IoT Smart Farm Coding Training Equipment

Smart Farm Ⅱ

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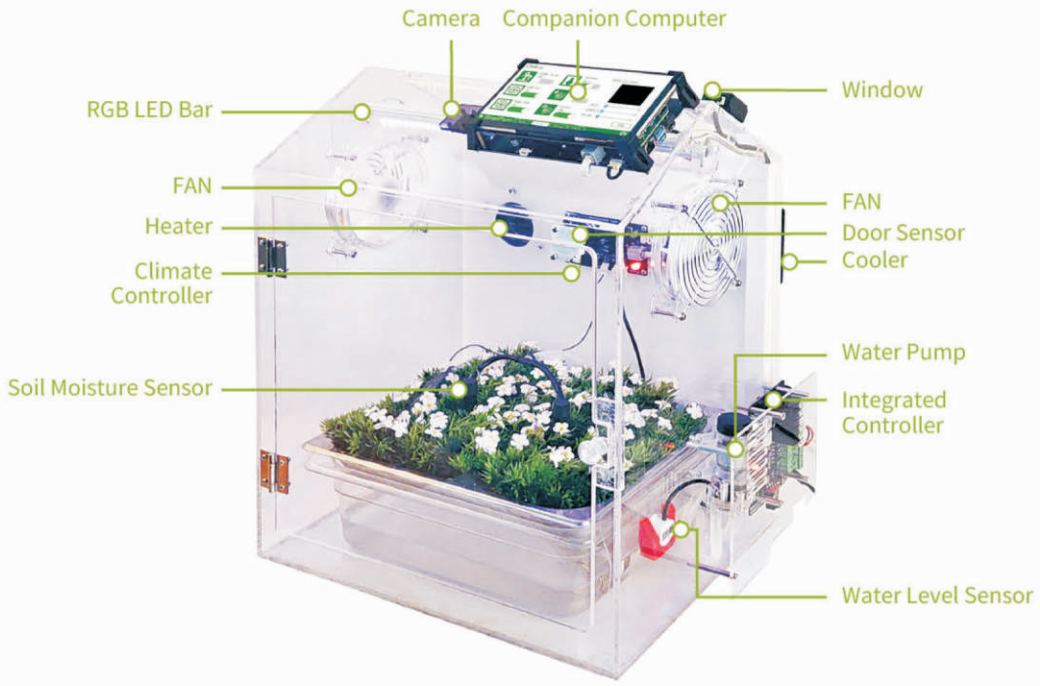
IoT Smart Farm Coding Training Equipment

Smart Farm II

Training Contents

- Overview of SmartFarm
- Training Environment Configuration for Smart Farm Ⅱ Simulator
- Smart Farm Ⅱ Simulator Control
- Automatic Smart Farm Ⅱ Control
- SmartFarm Ⅱ Control Using LoRa Communication
- SmartFarm Ⅱ Simulator GUI Application
- SmartFarm Ⅱ Application Project
  - Human Audio Interface Control
  - MQTT-based SmartFarm Ⅱ Control
  - OpenCV-based SmartFarm Ⅱ Surveillance Camera Control
  - SmartFarm Ⅱ Artificial Intelligence Application

Layout



Components

SmartFarm Ⅱ

Platform USB
(include OS image and Tools)
1EA

12V 10A Adapter
1EA

Micro SD Adapter
1EA

USB to Ethernet
Adapter
1EA

Ethernet Cable
1EA

User Guide book
1EA

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Smart Farm II

Smart Farm II

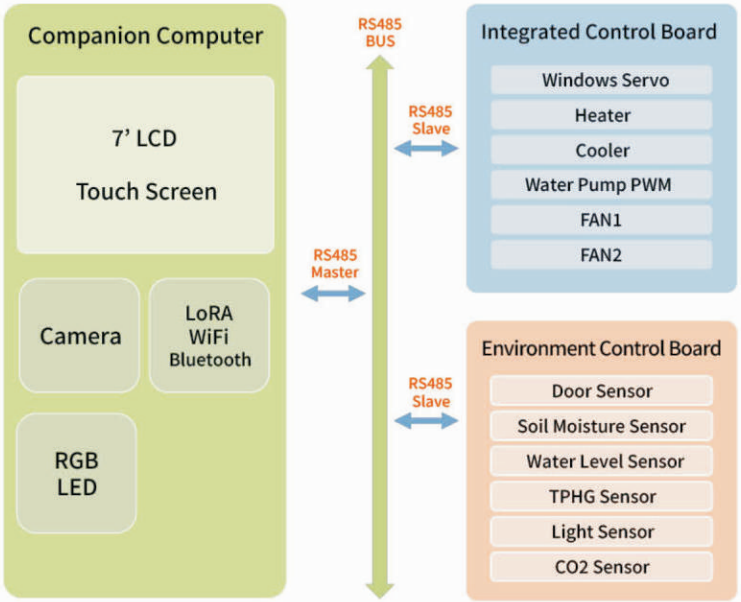
- Smart Farm Simulator Based on Glass Greenhouse. Practice of Sensor and Actuator Control and Artificial Intelligence Applications in IoT Environment
- Consists of a companion computer, environmental controller, and integrated controller. Interconnected via RS485 communication bus
- The companion computer, which operates with a high-performance ARM quad-core processor and a 7-inch touch screen, is linked to the integrated controller and environmental controller through HMI
- Companion computer is equipped with speaker, high-resolution Auto Focus(AF) camera, LED bar, and Ethernet/Wi-Fi/Bluetooth/LoRa modules to implement various user interfaces including artificial intelligence applications
- The environmental controller operates with FreeRTOS on the STM32 MCU and processes light, temperature, humidity, atmospheric pressure, Volatile Organic Compounds (VOC), soil moisture, water level detection, door opening detection, and CO_2 sensor data
- The integrated controller operates with FreeRTOS on the STM32 MCU and controls the water pump, heater, cooler, ventilation fan (DC motor), and ceiling window (serial bus servomotor)
- Supports a public integrated development environment based on Visual Studio Code for professional application development
- Provides a high-level smart farm control library implemented in Python for user convenience
- Provides Python-based smart farm control learning contents

Software Specification

List		Specifications
Companion Computer	Linux Kernel	aarch64 5.x
	CLI	Zsh with Oh-My-Zsh, Tmux, powerlevel10k thema, Powerline fonts
	Tool Chain	GCC (c, c++), JDK, Node JS, Python3, Cling, Clang
	Connectivity	SSH Server, Bluez, MQTT Server(Mosquitto), Blynk Server,
	Multimedia	OpenCV 4
	Data Science & AI	Numpy, Matplotlib, Pandas, Scipy, Seaborn, Scikit-learn
Pop Library with Smart Farm II	Output Object	Leds, PiezoBuzzer, OLed, PixelDisplay
	Input Object	Switch, UltraSonic, Potentiometer, Cds, Sound, Psd. Pir, Gesture, TempHumi,
	AI	Linear Regression, Logistic Regression, Perceptron, ANN

Hardware Specification

Consists of Companion Computer, Environment Control Board, and Integrated Control Board



IoT Smart Farm Coding Training Equipment

Smart Farm II

Body	Size	Body: 400 x 300 x 500(mm) Flowerpot : 325 x 265 x 30(mm) Water Tank : 325 x 265 x 100(mm)
	Power	12V/10A Adapter
Companion Computer	Function	Human Machine Interface(HMI)
	CPU	Quad core Cortex-A72 (ARM v8) 64-bit SoC @ 1.8GHz
	Memory	4GB LPDDR4-3200 SDRAM
	Communication	· RS485 : Differential Signal Transmission Multipoint Communication: up to 32 drivers and 32 receivers Long-Distance Transmission: up to 1200 meters Data Rates: up to 10Mb/s · Wifi / Bluetooth 2.4 GHz and 5.0 GHz IEEE 802.11ac wireless, Bluetooth 5.0, BLE, Gigabit Ethernet · LoRA 168 dB maximum link budget. | Programmable bit rate up to 300 kbps. High sensitivity: down to -148 dBm. | Frequency: 915MH
	7'inch TFT LCD with TouchScreen, Speaker	IPS | Resolution : 1024 x 600 | Capacitance Touch Screen
	12MP Camera	Resolution : 12MP (4056 x 3040 pixel) | HDR, Phase Detection Auto Focus (PDAF) Field of View: 120 degrees diagonal (16:9 aspect ratio)
	Light Control	RGB LED Strip Each pixel of the three primary color can achieve 256 brightness display, completed 16777216 color full color display, and scan frequency not less than 400Hz/s. Cascading port transmission signal by single line. Send data at speeds of 800Kbps. I/O Interface : PWM Control
Climate Controller	Auto Controller	Cortex M3 32bit MCU 72MHz, | 128 Kbytes of Flash memory, 20 Kbytes of SRAM
	RS485 Driver	
	Light Sensor	Measurement Range: 1 - 65535 lux | Interface: I²C
	TPHG Sensor	4-in-1 environmental sensor that measures gas, pressure, humidity, and temperature. Temperature Sensor: -40℃ to +85℃, accuracy: ±1℃ Pressure Sensor: 300 - 1100 hPa, accuracy ±0.12 hPa Humidity Sensor: 0 - 100% relative humidity, accuracy ±3% Gas Sensor: Indoor air quality monitoring, breath analysis I/O Interface : I²C
	CO_2 Sensor	Range: 0 ppm - 40,000 ppm Accuracy : ±(40 ppm + 5% of measured value) for 400 ppm to 2000 ppm, ±(50 ppm + 5% of measured value) for 2000 ppm to 40000 ppm Response time : 5 sec I/O Interface : I²C
	Water Level Sensor	Response time: 500ms Sensitivity: 0 ~ 13mm Waterproof performance: IP67 I/O Interface : Digital output
	Soil Moisture	Soil moisture level by capacitive sensing I/O Interface : Analog output
	Door Sensor	Normally Open Reed Switch I/O Interface : Digital output
Integrated Controller	Auto Controller	Cortex M3 32bit MCU 72MHz, | 128 Kbytes of Flash memory, 20 Kbytes of SRAM
	RS485 Driver	
	Water Pump	Power : 6W (12V, 0.5A) | Flow rate : 1.8L / Minute | Mini Sprinkler 2ea MOSFET Driver | I/O Interface : GPIO Control
	FAN	2 fans for intake / exhaust | Power : 12V/0.15A | FAN Speed : 1500RPM LED Light | I/O Interface : GPIO Control
	Windows	Angle 0° ~120° , Serial Bus Servo Motor Working voltage : 9 ~ 12.6V | Torque : 20kg.cm | Stall Current : 3A | Servo accurary : 0.2°
	Heater	Heating element: PTC | Power : 12V/10A | MOSFET Driver I/O Interface : GPIO Control
	Cooler	Peltier thermoelectric module | 40mm fan | Power : 12V/6A | MOSFET Driver I/O Interface : GPIO Control

Subject to Change

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