













Product Features

HANBACK ELECTRONICS

	A Physical AI-based smart home control system training platform, modularized into four zones—Entrance, Room (indoor), Kitchen, and Pixel Board—on a rectangular panel built with large aluminum-profile frames
	Sensors and actuators in each zone are driven by a high-performance MCU, supporting standard interfaces such as I ² C/PWM/GPIO and real-time control loops
	An intelligent unified controller equipped with a CUDA-accelerated edge supercomputer supports high-performance inference and multimodal perception/control services
	The intelligent unified controller provides a large touchscreen-based HMI/GUI runtime, enabling easy composition of system monitoring dashboards and control scenarios
	With a camera and digital microphone (array), supports AI human-machine interfaces (HMI) such as vision/audio-based user recognition and command processing
	The high-performance MCU and intelligent unified controller are interconnected over a TCP/IP network via a router; with Internet access, secure remote connectivity and control scenarios can be configured
	Provides the Pop plus library, which controls physical components through a unified API regardless of local or remote deployment (device abstraction, event-subscription I/O)
	Provides an open-source MQTT broker supporting SSL/TLS-based encrypted communication and authentication, with standard QoS and topic-level access control (ACL) configuration
	Provides an integrated Python/MicroPython development environment, including real-time logs/serial console, firmware transfer, and package-management workflows
	Provides sample implementations for IoT security training, including 2FA-based user authentication/authorization and AES-based encryption
	Provides Blynk examples for building remote-control GUIs on Android/iOS without coding
	Provides integrated Physical AI control examples based on PySide6, DeepStream Perception, and Riva Speech Embedded

Educational Content

HANBACK ELECTRONICS

- TestBed Overview
- Foundations of Smart Home Deployment
 - Smart Home Overview and Deployment
 - Control of lighting, ventilation fans, doors, curtains, and LED display boards
 - Sensor data acquisition
 - Foundations of Firmware Design
 - Threads, asynchronous control, and protocols
- User Interface (HMI)
 - MQTT-based message schema and topic design
 - GUI programming
 - Building a real-time monitoring system
 - Sensor data visualization and remote control
 - Anomaly detection and alerting
- Smartphone Integration and Monitoring
 - Mobile app-based remote control
- Cloud IoT Integration
 - Integration with open-source IoT clouds
 - Cloud dashboard development
 - Data visualization
- Security and Privacy
 - Certificate-based secure network communication
 - 2FA-based user authentication and access control
 - Vision-based user authentication
 - Data encryption and decryption
- Computer Vision and AI-Driven Control
 - OpenCV
 - Machine learning
 - Classification algorithms and data processing
 - OpenCV-based classification logic implementation
 - MediaPipe-based classification logic implementation
 - Voice-driven automated control
- Automation Logic Design and Implementation (Capstone Project)
 - Conditional behavior programming
 - Scenario-based control

Product Configuration

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AloT TestBed II



USB Repeater Cable 5M



220V Power Cable



USB A to B Cable



Ethernet Cable



Platform USB
(Include OS Image and Tools)



User Guide book

www.hanback.com

AloT TESTBED II

Physical AI-based Smart Home Control System



HANBACK ELECTRONICS
Since 1984

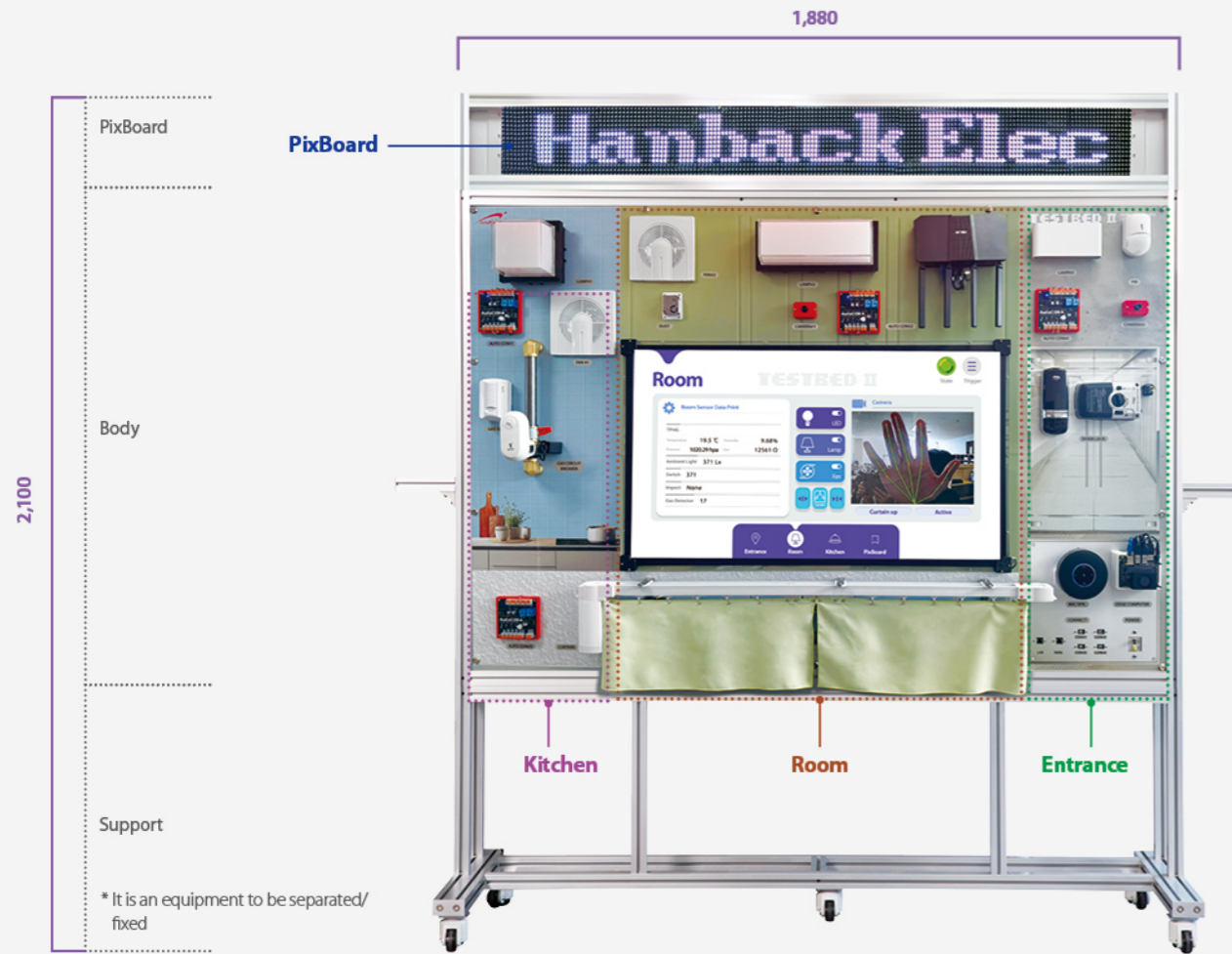
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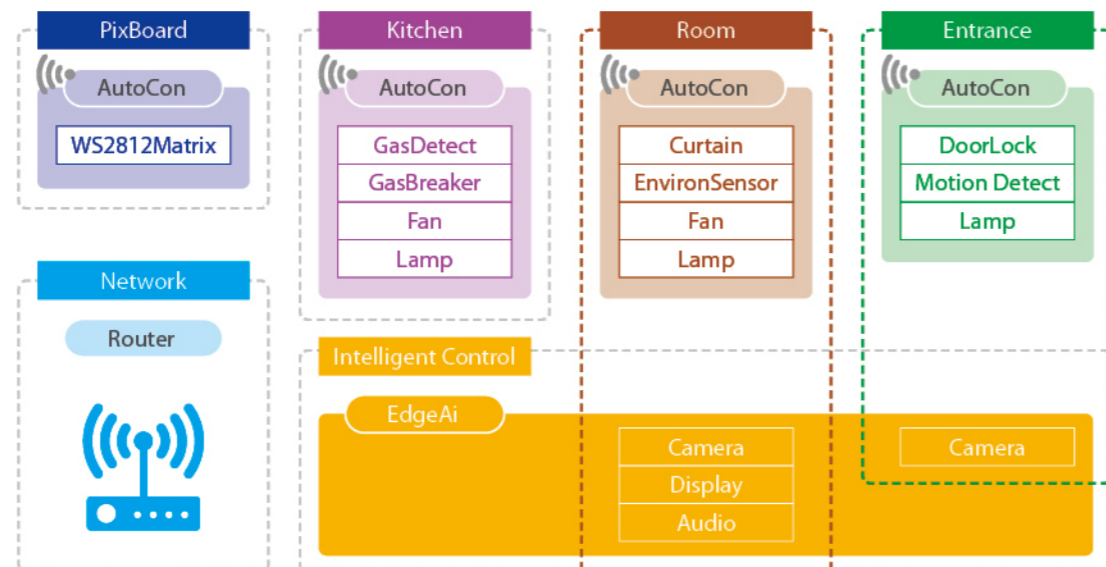
Homepage

AIOT TESTBED II



Block Diagram

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Software Specifications

	List	Specifications
AutoCon	Embedded Runtime Environment for MCU	MicroPython V1.26, upyboard
	Pop plus Library for MCU	Multiple control components (WS2812Matrix, Relay, ServoMotor, SR04 etc) Zsh, Tmux, Peco, powerlevel9k thema, Powerline fonts
Intelligent Integrated Controller	Embedded Runtime Environment for Application Processor	Openbox with X-Server, Tint2, conky, Oh-My-Zsh, tmux
	IoT Service	MQTT Broker, Things board
	User Authentication and Security	cryptography, pyotp, qrcode
	AI Service	PyTorch / TensorFlow / ONNX Runtime(TensorRT EP) DeepStream Perception(PeopleNet/YOLO), VLM Inference, Zero-Shot Detection Grounding DINO (GDINO), VLM Video Summarization & Analytics AI Riva Speech AI Embedded (ASR/TTS)
Intelligent Integrated Control Program	Pop plus Library for TestBed	WS2812Matrix, GasDetect, GasBreaker, Fan, Lamp, Curtain, Tphg, Light DoorLock, MotionDetect, Camera, Audio
		Implementing integrated physical AI control with DeepStream Perception and Riva Speech Embedded in the PySide6 GUI environment Implemented 2FA user authentication and authorization management, and AES-based data encryption It is implemented to control physical components equally regardless of local/remote distinction, enabling simultaneous execution of integrated control programs on the Intelligent Integrated Controller and PC

Hardware Specifications

	List	Specifications
AutoCon		Dual Core ARM Cortex-M33 Wi-Fi, Bluetooth Relay, Motor Driver, GPIO led, switch, Tphg, Ambient, 3-Axis
		High signal-to-noise ratio (SNR) Built-in 2D Dynamic Defect Pixel Correction (DPC)
Entrance Zone	Camera	Phase Detection Autofocus (PDAF) for rapid autofocus QBC Re-mosaic function HDR mode (up to 3 mega-pixel output)
	Lamp	Entrance lamp AC 220V LAMP with Feedback
	MotionDetect	Passive Infrared method
	DoorLock	Limit Switch for Feedback
AutoCon		Dual Core ARM Cortex-M33 Wi-Fi, Bluetooth Relay 2/ Motor Driver/ GPIO led, switch, Tphg, Ambient, 3-Axis
	Touch Display	43 inch LCD IR touch screen
Room Zone	Camera	High signal-to-noise ratio (SNR) Built-in 2D Dynamic Defect Pixel Correction (DPC) Phase Detection Autofocus (PDAF) for rapid autofocus QBC Re-mosaic function HDR mode (up to 3 mega-pixel output)
	Audio	Microphone Speaker
	Lamp	Room Lamp AC 220V LAMP with Feedback
	Fan	AC 220V Fan + LED(Active Fan) with feedback
	Curtain	Electric Curtain Limit Switch for feedback
	Environmental Sensor	Ambient light Tphg(Temperature, Press, Humidity, Gas), Dust Sensor

	List	Specifications
AutoCon		Dual Core ARM Cortex-M33 Wi-Fi, Bluetooth Relay 2/ Motor Driver/ GPIO led, switch, Tphg, Ambient, 3-Axis
		AC 220V LAMP with Feedback
Kitchen Zone	Lamp	Kitchen Lamp AC 220V LAMP with Feedback
	Fan	Air Circulator AC 220V Fan + LED(Active Fan) with feedback
	GasDetect	LPG Gas Detection Yellow LED flashes and alarm sound
	GasBreaker	GAS Valve Control GAS Valve moving by geared Motor Limit switch for feedback
PixBoard	AutoCon	Dual Core ARM Cortex-M33 Wi-Fi, Bluetooth PIO0, PIO1, PIO2, LED Power
	WS2812Matrix	16 x 160 RGB LED Display
Network Router	WAN	10/100/1000Mbps x1
	LAN	10/100/1000Mbps x4
Intelligent Integrated Controller		Arm-Cortex V8 64-bit, 16 GB LPDDR5 Ampere GPU 1024 CUDA cores + 32 Tensor cores, 100 TOPs 256 GB M.2 NVMe SSD
		1000 BASE-T Ethernet, 2.4G/5GHz dual-band Wi-Fi, Bluetooth 5.0 standard
Body	Size	1,880 x 2,100 x 300 mm
	Power	AC 220V Input