AIoT
Server Plus

AI and IoT application lab equipment which gives more freedom to use by module-to-module cabling

AIoT Server Plus provides a variety of exercises ranging from development environments, sensor control, databases, multimedia, and artificial intelligence on high performance edge devices based on Soda OS. This enables you to acquire the foundational knowledge and application projects required for developing on-device AI applications

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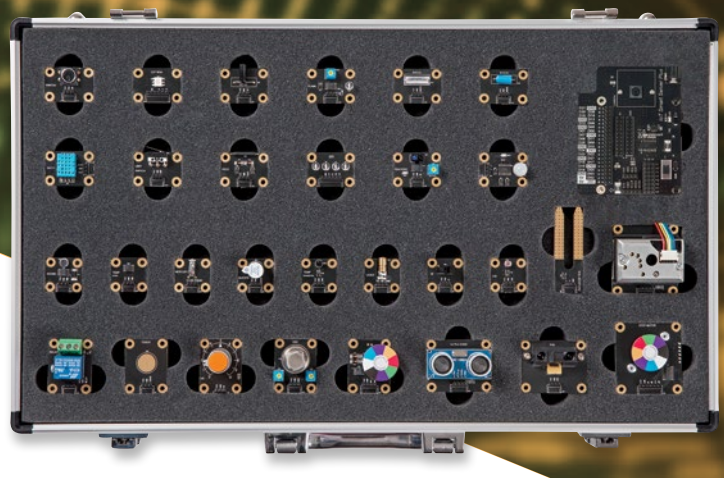


Product Features

- Module-to-module cabling makes AI and IoT application practice equipment easier to use
- Consists of ARM Cortex-A72 quad-core processor module, dedicated shield and IoT sensor module
- 2.54mm jumper cables and 30 IoT sensor modules enable a variety of real-world ideas
- Provides 8M pixel high resolution camera for image processing applications
- Provides Gigabit Ethernet, dual band Wi-Fi (2.4GHz, 5GHz) and Bluetooth 5.0
- Headsets support cloud-based speech recognition and audio playback
- Tensor processor unit module can be added as an option
- Soda OS and Pop library, the exclusive AIoT operating system
- Interpreter-based C/C++ development environment optimized for beginners in programming, including Python 3
- Dedicated web browser-based learning environment for learning Python 3 and C/C++ simultaneously on PCs and tablets
- mDNS/DNS-SD based distributed name resolution and network service publishing and discovery
- Integrated development environment based on Visual Studio Code for professional application development
- IoT sensor control and multimedia, AI learning contents

Software Specifications

Module	Item	Specifications
Soda OS	Linux Kernel	4.19
	Desktop	X-Server, Openbox, LightDM, Tint2, blueman, network-manager, conky
	CLI	Zsh, Tmux, Peco, powerlevel9k thema, Powerline fonts
	Tool Chain	GCC 9, JDK, Node JS, Python3, Clang
	IDE	Visual Studio Code, NeoVim, Geany
	Connectivity	Mosquitto(MQTT), Bluez, mtr, nmap, iptraf, Samba, Blynk Server, Remove Desktop Server
	Multimedia	portaudio. sox, OpenCV 4, snowboy, Google Assistant
	Data Science & AI	Python3, Numpy, Matplotlib, sympy, Pandas, Seaborn, Scipy, Gym Scikit-learn, Tensorflow, Keras
Pop library V1.0	Output Object (C/C++, Python3)	Led, Laser, Buzzer, Relay, RGBLed, DCMotor, StepMotor, OLed PiezoBuzzer, PixelDisplay, TextLCD, FND, Led Bar
	Input Object (C/C++, Python3)	Switch, Touch, Reed, LimitSwitch, Mercury, Knock, Tilt, Opto, Pir, Flame LineTrace, TempHumi, UltraSonic, Shock, Sound, Potentiometer, Cds SoilMoisture, Thermistor, Temperature, Gas, Dust, Psd. Gesture
	Multimedia (Python3)	AudioPlay, AudioPlayList, AudioRecord, Tone, SoundMeter
	Voice Assistant (Python3)	GAssistant, create_conversation_stream
	AI (Python3)	Linear Regression, Logistic Regression, Perceptron, ANN, DNN, CNN, DQN

Hardware Specifications

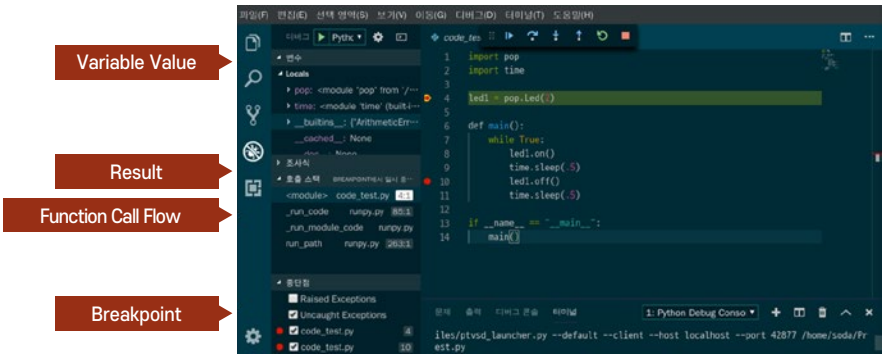
Module	Item	Specifications	
On Device Server	CPU	1.5GHz quad-core 64-bit ARM Cortex-A72 CPU	
	GPU	VideoCore VI graphics, supporting OpenGL ES 3.x	
	Video	4Kp60 hardware decode of HEVC, Dual monitor support, at resolutions up to 4K1	
	Memory	4GB of LPDDR4 SDRAM	
	Storage	32GB	
	USB	Two USB 3.0 and two USB 2.0 ports	
	Ethernet	Full-throughput Gigabit Ethernet	
	Wireless	Dual-band 802.11ac wireless networking and Bluetooth 5.0	
	Expansion I/O	40ea GPIO(2x20 2.54mm Pitch Header)	
	Size	88x58mm	
Shield Board	Camera	Still resolution	8 Megapixels
		Video modes	1080p30, 720p60 and 640 × 480p60/90
		Linux integration	V4L2 driver available
		Sensor	Sony IMX219
		Sensor resolution	3280 × 2464 pixels
		Optical size	1/4"
		Focal length	3.04 mm
	ADC	8ch 12bit Analog to Digital Converter	
	Expansion I/O	40ea GPIO(2x20 2.54mm Pitch Header)	
	size	85x66mm	
Sensor Modules	Pir Sensor	Sensor : RE200B Sensing Range : 110 Degree Operating Voltage : 3.3V I/O Interface : 1 pin Digital Out	
	Sound Sensor	Sensor : Microphone Operating Voltage : 5V I/O Interface : 1 pin Analog Output	
	Humidity Temperature Sensor	Sensor : DHT11 Operating Voltage : 5V I/O Interface : 1 pin Digital Output	
	Ultrasonic	Sensor : HC-SR04 Feature : 2~200cm distance measuring range, 40KHz Frequency Operating Voltage : 5V I/O Interface : 1 pin Digital Output, 1 pin Digital Input	
	Cds Sensor	Operating Voltage : 5V I/O Interface : 1 pin Analog Output	
	Potentiometer	Sensor : 1k(ohm) Variable Resistor Feature : 0~5V DC Variable Voltage out I/O Interface : 1 pin Analog Output	
	Tilt Sensor	Contact Resistance : 50m(ohm) Max Operating Voltage : 3.3v~5V I/O Interface : 1 pin Digital Output	
	Mercury Sensor	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output	
	Reed Sensor	Operating Voltage : 3.3V~5V Switching Current : 0.5A I/O Interface : 1 pin Digital Output	
	Psd Sensor	Operating Voltage : 3.3V~5V Sensing Range : 2~40cm I/O Interface : 1 pin Analog Output	

Module	Item	Specifications
Sensor Modules	Flame Sensor	Operating Voltage : 3.3V~5V Sensing Range : 60 Degree I/O Interface : 1 pin Digital Output
	Touch Sensor	Sensor: TTP223 Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	Opto Sensor	Sensor : FC33 Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	Shock Sensor	Sensor : SW-420 Operating Voltage : 5V I/O Interface : 1 pin Anlog Output
	Dust Sensor	Sensor : GP2Y1014AUOF Operating Voltage : 5V I/O Interface : 1 pin Analog Output, 1 pin Digital Input
	Gas Sensor	Sensor : MQ-1 Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output, 1 pin Analog Output
	Soil Moisture	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Analog Output
	Line Trace Sensor	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	Thermistor	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Analog Output
	Temperature	Sensor : LM35 Operating Voltage : 3.3V~5V I/O Interface : 1 pin Analog Output
	Limit Switch	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	knock Sensor	Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
	Relay	Feature : NC/NO Relay, 250VAC 10A/30VDC 10A Operating Voltage : 3.3V~5V I/O Interface : 1 pin Digital Output
Actuator Modules	LED Module	Operating Voltage : 3.3V~5V Current : 20mA I/O Interface : 1 pin Digital input
	DC Motor	Motor : Micro Type DC Motor Motor Driver : TB6552 Operating Voltage : 5V I/O Interface : 2 pin Digital input
	Step Motor	Feature : 32 Step, 1/16Gear Motor Motor driver : ULN2003 Operating Voltage : 5V I/O Interface : 4 pin Digital input
	Switch Module	Feature : Tact Button I/O Interface : 1 pin Digital input
	Buzzer Module	Sound Output at 10cm : 60dB(Min) Operating Voltage : 3.3V~5V Current Consumption : 2mA I/O Interface : 1 pin Digital input
	Laser Module	Wavelength : 650nm Operating Voltage : 5V I/O Interface : 1 pin Digital input
	RGB LED	Operating Voltage : 3.3V~5V I/O Interface : 3 pin Digital input
Network Adaptor	USB 3.0 Gigabit Ethernet Card IEEE 802.3/ 802.3u/ 802.3au 10/100/1000Mbps RJ-45 62x23x16mm(LxWxH)	
Sound Card	Virtual 7.1ch USB2.0 to Audio Converter Realtek ALC DAC/ADC 48KHz 16bit output, I2S/PCM/TDM support 47x28x12mm(LxWxH)	

Advantages of AIoT Server Plus

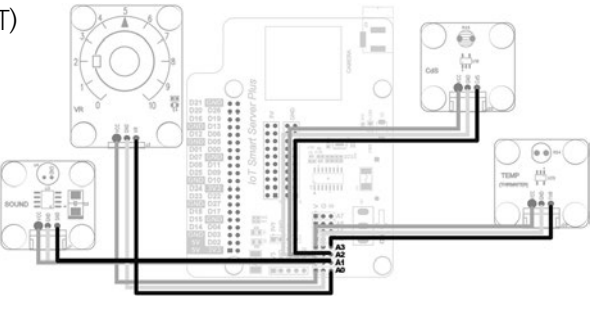
Part I Edge Device Development Environment

- AIoT Server Plus & Soda OS
- Host & Edge Device Connection
- Edge Device Support Software
- Python 101
- Desktop Environment
- CLI Environment
- Linux 101



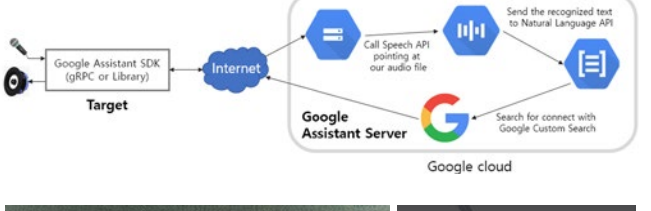
Part II Sensor Programming

- Circuit basics (charge, voltage, current, resistance, capacitors, inductors, diodes, transistors, computer amplifiers, comparators, integrated circuits, electrical supply devices)
- Hardware Interface (Signal Type, GPIO, PWM, ADC, I 2 C, SPI, UART)
- WiringPi and Pop Library
- GPIO output device control (Led, Buzzer, DC Motor)
- GPIO input device control (Switch, Pir, Ultrasonic)
- ADC Input device control (Potentiometer, Sound, Cds, Thermistor)
- Reading multiple analog sensor values



Part III IoT Application Technology

- Saving sensor value as text file and drawing chart with Excel
- Collecting sensor values and running multiple SQL statements
- WAV file playback and waveform output
- Using the microphone as an ambient noise level sensor
- Google text-to-speech converter
- Using Google Assistant API
- Creating stop motion with GAssistant-based user device action cameras and switch modules
- Recording whenever a human movement is detected by camera and Pir module
- Creating a vehicle video recording device with camera and shock module
- Gesture detection system
- OpenCV and Matplotlib Visualization
- Video capture with OpenCV and PiCamera



Part IV AI Application Technology

- Numpy for fast multidimensional matrix operations
- Pandas for time series and tabular data analysis
- Matplotlib for data visualization
- Understanding supervised and unsupervised learning
- Theory & practical exercise for Pop.AI-based linear regression algorithm
- Theory & practical exercise for Pop.AI-based logistic regression algorithm
- Theory & practical exercise for Pop.AI-based perceptron
- Theory & practical exercise for Pop.AI-based ANN
- Theory & practical exercise for Pop.AI-based DNN
- Theory & practical exercise for Pop.AI-based CNN
- Theory & practical exercise for Pop.AI & OpenAI DQN-based reinforcement learning
- Theory & practical exercise for Pop.AI-based On-device AI
- Understanding Tensorflow
- High level AI library design

Training Contents

Introduction to AIoT Server Plus

- Configuration and Lab Environment of AIoT Server Plus
- Python &Linux 101

IoT Application Technology

- Saving sensor value as text file and drawing chart with Excel
- Collecting sensor values and running multiple SQL statements
- WAV file playback and waveform output
- Using the microphone as an ambient noise level sensor
- Google text-to-speech converter
- GAssistant-based user device action
- Application of camera & sensors

Sensor Programming

- GPIO output device control
- GPIO input device control
- ADC input device control

AI Technology

- Numpy for fast multidimensional matrix operations
- Pandas for time series and tabular data analysis
- Matplotlib for data visualization
- Supervised and unsupervised learning
- Theory & practical exercise for Pop.AI-based linear regression & logistic regression algorithm
- Theory & practical exercise for Pop.AI-based perceptron
- Theory & practical exercise for Pop.AI-based ANN, DNN and CNN
- Theory & practical exercise for Pop.AI & OpenAI DQN-based reinforcement learning
- Understanding Tensorflow

Product Composition

AIoT Server Plus

5V 4A Power Adapter
1EA

Micro SD Adapter
1EA

USB to Ethernet Adapter
1EA

Ethernet Cable
1EA

Earphone Mic
1EA

User Guide book
1EA