NVIDIA 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

Microsoft Azure Certified Device

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

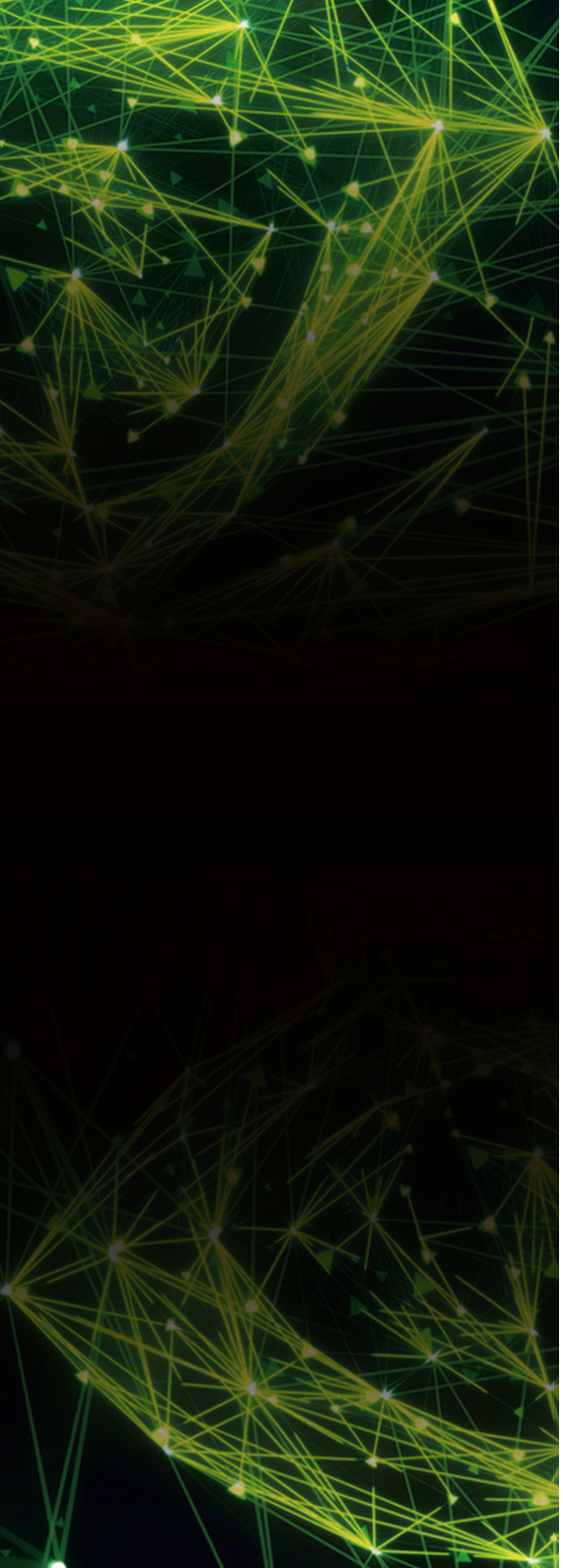
Jetson Nano, Jetson Xavier NX 8GB/16GB, (Coming soon) Jetson Orin NX 8GB/16GB

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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NVIDIA 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*

RoHS CE FC KC UKCA REACH

reServer J2032

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

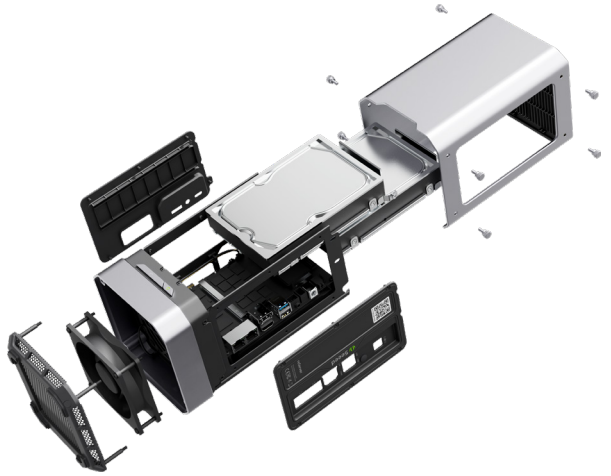
SKU: 110061403

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 Maxwel 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	Seeed Carrier board for AGX Xavier	NVIDIA® Jetson AGX Xavier Reference carrier board	Seeed Carrier board for AGX Orin	NVIDIA® Jetson AGX Orin Reference carrier board
AI Performance	32 TOPS		275 TOPS	275 TOPS
GPU	NVIDIA Volta TM 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(WiFi/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	Seeed 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 5.5/2.1mm)	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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