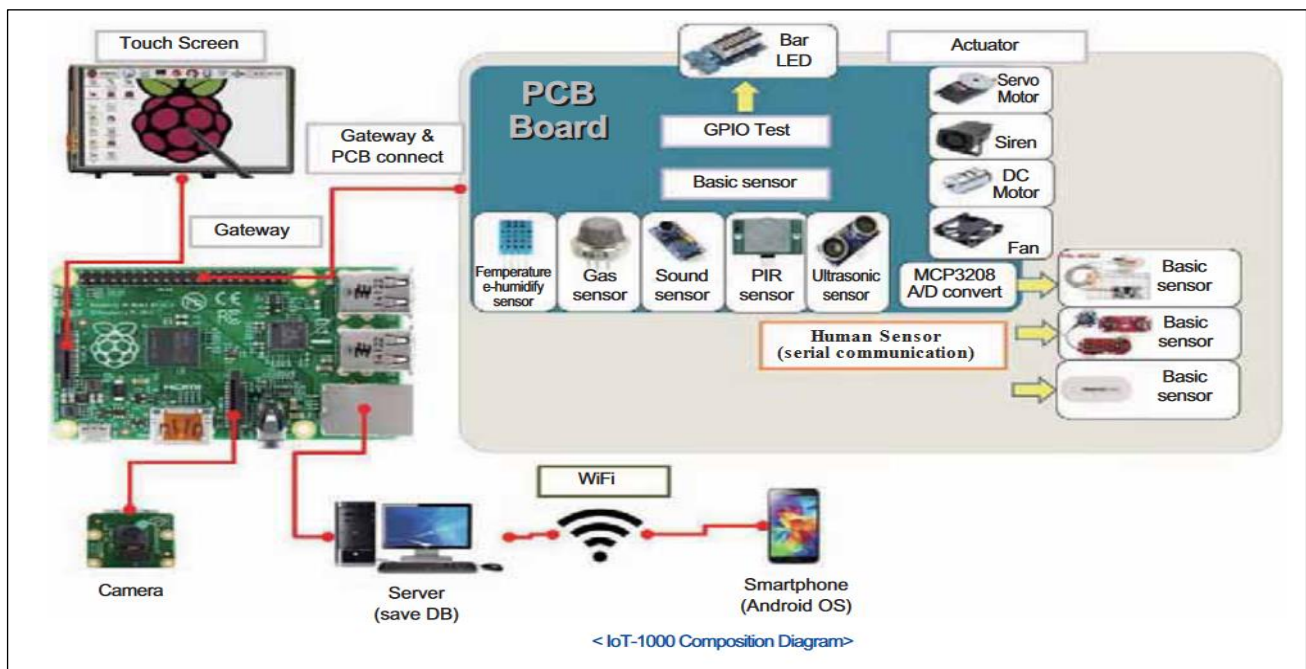


IOT Training System

- AI and IoT convergence training equipment using 2D model of living room of home
- Main module supporting AI acceleration calculation, multimedia and various IoT sensors are integrated into the base board
- The main module is selectable between a 128-core GPU supercomputer for edge devices or a Cortex-A72 quad-core processor with tensor processor unit
- 5 inch TFT LCD with 800x480 resolution and 8M pixel high resolution camera
- Provides Gigabit Ethernet, dual band Wi-Fi(2.4GHz, 5GHz) and Bluetooth 4.2 or 5.0
- Digital microphones and speakers support cloud-based speech recognition and audio playback
- 4 dedicated expansion interfaces support various IoT sensor modules
- Positioning sensors and actuators by creating 2D models of living rooms in real homes to increase attention
- Soda OS, the exclusive AIoT operating system, and Pop library
- Interpreter-based C/C++ development environments optimized for beginners to program including Python 3
- A dedicated web browser-based learning environment for training Python 3 and C/C++ simultaneously on PCs and tablets
- mDNS/DNS-SD based distributed name resolution, network service publishing and discovery support
- Open Integrated development environment based on Visual Studio Code for professional application development
- Educational contents for IoT sensor control, multimedia and AI
- AIoT Home Plus provides 8 types of IoT sensor modules connected to a dedicated expansion interface
- AIoT Home PrimeX contains a supercomputer up to 21TOPS supporting all AI frameworks



Composition Diagram

Training Contents

Introduction to AIoT Home
 Configuration and Practice Environment of AIoT Home
 Python and Linux 101
 IoT Application Technology

Sensor Control

File and DB-Based Data Persistence
 Audio Recording and Playback
 Google Text-to-Speech Converter
 Google Assistant and User Device Actions
 Camera and Sensor Applications

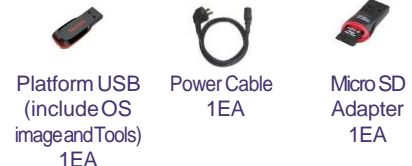
AI Technology

Numpy for Fast Multidimensional Matrix Operations
 Pandas for Time Series and Tabular Data Analysis
 Matplotlib for Data Visualization
 Supervised and Unsupervised Learning
 Theory & Practice for Pop.AI-based Linear and Logistic Regression Algorithm
 Theory & Practice for Pop.AI-based Perceptron
 Theory & Practice for Pop.AI-based ANN, DNN, and CNN
 Theory & Practice for Pop.AI & OpenAI DQN-based Reinforcement Learning
 Understanding Tensorflow

Product Configuration



8 types of sensor modules



Platform USB
(include OS
image and Tools)
1EA

Power Cable
1EA

Micro SD
Adapter
1EA



USB to Ether- Ethernet Cable

Micro USB



User Guid

Software Specification

Note: Picture just Reference. It may change

	List	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, Kerast
Pop Library	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

Main Module A (select 1) Only one of two main module3 can be 3elected

List	Specifications
CPU	Quad-Core ARM A57 @ 1.43 GHz
GPU	Maxwell Core 128EA
Memory	4GB 64-bit LPDDR4 25.6 GB/s
Storage	MicroSD (64GB)
Camera	MIPI CSI-2 DPHY Lanes
Connectivity	Dual Band Wireless Wi-fi 2GHz/5GHz Band, 867Mbps, 802.11ac, Bluetooth 4.2, Gigabit Ethernet
Display	HDMI and Display Port
USB	4x USB 3.0, USB 2.0 Micro-B
Video Encoder	4K@30 4x 1080p@30 9x 720p@30 (H.264/H.265)
Video Decoder	4K@60 2x 4K@30 8x 1080p@30 18x 720p@30 (H.264/H.265)

Main Module B (select 2) Only one of two main module3 can be 3elected

List	Specifications
CPU	BroadcomBCM2711, QuadCoreCortex-A72(ARMv8)64-bitSoC@1.5GHz
GPU	OpenGL ES 3.0
Memory	4GB LPDDR4-3200
Storage	32 GB Micro SD
Camera	2-Lane MIPI CSI camera port
Connectivity	Gigabit Ethernet, Wi-Fi 2.4G & 5G 802.11ac, Bluetooth 5.0, BLE
Display	Micro-HDMI 2Port (Up to 4kp60 Supported) 2-Lane MIPI DSI Display Port
USB	USB 3.0 2port, 2.0 2port
Codec	H.265 (4kp60 Decode), H264 (1080p60 Decode, 1080p30 Encode)

Base Board

List	Specifications
Camera	Image Sensor : Sony IMX219 Resolution : 8M Pixel Native Resolution Sensor (3280 x 2464 Pixel Static Images) Video : 1080p30, 720p60 and 640x480p90 Linux Integration : V4L2 Driver Available Focal length : 3.04 mm Horizontal Field of View : 62.2 Degrees Vertical Field of View : 48.8 Degrees Focal ratio (F-Stop) : 2.0
Sound	Sound IC : WM8960 Interface : I ² C, I ² S Channel : Input 2ch, Output 2ch Programmable ALC / Limiter and Noise Gate On-Chip Headphone driver 40mW Output Power Into 16Ω at 3.3V 2CH Microphone Stereo Speaker
Servo Motor	Dead Zone Width : 5μsec Working Speed : 0.12sec/60 (4.8V no Load) Stall torque : 1.2kg/cm (4.8V), 1.6kg/cm (6.0V) Neutral Location : 1500us Interface : I ² C Operating Voltage : 5V
TEXT LCD	CHARACTER LCD Format Size : 16 X 2 LED B/L, Black and White Interface : GPIO Supply Voltage : 5V
LED	(1x3) Group x 3EA : Light Display Stand Light Display 1EA Size : 5pi Color : Diffused White Interface : GPIO Current : 14mA Interface : GPIO Supply Voltage : 3.3V
RGB LED	Size : 5pi Wavelength : RED(630 nm), GREEN(525 nm), BLUE(430 nm) Supply Voltage : RED(2.1-2.5V), GREEN(3.8-4.5V), BLUE(3.8-4.5V) @20mA Interface : I ² C Operating Voltage : 3.3V
PIEZO	Rated Current : Max30mA Sound Output at 10cm(dB) : Min85dB Interface : GPIO Operating Voltage : 3.3V
FAN	Size : 30 X 30mm Speed : 900RPM Type : Common Cathode Interface : GPIO Supply Voltage : 5V
LED BAR x 2EA	Size : 20 X 10mm Type : Common Cathode Interface : GPIO Supply Voltage : 3.3V

List	Specifications
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 Supply Voltage : 3.3V
PIR Sensor	Transmittance : ≥75% Signal Output [Vp-p] : ≥3500mV Sensitivity : ≥3300V/W Detect : ≥1.4X108cm Detecting Distance : 10-80cm Interface : GPIO Supply Voltage : 3.3V
DUST Sensor	Based on Laser Scattering Technology Measured Particle Size : 0.3μm-10μm Measurement Range : PM1.0/PM2.5/PM10: 0-1,000μg/m ³ Time to First Reading : ≤8s Working Condition : -10°C-50°C, 0-95%RH (Non-Condensing) Interface : I ² C Supply Voltage: 5V
TFT LCD	Size : 4 inch Resolution : 800X480 IPS technology, High Quality and Perfect Displaying From Very Wide Viewing Angle Interface : HDMI Back Light Control to Low Power Consumption
Illuminance Sensor	Sensor : CdS Power Dissipation(at 25) : 100mW Temp.Range : -30-+70°C Light Resistance at 10Lux(at 25) : Min 20, Max 50Kohm Gamma Value at 10-100Lux : 0.7typ Dark Resistance at 0 Lux(10sec After Shut off 10Lux) : Min 2Mohm Peak Spectral Response: Min 550nm, Max 650nm interface : ADC Supply Voltage : 3.3V
GAS Sensor	Measure : LPG, Alcohol, Propane, Hydrogen, CO and Even Methane Analog Output Voltage : 0V to 5V Preheat Duration 20 Seconds Interface : ADC Supply Voltage : 5V
Touch Keypad	12Key Input Key Outline Size : 10 X 10mm Interface : I ² C Supply Voltage : 3.3V
Sensor Module Block	Sensor Block1 : +5V, +3.3V, GND, I ² C, ADC 2EA, GPIO 3EA Sensor Block2 : +5V, +3.3V, GND, I ² C, ADC 2EA, GPIO 3EA Sensor Block3 : +5V, +3.3V, GND, SPI, GPIO 3EA Sensor Block4 : +5V, +3.3V, GND, ADC 1EA, GPIO 7EA
Main Board Size	460 X 310 (mm)

The specification of AIoT Home Plus is included

Hardware Specifications of AIoT Home Plus

Sensor Pack

List	Specifications
Flame Module	Sensing Range : 60 Degree I/O Interface : 2 pin Digital Output
Eco Sensor Module	Light Sensor - Illuminance to digital converter - Wide range : 1 ~ 65535(lx) Temperature Measure : -40 ~ 85°C Humidity Measure : 0 ~ 100%r.H. Pressure Range : 300 ~ 1100hPa VOC Measure : Ethane, Ethanol, Acetone, Carbon Monoxide, Butadiene, methyl I/O Interface : I ² C
Carbon Dioxide(CO ₂) Gas Sensor Module	Measuring Range : 0 ~ 10000 ppm Accuracy : ±7%~±50ppm Response Time : 18 ~ 30 sec I/O Interface : I ² C
Pixel Display	Color : Pixel RGB Pixel : 8x8 I/O Interface : GPIO(Serial protocol)
Digital Thermopile Module Laser(DTPML)	IR Refresh Rate : 50Hz Digital Resolution : 0.1°C Standard Start-UP Time : 3 sec Accuracy : ±2% Stabilization Time : 1 min I/O Interface : SPI
Microwave Motion Sensor Module	Frequency Setting : 10.525 GHz(Typ) Spurious Emission : -7.3 dBm Pulse Repetition Frequency : 2KHz Setting Time : 3 μsec I/O Interface : Pulse Operation
PIR Sensor Module	Sensing Range : 110° Spectral Response : 5 ~ 14 μm Operating Voltage : 3.3V I/O Interface : Digital Put
IR Receiver Module	Operation Voltage : 3.3V Carrier Frequency : 38kHz

Hardware Specifications of AIoT Home PrimeX

The specification of AIoT Home Plus is included

Main Module

List	Specifications
CPU	6-core NVIDIA Carmel ARM v8.2 64-bit 6MB L2 + 4MB L3 Max Freq : 2-core@1900MHz, 4/6-core@1400Mhz
GPU	384-core NVIDIA Volta™ GPU with 48 Tensor Cores Max Freq : 1100MHz
Memory	8GB 128-bit LPDDR4x@ 1600MHz
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

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