X Node 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)

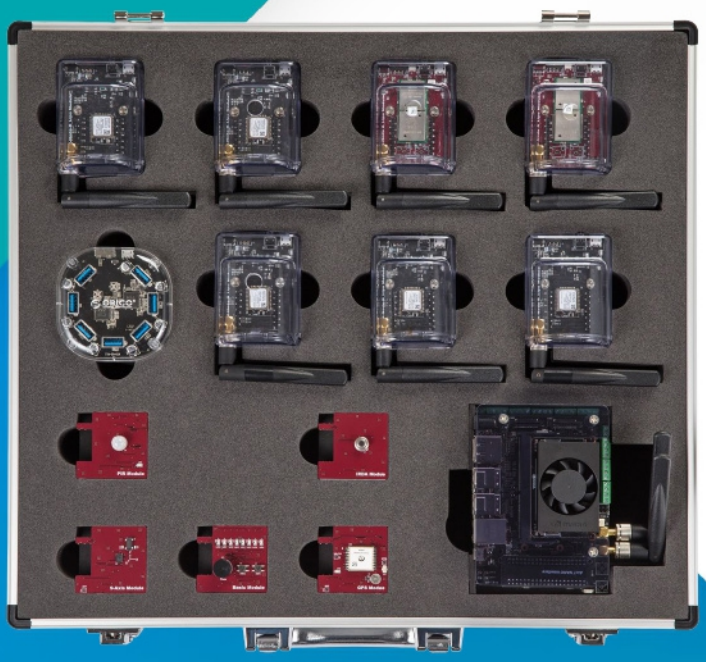
Provides 2100mA battery, RGB LED for indicator, light sensor based on lux unit and temperature/ humidity sensor for independent operation of sensor node

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	Soda OS	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
		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

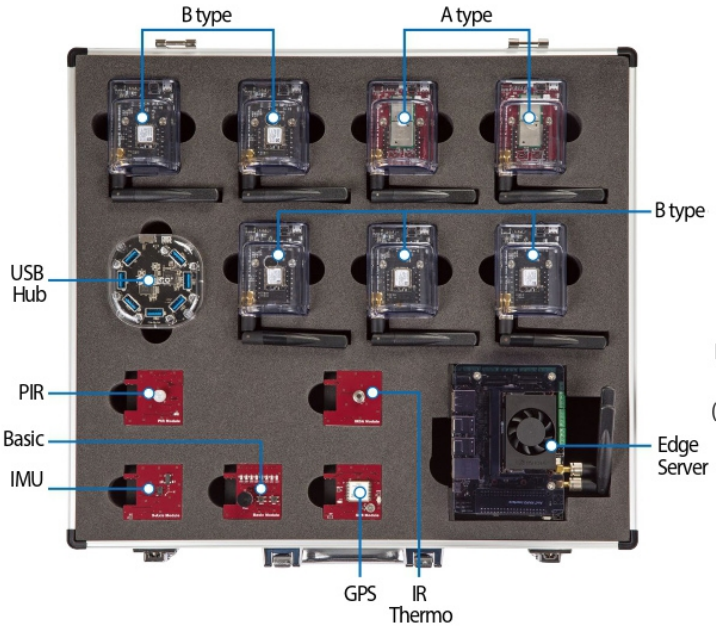
Hardware Specifications

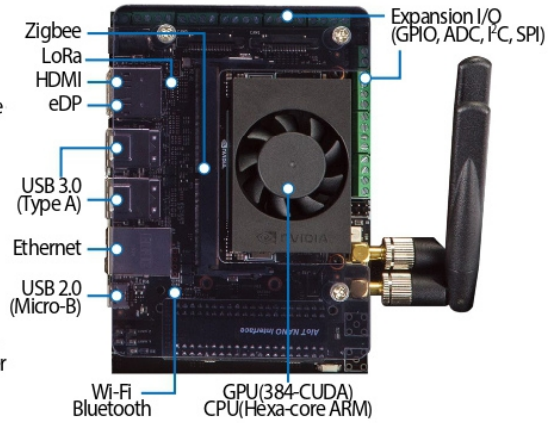
List	Specifications	
Node A (2EA)	RAM: 4MB	
	Flash Memory: 8MB	
	Interface: UART, SPI, I²C, I²S, ADC, PWM, GPIO	
	Indicator: RGB LED	
	Wi-Fi	802.11b/g/n Data Rate: 1Mbps to 72Mbps Transmit power: Up to +16dBm Receiver Sensitivity: -93 to -71 dBm
	Bluetooth	Bluetooth 4.2 BR/EDR BLE Range: 30M Data Rate: 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: I²C
	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: I²C
	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, I²C, 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: I²C
	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: I²C
	Power	Micro USB B type(+5V) Expansion Connector (+5V) Li-Po Type 3.7V/2100mAh (1EA)
Expansion Module	Basic	Input Device: Tact Switch x2EA(GPIO) output device: LED 8EA(I²C) 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: I²C 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: I²C 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)

Scientech

X Node Prime

Layout





Composition

Platform USB
1EA

Micro USB Cable
8EA

User Guide book
1EA

USB to Ethernet Adapter
1EA

Ethernet Cable
1EA

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

Subject to Change

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