

XNode Prime



IoT connectivity application training equipment based on wireless personal network (WPAN) and low-power wideband network (LPWAN)

Consist of high-performance edge server with integration of base station and network server, module type sensor node and expansion module

Edge server supports sensor node control and AI fusion programming in a web browser environment through the AIoT dedicated operating system Soda OS and Pop library

Edge server supports mDNS/DNS-SD, SSH, SFTP, SMB/CIFS, MQTT, and NX X Window protocols

Sensor node can be selected between LoRa/Sigfox/Wi-Fi/Bluetooth (Node A) or Zigbee Pro/Bluetooth (Node B)

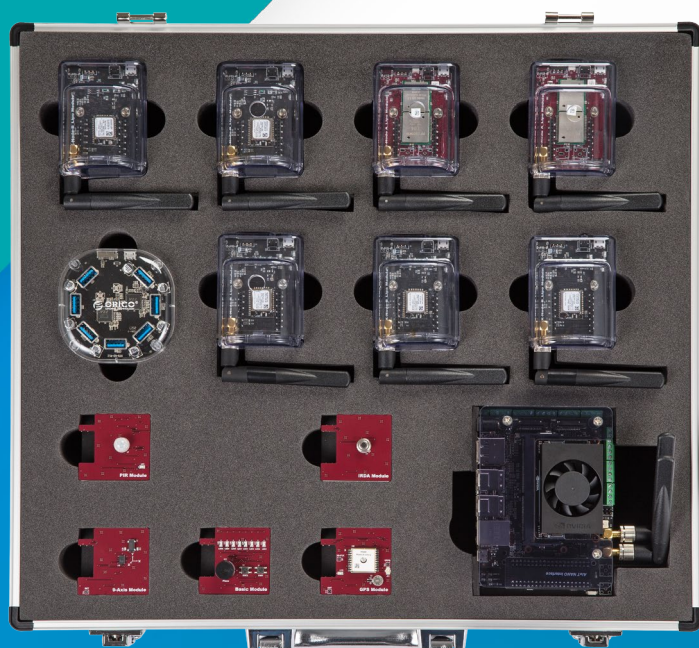
Provides 2100mA battery, RGB LED for indicator, light sensor based on lux unit and temperature/humidity sensor for independent operation of sensor node

Sensor node supports interpreter-style Python 3 so that control programs can be easily and concisely written

AIoT dedicated operating system Soda OS and Pop library

Visual Studio Code-based integrated development environment for professional application development

Provides training contents for Python-based edge server and sensor nodes



Software Specifications

List		Specifications
AI Edge Server	Linux Kernel	aarch32 4.x or aarch64 4.x
	Lightweight Desktop	X-Server, Openbox, lxdm, Tint2, blueman, network-manager, conky, pcmanfm, lxterminal
	CLI	Zsh with Oh-My-Zsh, Tmux, Peco, powerlevel9k thema, Powerline fonts
	Tool Chain	GCC (c, c++), JDK, Node JS, Python3, Cling
	IDE	Visual Studio Code, NeoVim, Geany
	Soda OS	Connectivity: SSH Server, Samba Server, Remove Desktop Server, mDNS(avahi), Bluez, MQTT Server(Mosquitto), Blynk Server
	Multimedia	PulseAudio, sox (lame, oggenc), snowboy, Google Assistant, OpenGL ES, OpenCV 4
	Data Science & AI	Numpy, Matplotlib, Pandas, Scipy, Seaborn, Scikit-learn, TensorFlow, Keras, PyTorch, TorchVision, OpenAI Gym
	Jupyter Lab	Python3 and Cling support, IPython Widgets, Terminal support
	Multimedia Object	AudioPlay, AudioPlayList, AudioRecord, Tone, SoundMeter
	Voice Assistant Object	GAssistant, create_conversation_stream
	AI Object	Linear Regression, Logistic Regression, Perceptron, ANN, DNN, CNN, DQN, Pilot with AutoCar & SerBot
	Node A	MicroPython 3 (built in node), Soda IDE, Configuration Software (compatible with Linux, OS X and Windows), Remote Terminal & Remote Desktop support
	Pop Library	Output Object: RGB LED, Buzzer, Input Object: Switch, PIR, Thermopile, 9Axis IMU, GPS

Node B		MicroPython 3 (built in node)
		Soda IDE
		Configuration Software (compatible with Linux, OS X and Windows)
		Remote Terminal & Remote Desktop support
Pop Library		Output Object: LED, Buzzer
		Input Object: Switch, PIR, Thermopile, 9Axis IMU, GPS

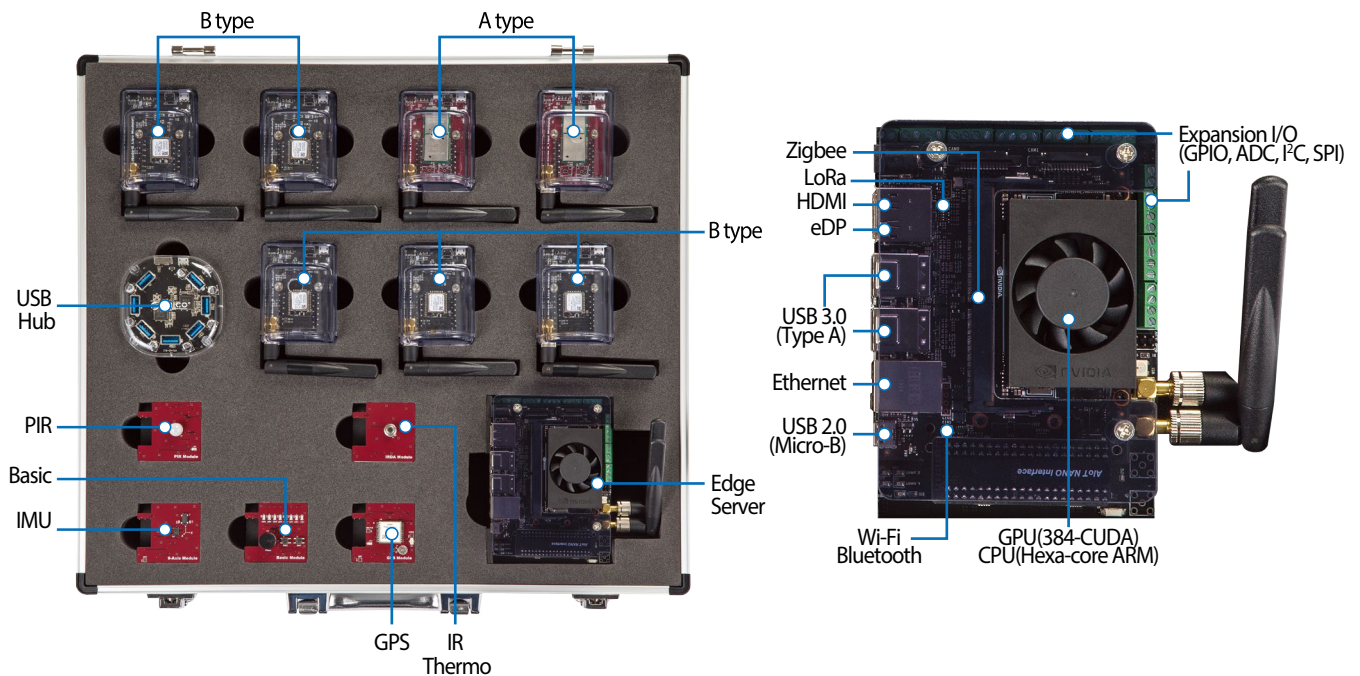
Hardware Specifications

List	Specifications
AI Edge Server	CPU: 6-core NVIDIA Carmel ARM v8.2 64-bit, 6MB L2 + 4MB L3, CPU Max Freq: 2-core@1900MHz, 4/6-core@1400MHz
	GPU: 384-core NVIDIA Volta™ GPU with 48 Tensor Cores, GPU Max Freq: 1100MHz
	Memory: 8GB 128-bit LPDDR4x@ 1600MHz
	Storage: 16GB eMMC 5.1
	Video Encoder: 2x464MP/sec(HEVC), 2x4k@ 30(HEVC), 6x 1080p@ 60(HEVC), 14x 1080p@ 30(HEVC)
	Video Decoder: 2x690MP/sec(HEVC), 2x4k@ 60(HEVC), 4x4k@30(HEVC), 12x1080p@ 60(HEVC), 32x 1080p@ 30(HEVC), 16x 1080p@30(H.264)
	CSI Camera: Up to 6 cameras(36 via virtual channels), 12 lanes MIPI CSI-2, D-PHY 1.2(up to 30 Gbps)
	Connectivity: Dual Band Wireless WiFi 2GHz/5GHz Band, 867Mbps, 802.11ac, Bluetooth 4.2, 10/100/1000 Base-T Ethernet
	Display: 2 multi-mode DP 1.4/eDP 1.4/HDMI 2.0
	USB: 4x USB 3.0, USB 2.0 Micro-B

Hardware Specifications

List	Specifications
Node A (2EA)	RAM: 4MB Flash Memory: 8MB Interface: UART, SPI, I ² C, I ² S, ADC, PWM, GPIO Indicator: RGB LED
	Wi-Fi 802.11b/g/n Data Rate: 1Mbps to 72Mbps Transmit power: Up to +16dBm Receiver Sensitivity: -93 to -71 dBm
	Bluetooth Bluetooth 4.2 BR/EDR BLE Range: 30M Data Rate: 1Mbps Sensitivity: -97dBm Output Power: 12dBm
	LoRa Frequency: 900MHz Range: 10km Data Rate: 300kbps Sensitivity: -148dBm Output Power: 20dBm
	Sigfox Frequency: 900MHz Range: 10km Data Rate: 100bps Output Power: 20dBm
	Light Sensor Illuminance: 1 ~ 65535(lx) Interface: I ² C
	HUMIDITY & TEMPERATURE Sensor Humidity Resolution: 12bit(0.04%RH), 8bit(0.7%RH) Humidity Accuracy: +-3%RH Temperature Resolution: 14bit(0.01C), 12bit(0.04C) Temperature Accuracy: +-4°C Interface: I ² C
	Power Micro USB B type(+5V) Expansion Connector (+5V) Li-Po Type 3.7V/2100mAh (1EA)
Node B (5EA)	RAM: 128KB Flash Memory: 1MB Interface: UART, SPI, I ² C, ADC, PWM, GPIO Indicator: LED
	ZigBee 3.0 Frequency: 2.4GHz Range: Max 3200m (outdoor), Max 90m(indoor) Data rate: 250kbps Sensitivity: -103dBm Output Power: 19dBm Receiver Sensitivity: -100 dBm Bluetooth support
	Light Sensor Illuminance: 1 ~ 65535(lx) Interface: I ² C
	HUMIDITY & TEMPERATURE Sensor Humidity Resolution: 12bit(0.04%RH), 8bit(0.7%RH) Humidity Accuracy: +-3%RH Temperature Resolution: 14bit(0.01C), 12bit(0.04C) Temperature Accuracy: +-4°C Interface: I ² C
	Power Micro USB B type(+5V) Expansion Connector (+5V) Li-Po Type 3.7V/2100mAh (1EA)
Expansion Module	Basic Input Device: Tact Switch x 2EA(GPIO) output device: LED 8EA(I ² C) Actuator: Passive Buzzer(GPIO) Size: 46x44(mm)
	IMU Acceleration ranges: 2g/±4g/±8g/±16g Gyroscope ranges: ±125°/s to ±2000°/s Magnetic field range: ±1300uT(x-,y-axis), ±2500uT(z-axis) Interface: I ² C Size: 46x44(mm)
	PIR Sensing Range: 110° Spectral Response: 5 ~ 14 um I/O Interface: Digital Out Size: 46x44(mm)
	IR Thermo Measurement resolution: 0.02°C Measure range: -40°C ~ +125°C Interface: I ² C Size: 46x44(mm)
	GPS Sensitivity: -165dBm Update Rate: up to 10Hz AGPS Support for Fast TTFF Consumption current(@3.3V) Acquisition: 25mA Typ Tracking: 20mA Typ Size: 46x44(mm)

Layout



Composition



Training Contents (Common to XNode)

01. Components and Concepts of Sensor Network
02. Sensor Network Platform
 - XNode B Type
 - XNode A Type
 - Edge Server
03. Sensor Network Protocol
04. Development Environment of Sensor Network
05. Basic Sensor Control
06. Expansion Module Control
07. Zigbee Basic Communication
08. Zigbee Communication Expansion
 - Multiple Coordinator Communication
 - Network Analysis Tool

09. Zigbee and BLE
10. Lora Communication
11. Sensor Network Application Project I
12. Sensor Network Application Project II
13. Sensor Network Application Project III
14. Sensor Network Application Project IV

[Appendix]

01. Additional Function on Visual Studio Code
02. Edge Server Initialization
03. Python

