深圳市海天雄电子有限公司
Shenzhen Haitianxiong Electronic Co., Ltd.

IOT Innovation Training Platform

Product Manual

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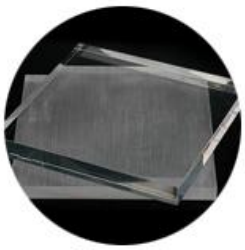


High transparent acrylic panel
Deploy all kinds of IOT equipment

Security power supply socket
Meet the power needs of IOT equipment

Toothed PVC trunking design
Easy wiring

LED lighting system
Easy for training and presentation

Safety power distribution system
With air switch and leakage protection system

Industrial rail power supply
safety and stablility

Intelligent Environment Monitoring System

Wind speed transmitter
Temperature and humidity transmitter
Air quality transmitter
Carbon dioxide transmitter
Illuminance transmitter
Atmospheric pressure transmitter
Power supply and RS485 adapter board

Intelligent Street Lighting Application System

Illuminance transmitter
Human body infrared sensor flashlight
Relay
RS485 device (digital collector)
Power supply and RS485 adapter board

Community Security Application System

Smoke detector
UV flame detector
Combustible gas detector
Alarm
Relay
IP Camera
RS485 device (digital collector)
Power supply and RS485 adapter board

Intelligent Agriculture Application System

Temperature and humidity sensor
Illuminance sensor
Human induction sensor
Flame sensor
Soil moisture sensor
Smoke sensor
Raindrop sensor
ZigBee router
ZigBee Coordinator

Smart Home Application System

Temperature and humidity sensor
Illuminance sensor
Infrared radiation sensor
Formaldehyde sensor
Human induction sensor
Smoke sensor
LED lighting module
IP Camera
ZigBee router
ZigBee Coordinator

Intelligent Gateway

A53 advanced embedded gateway

Introduction

IOT intelligent innovation training platform is a a high specification IOT application training experimental device which is designed closely around the IOT project curriculum set by the Ministry of Education. According to IOT project scenarios, it is configured with intelligent environment detection system, intelligent street lighting applications system, community security application system, intelligent agriculture application system, smart home application system and other functional modules. Taking super-performance 64-bit eight-core A53 embedded processor as an intelligent terminal, it supports RS485-MODEBUS, ZigBee, WiFi, Bluetooth and other protocols so as to fully meet the needs of students and teachers in the study and study of the IOT three-tier technology.

IOT intelligent innovation training device consists of practice training cabinet, gateway, computer and sensor, equipped with ZigBee wireless sensor terminal as well as multiple group sensor modules which communicated through RS485. IOT intelligent innovation training platform is divided into six modules, a group of intelligent gateways, the other five groups for a comprehensive experiment of multiple sensors. Operational experiments with the characteristics of high comprehensive and full range, which may fully meet the IOT professional training demand. Teachers and students can conduct a comprehensive experiment according to their own needs.

Features

- IOT intelligent innovation training platform using industrial steel material, solid and reliable
- Independent modular design, industrial equipment, easy to operate, data accurate, and can be configured according to the actual training needs of various modules
- Integrated IOT related interfaces, support RS485, ZigBee protocol communication
- Safety strong and weak electric power supply socket, to meet the power needs of all types of networking equipment
- Configuration of security power distribution system, with air switch and leakage protection system, one way power input, one way switch control, to ensure the safety and reliable use of equipment
- Industrial rail power supply, safety and stablility

Equipment Parameters

Training Console	Wired / Wireless Networking Console	1. IOT intelligent innovation training platform using industrial steel material, solid and reliable. Human Engineering design, easy for students' installation and configuration training operations. 2. The front of the training platform is configured with six sets of transparent acrylic panels which is used to deploy various types of IOT devices, build a variety of IOT application scenarios. 3. Independent modular design, industrial equipment, easy to operate, data accurate, and can be configured according to the actual training needs of various modules. 4. Configure strong and weak power supply system, 14 groups of strong power supply socket and USB power supply weak power socket, 36 groups

		of weak DC (commonly used 5V, 12V, 24V) power supply interface to meet the power needs of all kinds of networking equipment. 6 groups of dual-hole network port socket can meet the internet access of multiple devices at the same time. 5. With wireless and wired network interface, it can be accessed to a variety of network environments to meet the various requirements of the training room or innovative laboratory workstation design. 6. Configuration of security power distribution system, with air switch and leakage protection system, one way power input, one way switch control, to ensure the safety and reliable use of equipment. 7. PVC track trough installed on the panel to facilitate students conducting a variety of wiring. 8. Configure 4* 9W white LED lighting, easy to practice and demonstration operation. 9. Power input: 220V; strong power supply: 14 groups, five holes socket (with single switch, USB power supply); weak power supply: 36 groups, 5V, 12V, 24V weak power supply terminals; lighting system: 4 groups, 9W LED downlight. 10. Working environment: temperature range of -10 ℃ ~ +40 ℃, relative humidity <85% (25℃). 11. Training platform equipped with drawers and cabinets, convenient for the storage of networking equipment and consumables tools. 12. Dimensions (L * W * H): 1840mm * 800mm * 2200mm. 13. Optional computer.

Intelligent Environment Monitoring System

Item	Module	Parameters	Picture
1	Wind speed transmitter	• The wind speed sensor adopts three cups design concept which can effectively obtain the external environment information. The shell is made of high-quality aluminum alloy, the external is processed by electroplating spray with the characteristics of anti-corrosion, anti-erosion to ensure no stain for long-term use. Equipped with the internal smooth bearing system to ensure the accuracy of information collection. The transmitter is widely used in greenhouse, environmental protection, weather stations, ships, docks, breeding and other environment for wind speed measurement. • Using place: Outdoor, Waterproof Type: Waterproof, Accuracy (current output type: 1M / S (0.2M / S start, range: 0-30m / s, supply voltage: 12-24VDC, output signal: 4-20MA.	
2	Air quality transmitter	• Gas type: PM2.5 • Range: 0-500ug / M3 • Accuracy: <±3% (25℃) • Repeatability: <1% FS • Warm-up time:≤1min • Stability: <1% RH / year, / <0.1℃/year • Output signal: RS485 (moDbus) • Power supply: DC / AC 12-24V • Working temperature: 0℃~ +50℃ • Working humidity:≤80% RH • Power consumption: peak≤200mA average≤80mA • Output load: voltage output type:> 3k л • Installation: wall-mounted	
3	Temperature and humidity transmitter	• Measuring medium: air • Humidity measurement range: 0 ~ 100% RH • Temperature measurement range: -40 ~ +100℃ • Humidity measurement accuracy:±5% RH • Temperature measurement accuracy:±1℃ • Power supply: DC / AC 9-36V • Output signal: RS485 (Modbus) • Stability:±1% FS / year • Working temperature: -40℃~ 85℃ • Response frequency:≤15s • Protection level: IP54	

4	Illuminance transmitter	• Supply voltage: DC 24V • Output current: three-wire 4mA ~ 20mA, voltage: three-wire 0V ~ 5V (blind area is 30mV) • Communication: RS485 • The maximum allowable error: ±3% • Repeat test: ±5% • Temperature characteristics: ±0.5% /℃ • Sightseeing object: silicon blue photovoltaic detector with filter	
5	Carbon dioxide transmitter	• Adopts high sensitivity of photosensitive original as a sensor with wide measurement range, easy to use, easy to install and long distance transmission. • Supply voltage: DC 24V • Output current: three-wire 4mA ~ 20mA, voltage: three-wire 0V ~ 5V (blind area is 30mV) • Communication method: RS485	
6	Atmospheric pressure transmitter	• Power supply: 12-24V DC • Output signal: RS485 • Measuring range: 0 ~ 110KPa • Working temperature: 0℃~ +50℃ • Working humidity: less than 80% HR • Power consumption: peak≤40mA average≤20mA • Installation: wall-mounted	
7	Power supply and RS485 adapter board	• Splitter points out a few RS485 for peer communication modules and gateways, and divided into several groups of weak 12V and 24V for the modules to use.	

Intelligent Street Lighting Application System

Item	Module	Parameters	Picture
1	Illuminance transmitter	• Supply voltage: DC 24V • Output current: three-wire 4mA ~ 20mA, voltage: three-wire 0V ~ 5V (blind area is 30mV) • Communication: RS485 • The maximum allowable error: ±3% • Repeated test: ±5% • Temperature characteristics: ±0.5% /℃ • Sightseeing object: silicon blue photovoltaic detector with filter	
2	Breaker	• Coil voltage: 12-24V • Current: 5A • Main features: fine feet 2 to 2 closed	
3	Human body infrared sensor	• Working voltage: AC180V ~ 250V50Hz or DC 12V / 24V • Output form: relay trigger • Delay time: 6 seconds to 5 minutes adjustable • Sensing distance: 10 meters (far in winter and near in summer) • Induction angle: about 90 degrees, down 60 degrees	
4	Flashlight	• Brand: ECO-WORTHY • Model: DC 12V LED ball light • Bubble color classification: white • Working voltage: 12V • Power: 7 • Lamp connector (lamp type): E27 • Light color: white	
5	Relay RS485 device (digital collector)	• 8* photoelectric isolated digital input and output (NPN transistor open collector output). Using RS485 MODBUS RTU standard communication, which can network with configuration software, PLC, industrial touch screen, with communication and input and output status indicator. • Digital input channels: 8 (low active) • Digital output channels: 8 (NPN transistor open collector output, 500mA) • Operating temperature range: -20 ~ 70 ℃	

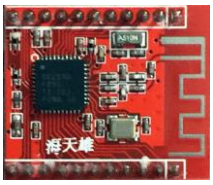
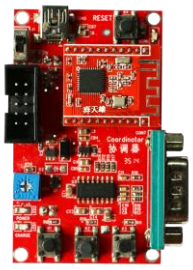
		• External power supply: DC 9V ~ 30V / 2W • Isolation protection: 1500VDC • Installation: Standard DIN rail mounting or screw mounting • Overall dimensions: 125×73×35mm	
6	Power supply and RS485 adapter board	• Splitter points out a few RS485 for peer communication modules and gateways, and divided into several groups of weak 12V and 24V for the module to use.	

Community Security Application System

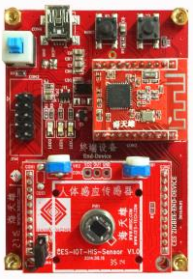
Item	Module	Parameters	Picture
1	Wireless Network HD Camera	• Supply voltage: DC 24V • Output Current: 3-wire 4mA ~ 20mA, voltage: 3V 0V ~ 5V (blind area is 30mV), network: RS485 \ RS232	
2	Breaker	• Coil voltage: 12-24V • Current: 5A • Main functions: small feet 2 open/ 2 closed	
3	RS485 device (digital collector)	• 8* photoelectric isolated digital input and output (NPN transistor open collector output). Using RS485 MODBUS RTU standard communication, which can network with configuration software, PLC, industrial touch screen, with communication and input and output status indicator. • Digital input channels: 8 (low active) • Digital output channels: 8 (NPN transistor open collector output, 500mA) • Operating temperature range: -20 ~ 70 ℃ • External power supply: DC 9V ~ 30V / 2W • Isolation protection: 1500VDC • Installation: Standard DIN rail mounting or screw mounting • Overall dimensions: 125×73×35mm	

4	Smoke detector	• Number of ports: 4 • Port Type: Analog Input • Port current: 4-20 mA • Communication mode: ZigBee	
5	UV flame detector	• Working voltage: Rated working voltage: DC24V, working voltage range: DC12V ~ DC30V • Working current: monitoring current: ≤ 10mA, alarm current: ≤ 30mA • Output capacity: passive normally open or normally closed (can be selected by JP1 detector on the PCB of the detector normally open -NO or normally closed -NC. Two kinds of optional output, contact capacity 1A, DC24V • Output control: through the probe on the PCB board jumper (JP2. Can be set to self-locking (LOCK. And non-self-locking (UNLOCK . • Indicator: normal, about once every 5S flashing, indicating the monitoring status, always lit while alarming • Spectral response range: 180nm ~ 290nm;	
6	Combustible gas detector	• Circuit voltage: 12-24V AC / DC • Measurement range: 500-10,000ppm • Sensitivity: Resistance ratio: 0.55-0.65 • Heater voltage: 5V±0.2V (AC / DC. • Package: Plastic, SUS double metal	
7	Alarm	• Alarm sound: ≥85dB • Power Supply: DC9V ~ DC28V • Current: quiescent current ≤200uA • Alarm current ≤50mA • Working temperature: -10℃~ +50℃ • Relative humidity: ≤95% RH (40℃±2℃ . • Relay passive	
8	Power supply and RS485 adapter board	• Splitter points out a few RS485 for peer communication modules and gateways, and divided into several groups of weak 12V and 24V for the module to use.	

Intelligent Agriculture Application System

Item	Module	Parameters	Picture
1	ZigBee Intelligent transmission module	• ZigBee wireless communication: using the IEEE standard ZigBee protocol, mesh network wireless communication, devices can forward signals between each other • Host automatically retrieve the network: After power networking, the system can automatically retrieve the host and complete networking. • Support for local and remote control: Full support for local and remote software control of home lighting, air conditioners, TVs, curtains and other household appliances. • Power supply: DC 5V / 1A • Wireless working frequency band: 16 • Wireless receiver sensitivity:> -90dBm • Wireless output power: -10 dBm - -22.5 dBm • Communication protocol: compatible with ZigBee HA protocol • Networking: ZigBee self- network, self-recovery technology • Network Protocol: ZigBee IEEE 802.15.4 • Encryption: AES-128-bit key dynamic encryption • Built-in 2.4GHz, 6dB omnidirectional antenna	
2	ZigBee Coordinator	• ZigBee main control module and ZigBee coordinator node baseboard constitute ZigBee coordinator node. Through the command sent by the host to send or receive routing node or terminal node data, and send the data received back to the host. The baseboard has the features as below: • Master module interface: 2.0 Pitch 22-pin (2 rows, 11-pin each row) socket interface, connected with ZigBee main control module • Host communication: through the serial port level conversion chip and the host to achieve serial communication • Communication with other nodes: to achieve via the connected main control board RF function • Power supply: USB, DC 5V or single lithium battery (3.7V) • ZigBee main control module: the main control module power supply circuit, DC 3.3V • Charging circuit: lithium battery charging circuit	

		• Function Interface: Debug Interface, compatible with TI standard simulation tools • Function keys: a reset, 3 ordinary keys • LED indicator: power indicator, charging indicator and networking indicator • Working temperature: -20~50℃(nominal temperature 20℃) • Storage temperature: -20~70℃ (nominal temperature 20℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH) • Size: 40mmx68mm	
3	ZigBee router	• ZigBee master module and ZigBee router backplane constitute ZigBee routing node. When the coordinator node can not communicate with all terminal nodes, the router node acts as an intermediary to make the coordinator node communicate with the terminal node to realize the routing communication function. The baseboard has the features as below: • Master module interface: 2.0 Pitch 22-pin (2 rows, 11-pin each row) socket interface, connected with ZigBee main control module • Communicate with the coordinator or terminal or routing node: to achieve via the connected main control board RF function • Power supply: USB, DC 5V or single lithium battery (3.7V) • ZigBee main control module: the main control module power supply circuit, DC 3.3V • Charging circuit: lithium battery charging circuit • Function Interface: Debug Interface, compatible with TI standard simulation tools • Function keys: 1 reset, 2 ordinary keys • LED indicator: power indicator, charging indicator and networking indicator • Working temperature: -20~50℃(nominal temperature 20℃) • Storage temperature: -20~70℃ (nominal temperature 20℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH) • Size: 40mmx63mm	

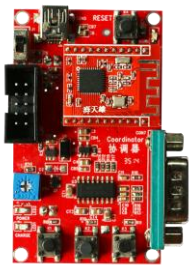
4	Temperature and humidity sensor	• Full scale calibration, two-line digital output • Humidity measurement range: 0 ~ 100% RH • Temperature measurement range: -40 ~ + 123.8 ℃ • Humidity measurement accuracy: ± 3% RH • Temperature measurement accuracy: ± 0.4 ℃ • Response time: 8s (tau63%) • Low power consumption 80μW (12-bit measurement, 1 time/s)	
5	Illuminance sensor	• The module uses ROHM original BH1750FVI chip • Power supply: 3.3V • Illumination range: 0-65535 lx • Sensor built-in 16bitAD converter • Direct digital output, omit complex calculations, omitted calibration • Do not distinguish ambient light sources • Spectral characteristics close to visual acuity • It can measure 1 lux for a wide range of brightness • Standard NXP IIC communication protocol	
6	Human induction sensor	• Working voltage: DC3.3V • Quiescent current: <50uA • Level output: high 3.3 V / low 0V • Trigger mode: L can not repeat trigger / H repeat trigger (default repeat trigger) • Delay time: 0.5-200S (adjustable) can be made in the range of fraction of seconds - dozens of minutes • Blocking time: 2.5S (default) can be made in the range of fraction of seconds - dozens of seconds • Sensing angle: <100 degrees cone angle • Working temperature: -15 ~ 70 ℃ • Sensing lens size: diameter: 23.2mm Fresnel lens • Size: 29.2mmx40mm	
7	Flame sensor	• Can detect the flame or the light source with a wavelength range from 760 nm to 1100 nm. The flame test distance of lighter is 80cm, the greater the flame, the longer the test distance • Detection angle is about 60 degrees, the flame spectrum is particularly sensitive • Adjustable sensitivity (blue digital potentiometer is adjustment)	

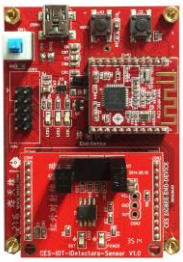
		• Comparator output, the signal is clean, the waveform is good, drive ability is strong, exceeds 15mA • With adjustable precision potentiometer to adjust sensitivity • Working voltage: 3.3V-5V	
8	Soil moisture sensor	• The use of the company's high-quality soil sensor for soil moisture testing, the surface is nickel-plated, with widened sensing area, can improve the conductivity, to prevent contact with the soil and get rust, prolong the service life • The product can control the humidity of the soil in a wide range and adjust and control the corresponding threshold value through the potentiometer. When the humidity is lower than the set value, the DO output high level, otherwise, output low level • Comparator using LM393 chip, stable work • Operating voltage 3.3V-5V	
9	Smoke sensor	• Circuit voltage: ≤15V (AC or DC) • Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power: ≤ 900mW • Test concentration range: 100ppm-20000ppm (different gas concentration range) • Working temperature: -10~50℃(nominal temperature 20℃) • Storage temperature: -20~70℃(nominal temperature 20℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH) • Oxygen concentration: 21% (standard conditions) (oxygen concentration will affect the sensitivity), the minimum value is more than 2% • Clean air voltage: ≤1.5V • Sensitivity: ≥3% • Response time: ≤1S (warm 3-5 minutes) • Reply time: ≤30S • With signal output indicator • Dual signal output (analog output and TTL level output) • TTL output valid signal is low, can be connected directly to the microcontroller IO port	

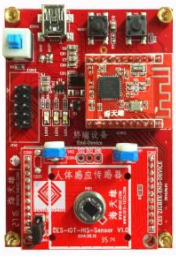
		• Analog output 0 ~ 2.5V voltage, the higher the concentration the higher the voltage • With better sensitivity for liquefied petroleum gas, butane, methane, smoke, etc.	
10	Raindrop sensor	• The sensor using high quality FR-04 double-sided material, large area of 5.0 * 4.0CM, and nickel-plated surface, with the feature of oxidation resistance, conductivity, and superior life expectancy • Comparator output, the signal is clean, the waveform is good, drive ability is strong, exceeds 15mA • With potentiometer adjustment sensitivity • Working voltage: 3.3V-5V • Output Type: digital switch output (0 and 1) and analog AO voltage output • Use a wide voltage LM393 comparator • Can be used for monitoring a variety of weather conditions, and converted into a fixed number of signals and AO output	

Smart Home Application System

Item	Module	Parameters	Picture
1	ZigBee Intelligent transmission module	• ZigBee wireless communication: using the IEEE standard ZigBee protocol, mesh network wireless communication, devices can forward signals to each other • Host automatically retrieve the network: Access the power network, the system can automatically retrieve the host and complete the network • Support local and remote control: fully support local and remote software control of home lighting, air conditioner, TV, curtains, curtains and other household appliances • Power supply: DC 5V / 1A • Wireless working frequency band: 16 • Wireless receiver sensitivity:> -90dBm • Wireless output power: -10 dBm - -22.5 dBm • Communication protocol: compatible with ZigBee HA protocol • Networking: ZigBee self-network, self-recovery technology	

		• Network Protocol: ZigBee IEEE 802.15.4 • Encryption: AES-128-bit key dynamic encryption • Built-in 2.4GHz, 6dB omnidirectional antenna	
2	ZigBee Coordinator	• ZigBee main control module and ZigBee coordinator node baseboard constitute ZigBee coordinator node, through the command sent by the host to send or receive routing node or terminal node data, and send the received data back to the host. The baseboard has the features as below: • Master module interface: 2.0 Pitch 22-pin (2 rows, 11-pin each row) socket interface, connected with ZigBee main control module • Host communication: through the serial port level conversion chip and the host to achieve serial communication • Communication with other nodes: to achieve RF function via the connected main control board • Power supply: USB, DC 5V or single lithium battery (3.7V) • ZigBee main control module: the main control module power supply circuit, DC 3.3V • Charging circuit: lithium battery charging circuit • Function Interface: Debug Interface, compatible with TI standard simulation tools • Function keys: a reset, 3 ordinary keys • LED indicator: power indicator, charging indicator and networking indicator • Working temperature: -20~50℃(nominal temperature 20℃) • Storage temperature: -20~70℃(nominal temperature 20℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH) • Size: 40mmx68mm	
3	ZigBee router	• ZigBee master module and ZigBee router baseboard constitute ZigBee routing node. When the coordinator node can not communicate with all terminal nodes, the router node acts as an intermediary to make the coordinator node communicate with the terminal node to realize the routing communication function. The baseboard has the features as below:	

		• Master module interface: 2.0 Pitch 22-pin (2 rows, 11-pin each row) socket interface, connected with ZigBee main control module • Communicate with the coordinator or terminal or routing node: to achieve RF function via the connected main control board • Power supply: USB, DC 5V or single lithium battery (3.7V) • ZigBee main control module: the main control module power supply circuit, DC 3.3V • Charging circuit: lithium battery charging circuit • Function Interface: Debug Interface, compatible with TI standard simulation tools • Function keys: 1 reset, 2 ordinary keys • LED indicator: power indicator, charging indicator and networking indicator • Working temperature: -20~50℃(nominal temperature 20℃) • Storage temperature: -20~70℃(nominal temperature 20℃) • Relative humidity: less than 95% RH (nominal humidity65%) • Size: 40mmx63mm	
4	Illuminance sensor	• The module uses ROHM original BH1750FVI chip • Power supply: 3.3V • Illumination range: 0-65535 lx • Sensor built-in 16bitAD converter • Direct digital output, omit complex calculations, omitted calibration • Do not distinguish ambient light sources • Spectral characteristics close to visual acuity • It can measure 1 lux for a wide range of brightness • Standard NXP IIC communication protocol	
5	Infrared radiation sensor	• With the features of high reliability, fast response • 5mm groove width • With output status indicator, output high level light is off, while output low level light is on • With blocking, output high level, otherwise, low level • Comparator output, the signal is clean, the waveform is good, strong drive ability, more than 15mA • Working voltage 3.3V-5V • Output format: digital switch output (0 and 1) • Use the wide voltage LM393 comparator	

6	Formaldehyde sensor	• Circuit voltage: 5 ± 0.1V (AC or DC) • Heating voltage: 5 ± 0.1V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power: ≤ 900mW • Detection concentration range: 1ppm-300ppm (different gas with different concentrations, including benzene, toluene, methanol, alcohol, acetone, formaldehyde) • Working temperature: -20~50℃(nominal temperature 20℃) • Storage temperature: -20~70℃(nominal temperature 20℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH) • Sensitivity: ≥3% • Response time: ≤1S (warm 3-5 minutes) • Reply time: ≤30S • With signal output indicator • Dual signal output (analog output and TTL level output) • TTL output valid signal is low, can be connected directly to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration the higher the voltage • Suitable for alcohols, ketones, aldehydes, aromatic compounds and other organic solvents detection	
7	Human induction sensor	• Working voltage: DC3.3V • Quiescent current: <50uA • Level output: high 3.3 V / low 0V • Trigger mode: L can not repeat trigger / H repeat trigger (default repeat trigger) • Delay time: 0.5-200S (adjustable) can be made in the range of fraction of seconds - dozens of minutes • Blocking time: 2.5S (default) can be made in the range of fraction of seconds - dozens of seconds • Sensing angle: <100 degrees cone angle • Working temperature: -15 ~ 70 ℃ • Sensing lens size: diameter: 23.2mm Fresnel lens • Size: 29.2mm * 40mm	

8	Smoke sensor	• Circuit voltage: ≤15V (AC or DC) • Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power: ≤ 900mW • Test concentration range: 100ppm-20000ppm (different gas with different concentration range) • Working temperature: -10~50℃(nominal temperature 20℃) • Storage temperature: -20~70℃(nominal temperature 20℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH) • Oxygen concentration: 21% (standard conditions) (oxygen concentration will affect the sensitivity characteristics), the minimum value of more than 2% • Clean air voltage: ≤ 1.5V • Sensitivity: ≥3% • Response time: ≤ 1S (warm 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output (analog output and TTL level output) • TTL output valid signal is low, can be connected directly to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration the higher the voltage • Has better sensitivity on liquefied petroleum gas, butane, methane, smoke, etc.	
9	LED lighting module	• Only a few external components are required • Output drive current up to 1.5A • 4 ~ 40V input voltage • High work efficiency • Electrostatic protection voltage 2KV	
10	IP Camera	• From Huawei HiSilicon chip program • Million high-definition pixels • Phone / network remote monitoring • Support two-way voice intercom • PTZ rotation (horizontal 355 °, vertical 90 ° • Support mail alarm / motion detection • Support TF card storage	

Intelligent Gateway

CPU	S5P6818 Octa-core Cortex-A53, frequency up to 1.6GHz, 32KB * 4 I / D L1 cache, 1MB L2 cache, single-channel 32-bit data bus, DDR3 up to 800MHz operating frequency
3D Acceleration	ARM Mali-T628 MP3 Core
Memory	1GB DDR3，800MHz
eMMC	8GB eMMC
PMIC	AXP228, support dynamic frequency modulation, coulometer
WIFI	Support 802.11b / g / n standard, USB interface
GPS	High sensitivity, tracking sensitivity of -165dBm, capture -148dBm
USB 2.0 HOST	1 *USB HUB, 4 *USB 2.0 HOST interface
SD/HSMMC	2*SD 2.0, the board leads to a SD / MMC card slot
UART	4 *UART port, baud rate up to 115200bps, used for GPS communications, ordinary serial port, debug information output
HDMI	HDMI 1.4（1080P/60Hz）
OTG	1* OTG interface
CVBS OUT	1 CVBS OUT
Display	LVDS display interface, standard 10.1-inch MIPI display with a resolution of 1920 * 1200
Ethernet Port	RTL8211E Gigabit Ethernet PHY
Audio	AC97 / IIS interface, support for recording and playback
Function Keys	Including power button, reset button. Interrupt button and so on
Infrared Sensor	IRDA serial communication
Buzzer	1*Buzzer
Power	12V / 5A DC power supply, with power switch and indicator
Battery	For RTC use, round lithium battery (3V)

Experimental Tutorial Content

Embedded Android Experiment	Experiment 1 Install Ubuntu Linux operating system experiment Experiment 2 Build Android development environment experiment Experiment 3 Compile Android system experiment Experiment 4 Burning Android system experiment Experiment 5 Hello Android application experiment Experiment 6 Android JNI development experiment Experiment 7 BUZZER control experiment Experiment 8 LED indicator control experiment Experiment 9 UART serial communication experiment
Intelligent Environment Testing System Experiment	Experiment 10 Temperature/ humidity transmitter experiment (RS485) Experiment 11 Illuminance transmitter experiment (RS485) Experiment 12 Air quality transmitter experiment (RS485) Experiment 13 Wind speed transmitter experiment (RS485) Experiment 14 Carbon dioxide transmitter experiment (RS485) Experiment 15 Atmospheric pressure transmitter experiment (RS485) Experiment 16 Intelligent environment testing system comprehensive experiment (RS485)
Intelligent Street Lamp Application System Experiment	Experiment 17 Lighting Control Experiment (RS485) Experiment 18 Human body infrared sensor experiment (RS485) Experiment 19 Intelligent street lamp application system comprehensive experiment (RS485)
Community Security Application System Experiment	Experiment 20 Alarm control experiment (RS485) Experiment 21 Flammable gas smoke detector experiment (RS485) Experiment 22 Remote camera monitoring experiment (network) Experiment 23 Community security application system experiment (RS485)

Intelligent Agriculture Application System Experiment	Experiment 24 Temperature and humidity sensor experiment (ZigBee) Experiment 25 Light sensor experiment (ZigBee) Experiment 26 Soil moisture sensor experiment (ZigBee) Experiment 27 Human sensor experiment (ZigBee) Experiment 28 Flame sensor experiment (ZigBee) Experiment 29 Raindrop sensor experiment (ZigBee) Experiment 30 Smoke Sensor Experiment (ZigBee) Experiment 31 Intelligent agriculture application system integrated experiment (ZigBee)
Intelligent Home Application System Experiment	Experiment 32 LED lighting module experiment (ZigBee) Experiment 33 Infrared sensor (ZigBee) Experiment 34 Formaldehyde sensor experiment (ZigBee) Experiment 35 Cloud platform service experiment (network) Experiment 36 Smart home application system integrated experiment (ZigBee)

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Disclaimer

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