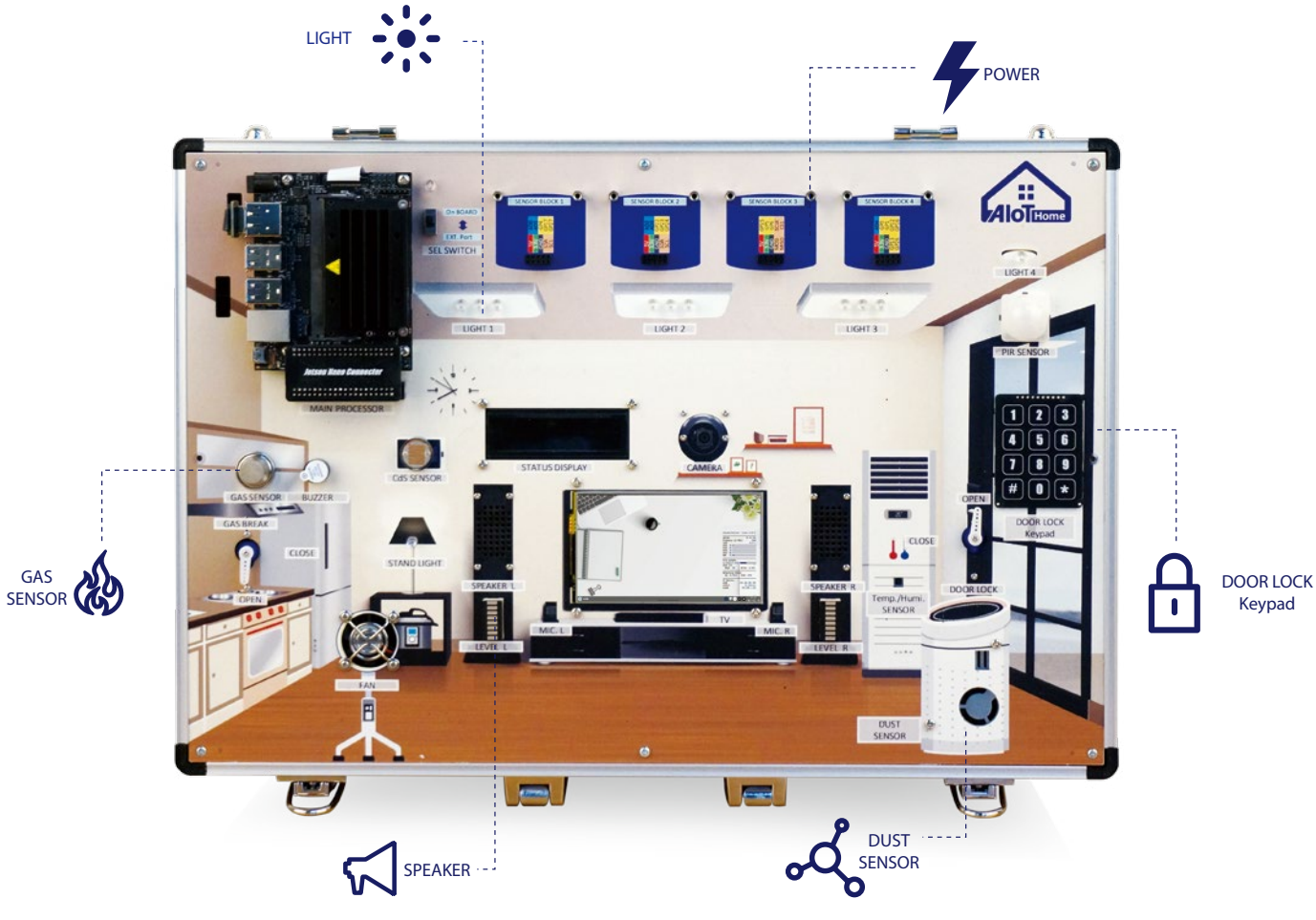
AIoT Home

AI and IoT Convergence Training Equipment using 2D Model of Living Room of Home



Smart home application equipment with on-device AI.
To increase intuition, IoT sensors and actuators are placed on 2D images of real house motif.
It provides immersive hands-on experiences such as implementing services in real homes.

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AIoT Home

Smart home application equipment with on-device AI. To increase intuition, IoT sensors and actuators are placed on 2D images of real house motif. It provides immersive hands-on experiences such as implementing services in real homes.

Product Features

- 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
- 4 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 immersion
- Soda OS, the exclusive AIoT operating system, and Pop library
- Interpreter-based C/C++ development environments optimized for programming beginners, 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

Software Specifications

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, Keras
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

List		Specifications
Main Module A (select 1)	CPU	Quad-core ARM A57 @ 1.43 GHz
	GPU	Maxwell Core 128EA
	Memory	4GB 64-bit LPDDR4 25.6 GB/s
	Storage	microSD (64GB)
	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)
	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
Main Module B (select 2)	CPU	Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz
	Memory	4GB LPDDR4-3200
	Connectivity	Gigabit Ethernet, Wi-Fi 2.4G & 5G 802.11ac, Bluetooth 5.0, BLE
	USB	USB 3.0 2port, 2.0 2port
	HDMI	micro-HDMI 2port (up to 4kp60 supported)
	Codec	H.265 (4kp60 decode), H264 (1080p60 decode, 1080p30 encode)
	Graphics	OpenGL ES 3.0
	Data Storage	32 GB Micro SD
	GPIO	40 pin GPIO header (fully backwards compatible with previous boards)
	LCD	2-lane MIPI DSI display port
	Camera	2-lane MIPI CSI camera port
	Power supply	5V DC via USB-C connector, 5V DC via GPIO header

Hardware Specifications

List		Specifications
Base Board	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^2C, I^2S 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: 5usec 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^2C Operating Voltage: 5V
	TEXT LCD	CHARACTER LCD Format Size : 16x2 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^2C Operating Voltage: 3.3V
	PIEZO	Rated Current: Max30mA Sound Output at 10cm(dB): Min85dB Interface: GPIO Operating Voltage: 3.3V
	FAN	Size: 30x30mm Speed : 900RPM Type: Common cathode Interface: GPIO Supply Voltage: 5V
	LED BAR x 2EA	Size: 20x10mm Type: Common cathode Interface: GPIO Supply Voltage: 3.3V

List		Specifications
Base Board	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^2C 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℃~50℃, 0-95%RH (non-condensing) Interface: I^2C 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℃ 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 Spectrol 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: 10x10mm Interface: I^2C Supply Voltage: 3.3V
	Sensor Module Block	Sensor Block1: +5V, +3.3V, GND, I^2C, ADC 2EA, GPIO 3EA Sensor Block2: +5V, +3.3V, GND, I^2C, ADC 2EA, GPIO 3EA Sensor Bl ock3: +5V, +3.3V, GND, SPI, GPIO 3EA Sensor Block4: +5V, +3.3V, GND, ADC 1EA, GPIO 7EA

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

Layout

01 Main Processor
02 Connection Select Switch
03 Sensor Block
04 LED Block
05 GAS Sensor
06 GAS Break(Servo Motor)
07 Buzzer
08 CdS Sensor
09 Text LCD
10 Camera
11 Touch Keypad(3 x 4 key)
12 RGB LED
13 TFT LCD
14 Audio Block (Sound/Speaker/Mic/Level Bar)
15 Temperature/Humidity Sensor
16 Door Lock(Servo Motor)
17 FAN
18 Dust Sensor

Product Configuration

AIoT Home

Platform USB
(include OS image and Tools)
1EA

Power Cable
1EA

Micro SD Adapter
1EA

USB to Ethernet Adapter
1EA

Ethernet Cable
1EA

Micro USB Cable
1EA

User Guide book
1EA

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