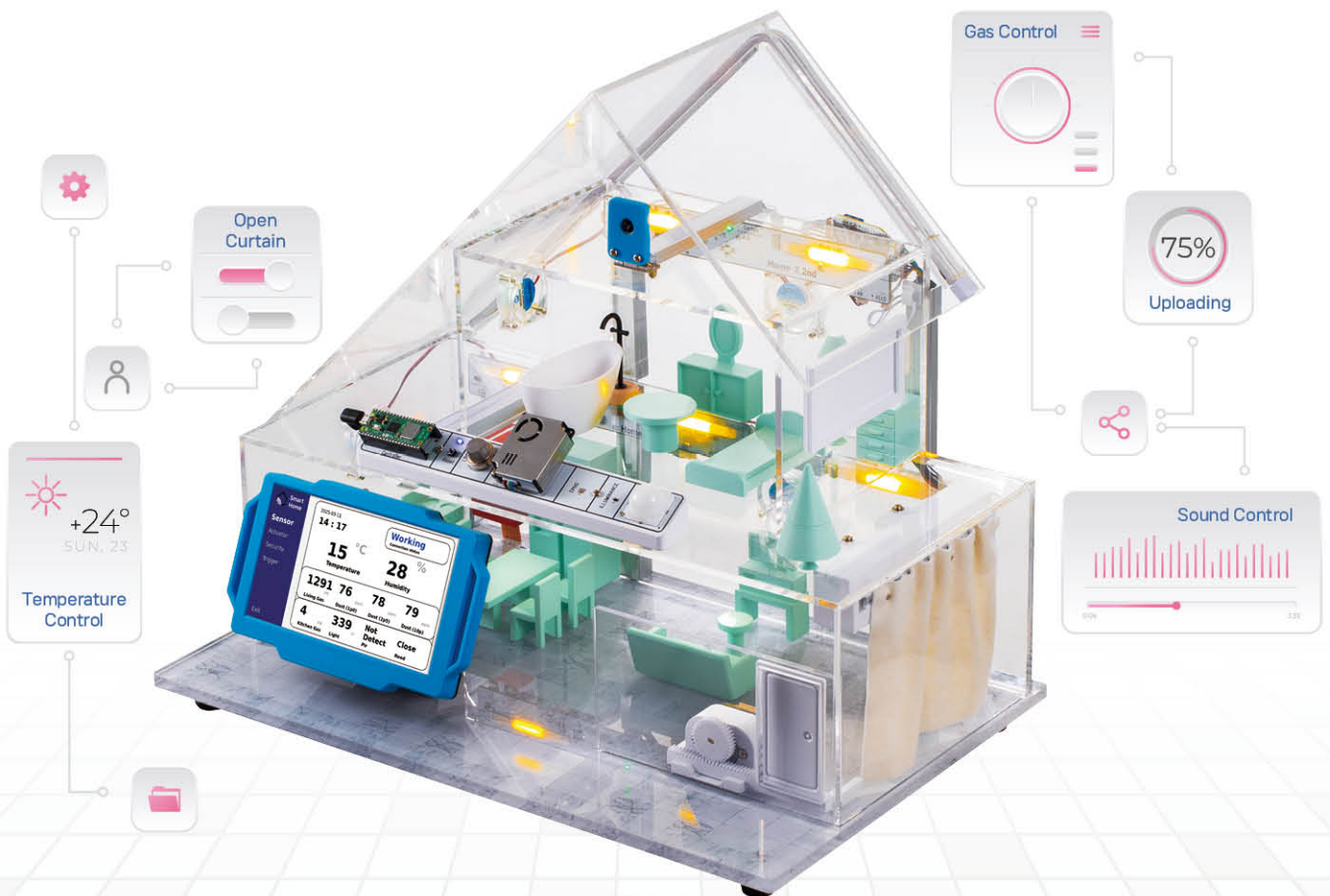




Since 1984

Smart Home Automation Training Equipment

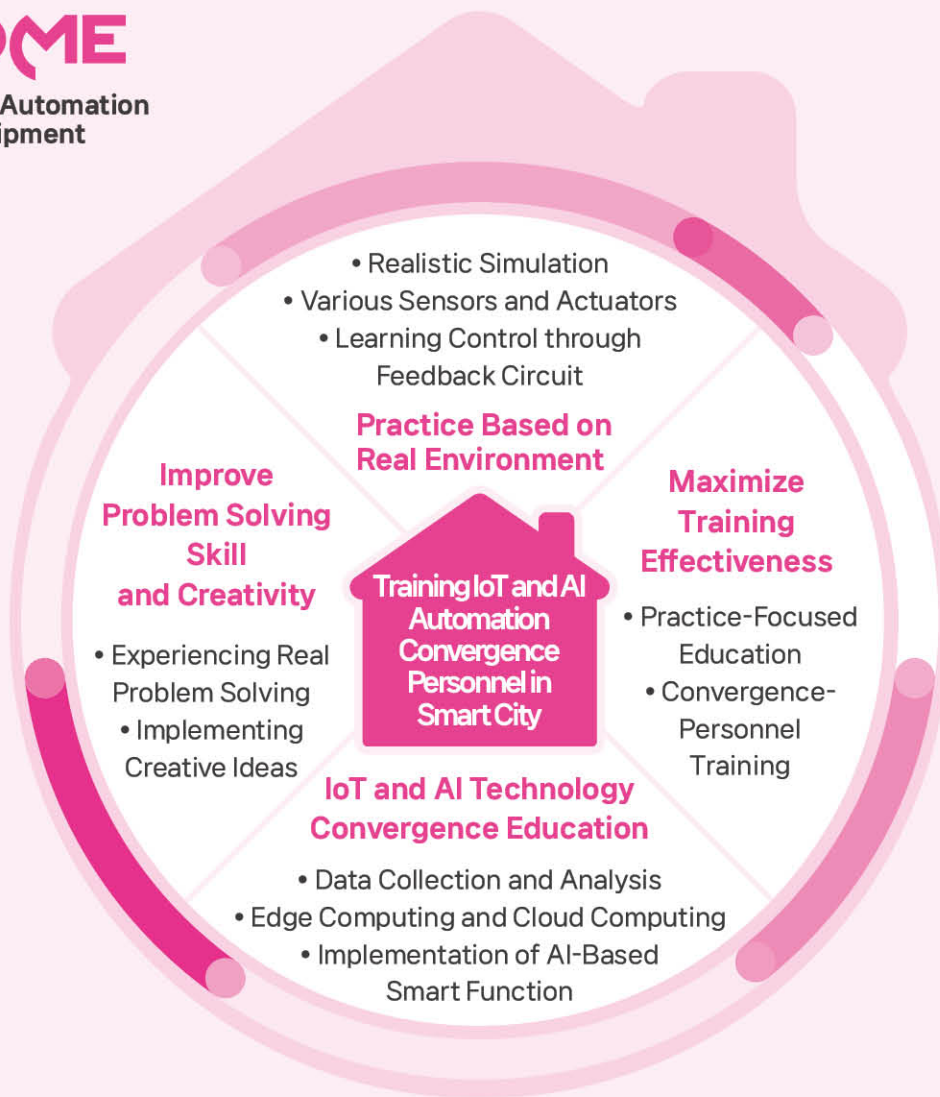
XHOME



Homepage

HANBACK ELECTRONICS

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HMI BLOCK

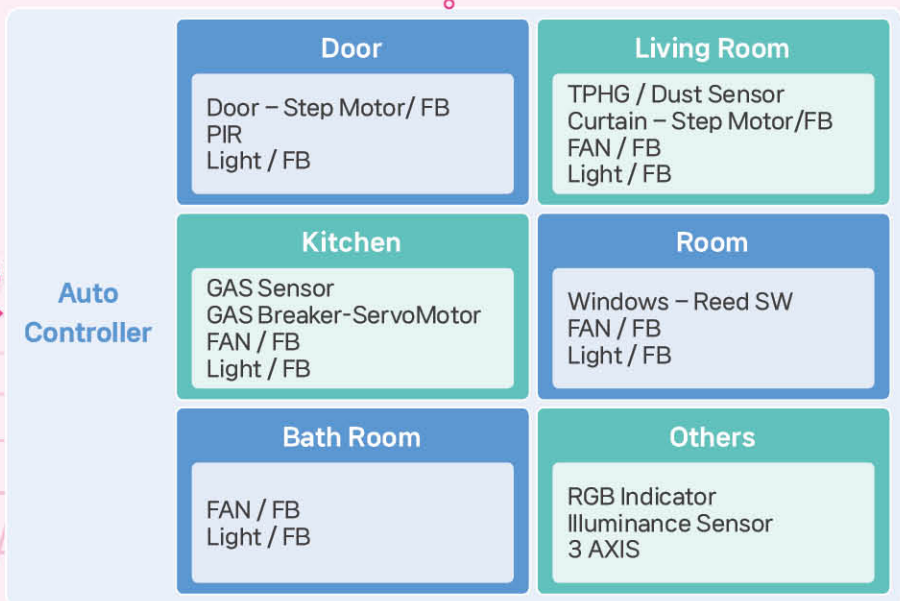
Edge Processor
+
(option)
AI Accelerator

7" TFT LCD
(Touch Screen)

Camera

USB

Home



Software Specification

List	Specifications
HMI	Linux Kernel • aarch64 6.x
	Cloud & Edge • SSH Server, Bluez, Mosquitto, S2M Bridge Server, AWS IoT
	GUI & Vision • PySide6, OpenCV
	Data Science & AI • Numpy, Matplotlib, Pandas, Scipy, Seaborn, Scikit-learn, Mediapipe
	Security • SSL/TLS, MQTT, 2FA, AES/KDF
Pop plus Library(HMI)	Actuator & Feedback • Lamp, Fan, DoorLock, GasBreaker, MoodLamp
	Sensor Object • Pir, Illuminance, TPHG, Dust, LPG Gas, 3-Axis Accelerometer, Open Detection
Auto Controller	Embedded Runtime • REPL, Garbage Collection, PIO, LittleFS, CDC, MQTT
	AI • Linear Regression, Logistic Regression, Perceptron, ANN
Pop plus Library (Auto Controller)	Actuator & Feedback • Lamp, Fan, DoorLock, GasBreaker, MoodLamp
	Sensor Object • Pir, Illuminance, TPHG, Dust, LPG Gas, 3-Axis Accelerometer, Open Detection

Hardware Specification

List	Specifications
HMI (Human Machine Interface)	Edge Processor <ul style="list-style-type: none"> • 2.4GHz Quad-core 64-bit Arm Cortex-A76 CPU • 512KB per-core L2 caches, 2MB shared L3 cache • LPDDR4X-4267 SDRAM • Dual-band 802.11ac Wi-Fi®, Bluetooth 5.0 / Bluetooth Low Energy (BLE)
	(Option) AI Accelerator <ul style="list-style-type: none"> • Providing 26 TOPS in inferencing performance • Compatible with popular frameworks such as TensorFlow and PyTorch • Utilizing the neural network accelerator for executing post-processing tasks like object detection, image segmentation, and pose estimation.
	7inch TFT LCD <ul style="list-style-type: none"> • IPS, Resolution : 1024 x 600 • Capacitance Touch Screen • 2ch Speaker
	2MP Camera <ul style="list-style-type: none"> • Resolution : 1080p @ 30 fps • Field of View: 120 degrees diagonal
Home Block	Auto Controller <ul style="list-style-type: none"> • Equipped with Dual Cortex-M33 or RISC-V Hazard3 cores operating at speeds of up to 150MHz • Features 520 kB of high-performance multi-bank SRAM • Includes external Quad-SPI flash with eXecute In Place capability and 16kB of on-chip cache
	Door <ul style="list-style-type: none"> • Automatic Door Opening/Closing <ul style="list-style-type: none"> - Utilizes door models to illustrate the opening and closing mechanism. - Comprises 1x 5V Step Motor and 2x Feedback Switches • Light - 2x 54mm LED with feedback • PIR Sensor - Detection range: 10 to 80 cm
	Living Room <ul style="list-style-type: none"> • Curtain - Operated by a 12V Step Motor with 2 Feedback Switches • FAN - 5V 40mm FAN featuring RGB LED with feedback • Light - 2x 54mm LED with feedback • Dust Sensor - Detects particle sizes from 0.3µm to 10µm <ul style="list-style-type: none"> - Measurement range for PM1.0/PM2.5/PM10: 0 to 1,000µg/m³ • TPHG Sensor - AI Environmental Sensor measuring VOC, Temperature, Humidity, and Pressure
	Kitchen <ul style="list-style-type: none"> • GAS Breaker - Servo Motor with feedback Switch • FAN - 5V 40mm FAN with RGB LED with feedback • Light - 2x54mm LED with feedback • GAS Sensor - LPG and Methane Gas Detector • Room - Windows / Security Reed Switch • FAN - 5V 40mm FAN with RGB LED with feedback • Light-2x54mm LED with feedback
	Bathroom <ul style="list-style-type: none"> • FAN -5V 40mm FAN with RGB LED with feedback • Light - 2x54mm LED with feedback
	Others <ul style="list-style-type: none"> • Indicator - 12V RGB LED Strip for indicate status • Illuminance Sensor - Ambient Light detection sensor • Shock Detection Sensor - 3-Axis Digital Accelerometer with ±2 g/ ±4 g/±8 g/±16 g sensitivity

Features

- AI convergence training equipment to build a smart home, which has structure for application implementation and provides connectivity
- Simulation environment that is a scaled-down two-story house to be placed on a table
- Provides HMI with built-in touchscreen to enable sensor and actuator control in GUI environment
- Provides automatic controller that controls light, ventilation fan, door, curtain motor and monitors humidity, harmful gas
- Feedback circuit is configured for all actuators enabling feedforward and feedback control
- Supports cloud and smartphone/tablet connectivity via Wi-Fi and Bluetooth
- Supports AI accelerator to scale up machine learning-based smart home automation
- Low-level and high-level control are possible through MicroPython, Python, Pop plus library
- Provides a user-friendly interface with GUI designed on PySide6
- Supports to implement image processing and classification logic using OpenCV and MediaPipe
- Controlling the device remotely via mobile apps such as Blynk is possible
- Conditional operation that automatically sets the device to run based on specific condition is possible
- Scenario-based control such as away mode and sleep mode
- Supports for data communication encryption using SSL/TLS and MQTT
- Supports 2FA user authentication and authorization management
- Protects sensitive data by encrypting data with AES/KDF
- Supports dashboard and remote monitoring through open source IoT platform, analytics and interactive visualization tool
- Monitors sensor data remotely and supports interworking with cloud collaboration system and internet messenger in case of error

Training Contents

Controlling Sensor and Actuator

- Overview and Implementation of Smart Home
 - Controlling light, ventilation fan, door, curtain
 - Controlling home Indicator light
 - Reading sensor data
- Connectivity
- Firmware Design
 - Thread, asynchronous control, protocol

HMI(Human-Machine Interface)

- Interworking with Serial-based Auto Controller
- GUI Design
- Real-time monitoring system implementation
 - Sensor data visualization and remote control
 - Error detection and alert system

Vision Processing and Artificial Intelligence

- OpenCV
- Machine Learning
- Classification Algorithm and Data Processing
 - Implementing OpenCV-based classification logic
 - Implementing MediaPipe-based classification logic

Smartphone Integration and Monitoring

- Mobile App Development
- Device Control

Designing and Implementing Automation Logic

- Conditional Operation Control
- Scenario-based Control

Security and Privacy

- Network Authentication and Encryption
- User Authentication and Authorization Management
- Data Encryption

Cloud Service Integration and Monitoring

- Open Source-based IoT Cloud Integration
- Building Cloud Dashboard
- Data Visualization

Components



Ethernet Cable
1ea



12V/10A Adaptor
1ea



User's Guide Book
1ea