



loT connectivity application practical training equipment based on wireless personal area network (WPAN)

















#### **Product Features**

IoT connectivity application training equipment based on wireless personal network (WPAN)

By using the mesh network method, it can be used in large quantities in a wide range of areas such as wireless control and monitoring, and a wide range of communication is possible

Provides an environment for building a smart home with devices used in real home appliances such as door locks, gas circuit breakers, gas detectors, fans, and LED lights

DC power is supplied and measured by the XNode Power board, and the measured usage can be monitored remotely

Provides sensors such as GPS, IrThermo, IMU, and PIR in addition to the Basic Module

The sensor node provides a 2100mA battery so that it can be operated independently, and also provides an LED for an indicator, and a light sensor and temperature/humidity sensor based on lux units

Provided sensor node supports interpreter-style Python 3 to write control programs easily and concisely Visual Studio Code-based integrated development environment for professional application development

Provides training contents for Python-based sensor nodes

## Software Specifications

	List	Specifications			
		MicroPython 3 (built in node)			
		VSCode4Soda	VSCode4Soda		
	Node B	Configuration Software	Configuration Software (compatible with Linux, OS X and Windows)		
	Node b	Remote Terminal & Remote Desktop support			
		Pop Library	Output Object: LED, Buzzer		
			Input Object: Switch, PIR, Thermopile, 9Axis IMU, GPS		



## Hardware Specifications

List		Specifications	List		Specifications
	RAM: 128KB		-	RAM: 128KB	
	Flash Memory: 1MB			Flash Memory: 1MB	
	Interface: UART, SPI, I <sup>2</sup> C, ADC, PWM, GPIO			Interface: UART, SPI, I <sup>2</sup> C, ADC, PWM, GPIO	
	Indicator: LED			Indicator: LED	
XNode Power	ZigBee 3.0	Frequency: 2.4GHz Range: Max 3200m (Outdoor), Max 90m(Indoor) Data Rate: 250kbps Sensitivity: 103dBm Output Power: 19dBm Receiver Sensitivity: 100dBm Bluetooth Support	XNode Auto	ZigBee 3.0	Frequency: 2.4GHz Range: Max 3200m (Outdoor), Max 90m(Indoor) Data Rate: 250kbps Sensitivity: 103dBm Output Power: 19dBm Receiver Sensitivity: 100dBm Bluetooth Support
	Measure: DC Cur			Relay: 3ch	DC: 5A/30VDC AC: 5A/250VAC
	Power Output: DC 12V x 3EA		-	Motor Driver: Dual FullBridge Driver(4A/46V)	
	Size: 93.5 x 76(mm)			Size: 103 x 89(mm)	



List	Specifications		List		Specifications
	RAM: 128KB				Sensing Range: 110° Spectral Response: 5 ~ 14 um I/O Interface: Digital Out
	Flash Memory: 1MB			PIR Senor	
	Interface: UART, SPI, I <sup>2</sup> C, ADC, PWM, GPIO				
	Indicator: LED				Size: 46x44(mm)
	ZigBee 3.0  Light Sensor	Frequency: 2.4GHz Range: Max 3200m (Outdoor), Max 90m(Indoor) Data rate: 250kbps Sensitivity: 103dBm	Expansion Module	Infrared Thermometer	Measurement Resolution: 0.02°C Measure Range: 40°C ~ +125°C Interface: I <sup>2</sup> C Size: 46x44(mm)
Node B (3a)		Output Power: 19dBm Receiver Sensitivity: 100 dBm Bluetooth Support Illuminance: 1 ~ 65535(lx)		GPS Module	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)
		Interface: I <sup>2</sup> 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: 1 <sup>2</sup> C		Door Lock	Method: One Way Solution (Secret Code) Operating Voltage: 8V
	Power	Micro USB B Type(+5V) Expansion Connector (+5V) LiPo Type 3.7V/2100mAh (1EA)		Gas Sensor	Operating Voltage: 12V Type: Stand Alone, Immediate, Diffusion
	Basic	Input Device: Tact Switch x 2EA(GPIO) asic Output Device: LED 8EA(I <sup>2</sup> C) Actuator: Passive Buzzer(GPIO)		Gas Sensor	Applicable Gas: LNG, Town Gas Alarm Indication: Flashing Yellow, Buzzer
Expansion Module	Size Acce ±2g/ Gyrc 9axis Sensor  9axis Sensor  4125 Mag ±130 Inter	Size: 46x44(mm)  Acceleration ranges: ±2g/±4g/±8g/±16g Gyroscope ranges: ±125°/s to ±2000°/s		Gas Circuit Breaker	Shutoff Method: Geared Motor Opening/Closing Speed: >10s Current Rating: Max 500mA
Module				MR16 LED	12V/6W
		Magnetic Field Range: ±1300uT(x,y axis), ±2500uT(z axis) Interface: I <sup>2</sup> C Size: 46x44(mm)		FAN	12V/140mA FAN Speed: 1300rpm Size: 60x60x15(mm)



# Edge Server [Option]

Edge server supports sensor node control and artificial intelligence convergence programming in a web browser environment through Soda OS, an AloT-only operating system, and Pop Library

Edge server supports mDNS/DNS-SD, SSH, SFTP, SMB/CIFS, MQTT, NXX Window protocol Soda OS and Pop Library, an AloT-only operating system are provided



Edge Server **Option** 



# Software Specifications

List		Specifications		
		Linux Kernel	aarch32 4.x or aarch64 4.x	
		Lightweight Desktop	X-Server, Openbox, Ixdm, 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	Multimedia	PulseAudio, sox (lame, oggenc), snowboy, Google Assistant	
Edge Server			OpenGL ES, OpenCV 4	
(Gateway)		Data Science & Al	Numpy, Matplotlib, Pandas, Scipy, Seaborn	
(Gateway)			Scikit-learn, TensorFlow, Keras, PyTorch, TorchVision, OpenAl 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	
		Al Object	Linear Regression, Logistic Regression, Perceptron, ANN, DNN, CNN, DQN	
			Pilot with AutoCar & SerBot	



List	Specifications		
	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)	
Edge Server (Gateway)		6x 1080p@ 60(HEVC), 14x 1080p@ 30(HEVC)	
Edge Server (Gateway)	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)	
	Col Calliela	12 Lanes MIPI CSI-2, D-PHY 1.2(up to 30 Gbps)	
		Dual Band Wireless Wi-Fi 2GHz/5GHz Band, 867Mbps, 802.11ac	
	Connectivity	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	

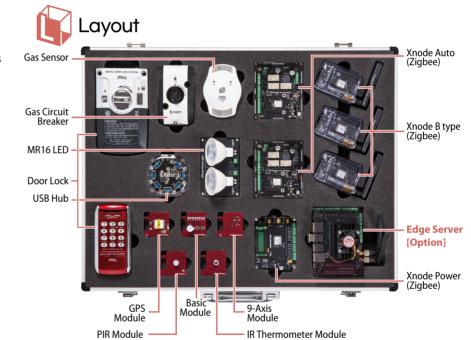


## **Training Contents**

- 1. Components and Concepts of Sensor Network
- 2. Sensor Network Platform
- 3. Sensor Network Protocol
- 4. Sensor Network **Development Environment**
- 5. Basic Sensor Control
- 6. Extension Module Control
- 7. Zigbee Basic Communication
- 8. Zigbee Communication Extension
- 9. Zigbee and BLE
- 10. Sensor Network **Application Project**

#### **Appendix**

- 1. Visual Studio Code Add-on
- 2. Edge Server Initialization
- 3. Python





### Composition













User Guide book 1EA

Platform USB 1EA Micro USB Cable 5EA



DC Jack Cable 2FA

