

AIoT TestBed

AIoT Test Bed Platform Based on Smart Home



AIoT TestBed

AIoT Test Bed Platform Based on Smart Home



Test Bed Platform Based on Open API





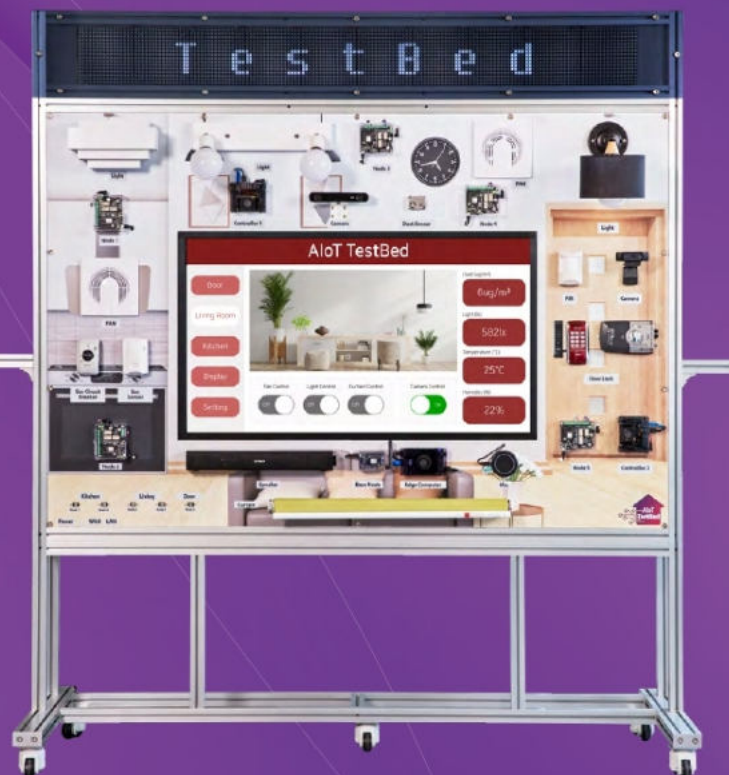
Soda OS and Pop library, AIoT dedicated Operating System





AI IoT service for each area of the door, living room, and kitchen





- IoT test bed platform based on Open API that can test the interworking of smart home products
- Divided into door, living room, and kitchen areas, and AI IoT Service for each area is supported
- Consists of high-performance AIoT server, high-performance access point, IoT nodes (sensors and actuators), display, camera, and audio (microphone, speaker)
- High-performance IoT server supports AI accelerated computation through CUDA GPGPU
- GUI-based test bed operation monitoring through 43-inch 4K UHD large monitor including touch screen
- Provides a large pixel display that can implement emotional lighting and real-time notification services
- Supports various IoT connectivity through Gigabit Ethernet, Wi-Fi, Bluetooth, and ZigBee
- Provides high-performance digital microphones and speakers necessary for implementing AI-based voice command services
- Supports for deep learning-based image recognition services required to implement customized services
- Soda OS and Pop library, the AIoT dedicated operating system
- 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
- Provides comprehensive AIoT practical exercise contents in connection with existing AIoT educational equipment

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
	Multimedia (Python3)	SoilMoisture, Thermistor, Temperature, Gas, Dust, Psd, Gesture 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

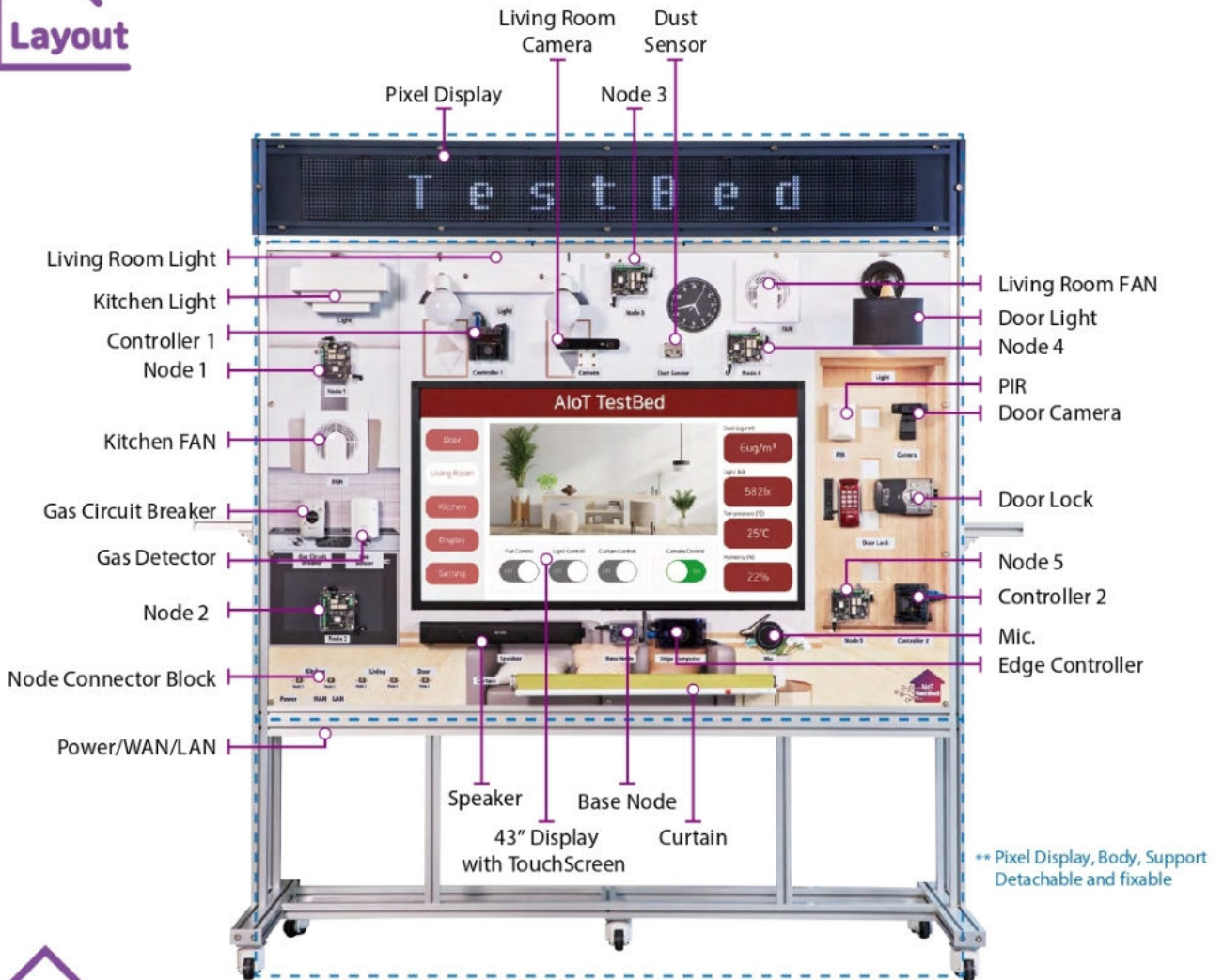
List	Specifications	
AIoT Server Part	CPU: Intel 8th m3-8100 Core: 1.1-3.4GHz Dual-Core, Four-Thread RAM: 8G LPDDR3 Memory: 64GB eMMC V5.0, 512G M.2 SSD Graphics: Intel HD Graphics 615, 300-900MHz, NVIDIA GeForce RTX 20	
	External Memory	1xM.2 M Key, PCIe4x, Supports NVMe, SSD and SATA SSD 1xM.2 E Key, PCIe2x, Supports USB2.0, UART, PCM
	Connectivity	WiFi 802.11ac, 2.4G & 5G Dual Band Bluetooth 4.2 Gigabit Ethernet
	USB Ports	3x USB3.0 Type A 1x USB Type C, Supports PD, DP, USB3.0
	Display	HDMI Output Type-C DP Support Extendable eDP Touch Displays
	Co processor: Arduino Leonardo	
	GPIO & Other Features	2x50p GPIOs Including I ² C, I ² S, USB, UART, RTC, Power Management Extendable Power Button
	GPU: NVIDIA GeForce® GTX 1080 Ti	CUDA Core: 3584 Memory: 11GB(GDDR5X 352bit/4848.4 GB/s) Power Consumption: 250W
	Display	Screen Size: 43"(16:9 Wide) Resolution: 4K UHD Interface: HDMI High Dynamic Range Support
		Touch Screen
Speaker		Power Rating: 7W Speaker Unit: 2.0" Full Range Speaker+Vibrating Diaphragm Channel: 2.0CH Power: DC5V(USB)
Microphone	High Performance Digital Microphone x 4EA Sensitivity: -26 dBFS(Omnidirectional) Acoustic Overload Point: 120dB SPL SNR: 63dB	
Ethernet Access Point	Memory: 128MB Flash WAN: 10/100/1000Mbps x1 LAN: 10/100/1000Mbps x8 Protocols: HTTP, DHCP, PPPoE	
Edge Computer	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 WiFi 2GHz/5GHz Band, 867Mbps, 802.11ac Bluetooth 4.2 Gigabit Ethernet
Living Room	Display: HDMI and Display Port USB: 4x USB 3.0, USB 2.0 Micro-B High Performance 32-bit 76.8 MHz ARM Cortex®-M33 RAM: 128KB / Flash Memory: 1MB	
	ZigBee 3.0	Frequency: 2.4GHz Range: Max 3200m (outdoor), Max 90m(indoor) Data Rate: 250kbps Sensitivity: -103dBm Output Power: 19dBm Receiver Sensitivity: -100 dBm Bluetooth Support
	XNode Auto x 2EA	Light Sensor
	HUMIDITY & TEMPERATURE Sensor	Illuminance: 1 ~ 65535(lx) Interface: I ² C 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
	Motor Driver	Up to 46V/4A 3.5mm Terminal Block
	Relay Control	Nominal Switching Capacity: AC 8A/250V, DC 5A/30V Output: NO, COM
	I/O Interface: I ² C, GPIO Terminal Block	
	Light	Type: Downlight LED Normal Voltage: 220V/60Hz Socket Size: E26 Size: 320x80x100(mm)
	FAN	Normal Voltage: 220V/60Hz Power Consumption: 13W Size: 166x166x84(mm)
	Camera	Dual Image Sensor(1/3" 4MP CMOS) Array Size: 2688 x 1520 pixels Output Resolution: 2x(1920x1080) @15/30fps Cropping Mode 2x(672x376) @15/30/60/100fps binning 4x4 mode
Dust Sensor	Baseline: 120mm(4.7") Field of View: Max. 110°(H)x70°(V)x120°(D) Accelerometer Range: ±8G Gyroscope Range: ±1000dps Magnetic Field Range: ±2500uT(z), ±1300uF(x,y) Pressure Range: 300to 1100hPa Temperature Range: -40 to 125°C	
	Measurement Range	PM1.0 : 0 ~ 10000ug/m3 PM2.5 : 0 ~ 10000ug/m3 PM10 : 0 ~ 10000ug/m3
	Resolution: 1ug/m3 Respond Time: 1sec Time to First Reading: ≤8seconds Operating Voltage: 3.3V I/O Interface: I ² C	
Curtain	Roll Curtain Electric Motor Suit for Roller Blinds Suit for Pipe with 36mm Inner Diameter Support Weight: About 4kg	

List	Specifications
Kitchen	High Performance 32-bit 76.8 MHz ARM Cortex®-M33 RAM: 128KB / Flash Memory: 1MB
	ZigBee 3.0 Frequency: 2.4GHz Range: Max 3200m (Outdoor), Max 90m(Indoor) Data Rate: 250kbps Sensitivity: -103dBm Output Power: 19dBm Receiver Sensitivity: -100 dBm Bluetooth Support
	XNode Auto x 2EA Light Sensor Illuminance: 1 ~ 65535(lx) Interface: I ² 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: I ² C
	Motor Driver Up to 46V/4A 3.5mm Terminal Block
	Relay Control Nominal Switching Capacity: AC 8A/250V, DC 5A/30V Output: NO, COM
	I/O Interface: I ² C, GPIO Terminal Block Type: Single Instant Diffusion and Burning Type
	Gas Sensor Appropriate Gas: LPG, LNG Alarm Indication: Yellow LED Flashes and Alarm Sound Output: DC8V(when alarm)
	Gas circuit breaker Shut-off Method: Geared Motor Opening/Closing Speed: >10s Current Rating: Max 500mA
	Light Type: Downlight LED Normal Voltage: 220V/60Hz Socket Size: E14 Size: 250x140x110(mm)
FAN Normal Voltage: 220V/60Hz Power Consumption: 13W Size: 166x166x84(mm)	
Door	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
	High Performance 32-bit 76.8 MHz ARM Cortex®-M33 RAM: 128KB / Flash Memory: 1MB
	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: -100 dBm Bluetooth Support
	Light Sensor Illuminance: 1 ~ 65535(lx) Interface: I ² 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: I ² C
	Motor Driver Up to 46V/4A 3.5mm Terminal Block
	Relay Control Nominal Switching Capacity: AC 8A/250V, DC 5A/30V Output: NO, COM
	I/O Interface: I ² C, GPIO Terminal Block Type: Downlight LED Normal Voltage: 220V/60Hz Socket Size: E26 Size: 270x230x180(mm) Resolution: 1080p/30fps
Camera Focus: Auto Lens: Full HD Glass Field of View: 78° Interface: USB	
PIR Method: Passive Infrared Operating Voltage: 10 ~ 15V Detect Zone: Max 12m	
Door Lock Method: One Way Solution(Secret Code) Operating Voltage: 8V	
Pixel Display	CPU: Broadcom BCM2711, Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.5GHz Memory: 2GB 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 Color: Pixel RGB Pixel: 160 x 16
	I/O Interface: GPIO(Serial Protocol) SMPS: 5V/18A Size: 1880x250x180(mm) AC: 220V
Frame	AC-DC SMPS: 700W Type: Panel Dimension: 1,880 x 2,130 x 300 (mm)

Training Contents

- Lab Environment of AIoT Test Bed
- Low Power Wireless Sensor Network Programming
- IoT Sensor Control Programming by Voice Command
- Smartphone Interlocking Programming
- Cloud Programming
- Face Recognition Programming Based on Deep Learning

Layout



Product Configuration




AIoT TestBed

AIoT Test Bed Platform Based on Smart Home



Test Bed Platform
Based on Open API



Soda OS and Pop library,
AIoT dedicated Operating
System



AI IoT service
for each area of the door,
living room, and kitchen

