

XNode Prime IOT-015



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 Window protocols

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

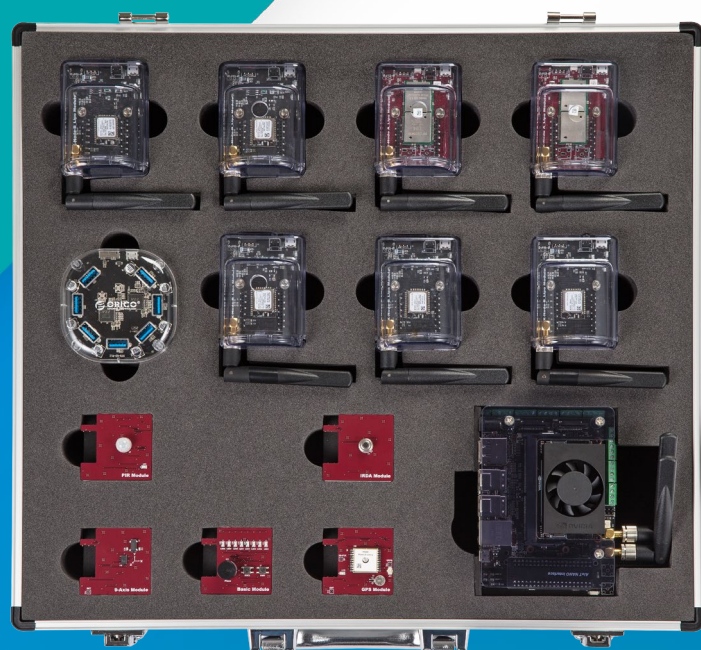
Provides 2100mA battery, RGB LED for indicator, light sensor based on lux unit and temperature/humidity sensor for independent operation of sensor node

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 pmanfm, 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
	Pop Library	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

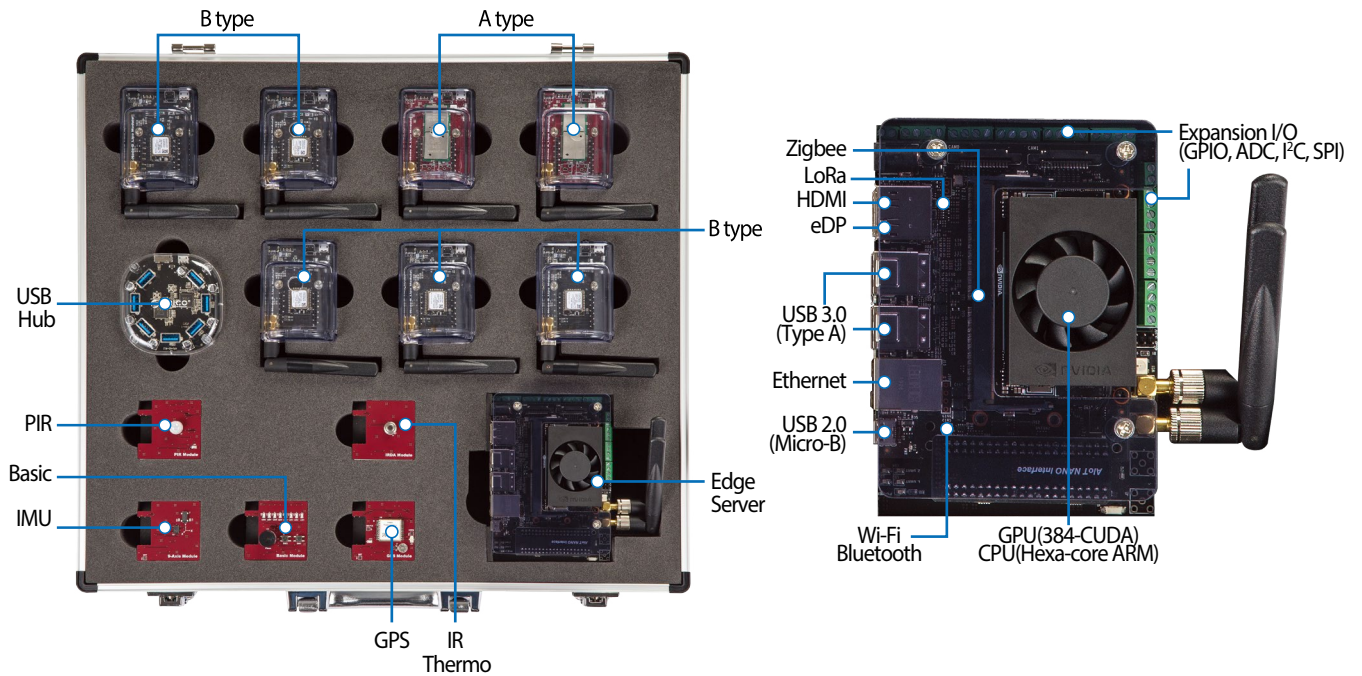
Hardware Specifications

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 VoltaTM 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

