

AIoT

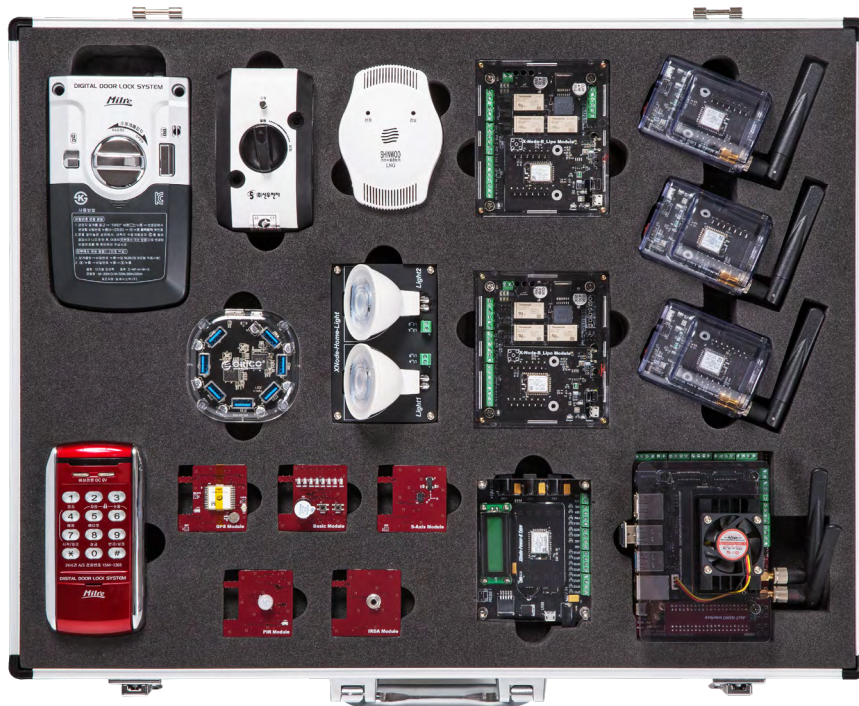
IT EDUCATION PLATFORMS



XNode Home

IOT-014

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



XNode Home



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
Node B	MicroPython 3 (built in node)
	VSCode4Soda
	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	List	Specifications
XNode Power	RAM: 128KB	XNode Auto	RAM: 128KB
	Flash Memory: 1MB		Flash Memory: 1MB
	Interface: UART, SPI, I ² C, ADC, PWM, GPIO		Interface: UART, SPI, I ² C, ADC, PWM, GPIO
	Indicator: LED		Indicator: LED
ZigBee 3.0	Frequency: 2.4GHz Range: Max 3200m (Outdoor), Max 90m(Indoor)	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		Data Rate: 250kbps Sensitivity: 103dBm Output Power: 19dBm Receiver Sensitivity: 100dBm Bluetooth Support
	Measure: DC Current		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)	

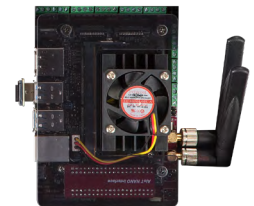
Hardware Specifications

List	Specifications	List	Specifications		
Node B (3a)	RAM: 128KB	PIR Sensor	Sensing Range: 110°		
	Flash Memory: 1MB		Spectral Response: 5 ~ 14 um		
	Interface: UART, SPI, I ² C, ADC, PWM, GPIO		I/O Interface: Digital Out		
	Indicator: LED		Size: 46x44(mm)		
	ZigBee 3.0		Frequency: 2.4GHz	Infrared Thermometer	Measurement Resolution: 0.02°C
			Range: Max 3200m (Outdoor), Max 90m(Indoor)		Measure Range: 40°C ~ +125°C
Data rate: 250kbps		Interface: I ² C			
Sensitivity: 103dBm		Size: 46x44(mm)			
Output Power: 19dBm					
Light Sensor	Receiver Sensitivity: 100 dBm	GPS Module	Sensitivity: 165dBm		
	Bluetooth Support		Update Rate: up to 10Hz		
Humidity & Temperature Sensor	Illuminance: 1 ~ 65535(lx)	Door Lock	AGPS Support for Fast TTFF		
	Interface: I ² C		Consumption Current(@3.3V)		
Power	Humidity Resolution: 12bit(0.04%RH), 8bit(0.7%RH)	Expansion Module	Acquisition: 25mA Typ		
	Humidity Accuracy: +3%RH		Tracking: 20mA Typ		
Basic	Temperature Resolution: 14bit(0.01C), 12bit(0.04C)	Gas Sensor	Size: 46x44(mm)		
	Temperature Accuracy: +4°C		Method: One Way Solution (Secret Code)		
Expansion Module	Interface: I ² C	Gas Circuit Breaker	Operating Voltage: 8V		
	Micro USB B Type(+5V)		MR16 LED	Operating Voltage: 12V	
9axis Sensor	Expansion Connector (+5V)	FAN		Type: Stand Alone, Immediate, Diffusion	
	LiPo Type 3.7V/2100mAh (1EA)		FAN Speed: 1300rpm		
Input Device: Tact Switch x 2EA(GPIO)	Output Device: LED 8EA(I ² C)	Actuator: Passive Buzzer(GPIO)	Alarm Indication: Flashing Yellow, Buzzer		
			Size: 46x44(mm)	Shutoff Method: Geared Motor	
Acceleration ranges: ±2g/±4g/±8g/±16g	Gyroscope ranges: ±125°/s to ±2000°/s	Magnetic Field Range: ±1300uT(x,y axis), ±2500uT(z axis)	Opening/Closing Speed: >10s		
			Interface: I ² C	Current Rating: Max 500mA	
Size: 46x44(mm)			12V/6W		
				12V/140mA	

Edge Server [Option]

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



Edge Server Option

Software Specifications

List	Specifications	
Edge Server (Gateway)	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	PulseAudio, sox (lame, oggenc), snowboy, Google Assistant
	Multimedia	OpenGL ES, OpenCV 4
	Data Science & AI	Numpy, Matplotlib, Pandas, Scipy, Seaborn
	Jupyter Lab	Scikit-learn, TensorFlow, Keras, PyTorch, TorchVision, OpenAI Gym
	Multimedia Object	Python3 and Cling support
Pop Library	Terminal support	IPython Widgets
	Voice Assistant Object	Terminal support
	AI Object	Linear Regression, Logistic Regression, Perceptron, ANN, DNN, CNN, DQN
		Pilot with AutoCar & SerBot

Hardware Specifications

List	Specifications	
Edge Server (Gateway)	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 Wi-Fi 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

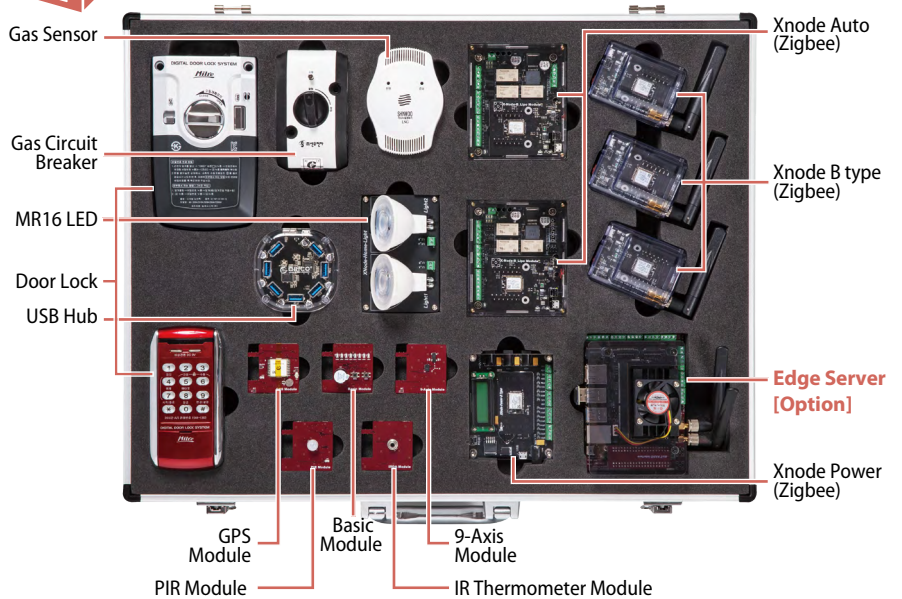
Training Contents

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

Layout



Composition



Composition

