CES-IOT6818

Product Manual

IOT Comprehensive Experimental System III

Rev. V1.0

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Introduction

Hailum. IOT comprehensive experimental system III (CES-IOT6818) is optimized on the basis of Type II (CES-IOT4412).

Configured with high-performance embedded ARM Cortex-A53 eight-core CPU S5P6818 gateway and a wealth of extended application interfaces, and up to 45 sensor modules, 8 controller modules for selection, all using   unified pluggable interfaces. In addition, the platform is equipped with 4G, WiFi, GPS, Bluetooth, camera modules and 10.1-inch high-definition capacitive touch LCD screen, support Android 5.1.1 Lollipop operating system.

Hailum. IOT comprehensive experimental system III adopts modular design. The whole system consists of four parts: Advanced Internet of Things gateway, ZigBee wireless module, sensor module and RFID radio frequency development kit. The experimental system includes about dozens of course experiments which provide open software and hardware resources, focusing on the practical ability of students to achieve teaching, research and other IOT related issues.

Features

◆   Embedded ARM Cortex-A53 S5P6818 octa-core processor as the gateway, with a wealth of extended application interfaces

◆   Up to 45 sensor modules, 8 controller modules for selection, using a unified interface, pluggable

◆   Complete and intranet IOT technology, covering sensor technology, RF identification technology, ZigBee wireless communication technology, Internet technology, embedded hardware technology, embedded software technology, integrated circuit technology, electronic application technology and pant Ethernet communication technology

- Using ubiquitous network, including ZigBee, Bluetooth, 4G, GPS, Wi-Fi wireless communication network, and wired data communication network, to achieve a variety of wired and wireless networks and Internet convergence

- Provide Internet application based on JAVA design language

- The IOT underlying single-chip microcomputer and its related application technology, to provide C language-level source code

- From shallow to deep, starting from the bottom of the IOT technology, step by step learning sensor technology, wireless communication network technology, and then to the deep level of integrated application system
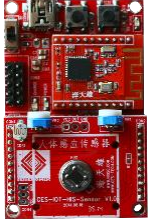
Function Interfaces (Standard)

- Cortex-A53 Octa-core 6818 Gateway
- 8 x Sensor Module
- 1x ZigBee Coordinator Module
- 1x Relay Control Module
- 3x ZigBee Router Module
- 10.1″ LCD Screen
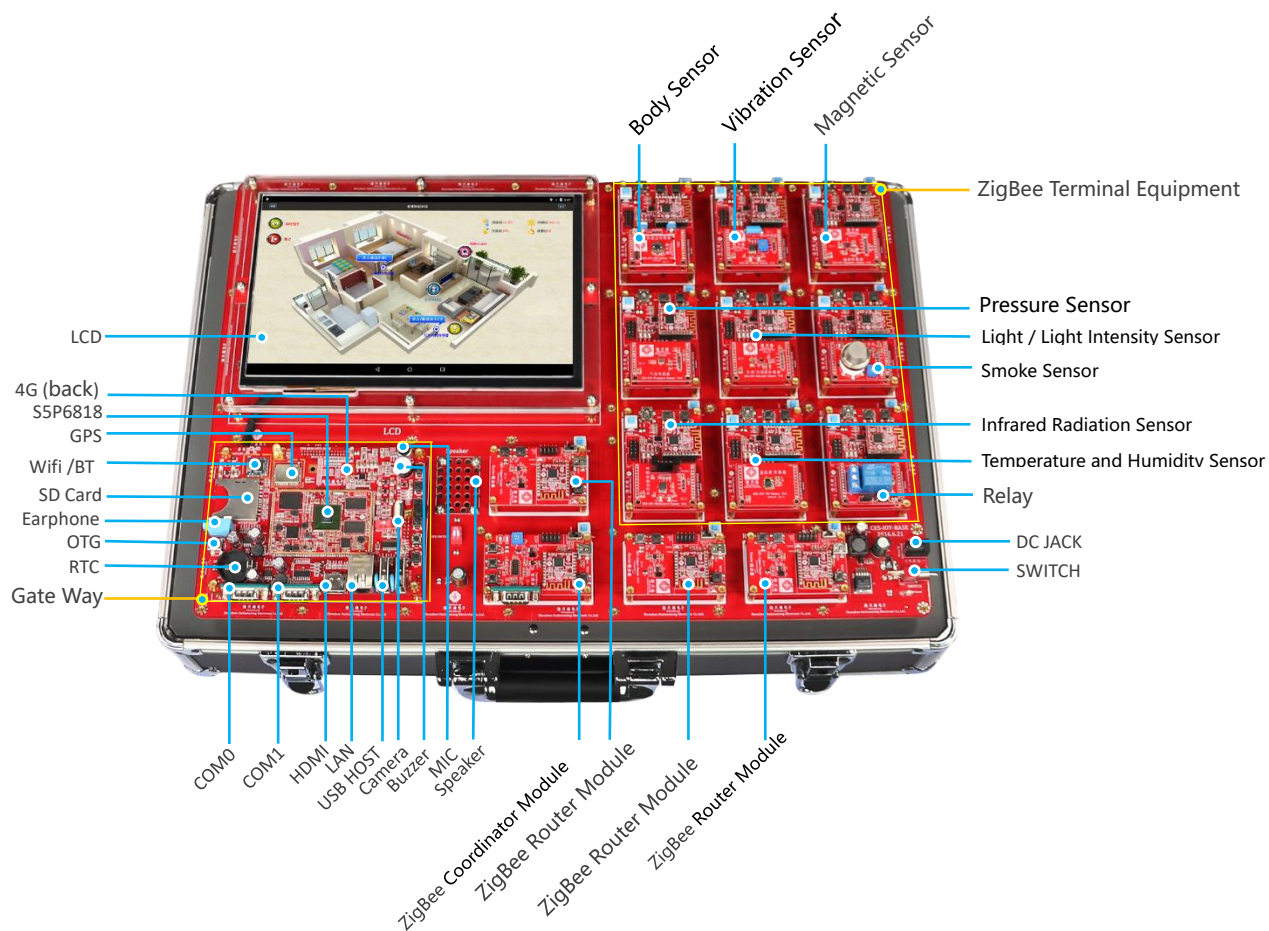
Hardware Parameters——Gateway

CPU	Samsung Cortex-A53 octa-core processor S5P6818, frequency 1.6GHz, support 32KB * 4 I / D L1 cache, 1MB L2 cache, support single-channel 32-bit data bus, DDR3 operating frequency up to 800MHz
Memory	1GB DDR3 , 800MHz
eMMC	8GB eMMC
PMIC	AXP228 , support dynamic FM, Coulomb and so on
4G Module	QUECTEL EC20 , PCIE interface
WiFi / BT	Realtek8723 WiFi / BT integrated module, support 802.11b / g / n, Bluetooth 4.0, USB interface
GPS	High sensitivity, tracking sensitivity of -165dBm, capture -148dBm
Camera	Standard 24Pin Camera Interface , support OV3640 , 3 million pixel camera
Ethernet	RTL8211E Gigabit Ethernet PHY
LCD	Configuration of 10.1 inch LVDS capacitive touch LCD, resolution: 1280 * 800
Audio	IIS interface , support recording, playback, and with external power amplifier
HDMI	1*HDMI 1.4 interface（1080P/60Hz）
UART Serial	2 ports for serial communication and debug output
SD/HSMMC	2*SD 2.0, the board leads an SD / MMC card slot
USB 2.0 HOST	Through 1* USB HUB extend to 2 *USB 2.0 HOST interface
OTG	1*OTG Interface
Function Button	Power button, reset button, interrupt button and so on
LED Indicator	3*LED Indicator
Buzzer	1*MMBT3904/SOT buzzer
Battery	For RTC use , round lithium battery
Power Supply	AC220 DC12V/5A power adapter with power switch and indicator light
Size	52*38*16CM

Hardware Parameters——Sensor Module (Standard 8* Senso,1*Controller)

Item	Module Name	Parameter	Picture
1	Human Body infrared Sensor	• Operating voltage：DC3.3V • Quiescent current: <50uA • Level output：high 3.3 V /low 0V • Trigger mode：L non-repeatable trigger / H repeat trigger (default repeat trigger) • Delay time：0.5-200S (adjustable) can be made range of zero seconds - tens of minutes • Block time：2.5S(default) can be made range of zero seconds - tens of seconds • Sensing angle：<100 degrees taper angle • Operating temperature：-15～70℃ • Induction lens size: Diameter: 23.2mm Fresnel lens • Size：29.2mmx40mm	
2	Vibration Detection Sensor	• high sensitivity vibration sensor, all-round induction vibration • Comparator output, clean signal, good waveform, strong drive ability, extends 15mA • Operating voltage：3.3V-5V • Output type: digital switch output (0 and 1) • Can detect the vibration of the surrounding environment, the sensitivity is adjustable • For a variety of vibration trigger, report alarm, intelligent car, earthquake alarm, motorcycle alarm etc. • Compare with the normally open vibration sensor module, this one has longer vibration, can drive the relay module	
3	Magnetic Sensor	• 12-bit ADC and low-interference AMR sensor, can achieve 5 mm Gaussian resolution in ± 8 Gaussian magnetic field • Built-in self-test function • Low voltage operation (2.16-3.6V) and ultralow power consumption (100uA) • Built-in drive circuit • I2C digital interface • Leadless package construction • Wide magnetic range (+/- 8Oe) • With the related software and algorithm support • Maximum output frequency up to 160Hz	

4	Pressure Measurement Sensor	• Pressure range: 300 ~1100hPa (elevation 9000m -500m) • Voltage : 1.8V~3.6V（VDDA）, 1.62V~3.6V（VDDD） • LCC8 package: lead-free ceramic carrier package (LCC) • Size : 3.6mmx3.8x0.93mm • Low power consumption: 5µA in standard mode • High precision: in low power consumption mode, the resolution is 0.06hPa (0.5 m) • In high linearity mode, the resolution is 0.03hPa (0.25 m) • Temperature output • I2C interface • Temperature compensation • Lead-free, in compliant with RoHS • MSL 1 reaction time: 7.5ms • Standby current: 0.1µA • No external clock circuit required	
5	Light / Light Intensity Sensor	• This module uses ROHM original BH1750FVI chip • Power supply: 3.3V • Illumination range: 0-65535 lx • Sensor built-in 16bitAD converter • Direct digital output, omitting complex calculations, omitting calibration • No distinguish between ambient light sources • Spectral characteristic is close to visual sensitivity • High accuracy of 1 lux for a wide range of brightness Standard NXP IIC communication protocol	
6	Smoke Sensor	• Loop voltage: ≤15V (AC or DC) • Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 100ppm-20000ppm (different gas concentration range is different) • Operating temperature: -10 ~ 50 ℃ (nominal temperature 20 ℃) • Storage temperature: -20 ~ 70 ℃ (nominal temperature 20 ℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH)	

6		• Oxygen concentration: 21% (standard condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2% • Clean air voltage: ≤1.5V • Sensitivity: ≥3% • Response time: ≤ 1S (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output (analog output and TTL level output) • The low valid TTL output, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • Have good sensitivity to liquefied gas, butane, methane, smoke and so on	
7	Infrared Radiation Sensor	• High reliability and fast response • Slot width 5mm • With the output status indicator, when lights off, the output high level, otherwise, output low level • Has block, high level output, otherwise, low level output • Comparator output, clean signal, good waveform, strong drive ability, exceeds 15mA • Operating voltage 3.3V-5V • Output type: digital switch output (0 and 1) • Use a wide voltage LM393 comparator	
8	Temperature and Humidity Sensor	• full scale calibration, two-wire 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)	
9	Relay Control Module	• The module complies with international safety standards and there is separation slot between the control area and load area • The module has optocoupler isolation, touch is more reliable and stable	

| 7 | | • Double-sided FR-4 circuit board design, high-end chip production process
• With Song Le genuine relay Control
• With power and relay action instructions, pull bright, open does not shine
• When the signal input has a low level signal, the common terminal and the normally open terminal are turned on
• The relay can directly control various devices and loads
• There is one normally open and one normally closed contact
• Blue KF301 terminal access control line is more convenient
• low level Input is active | |

Hardware Parameters——Sensor Modules (Optional 37*Sensor, 7*Controller)

Item	Module Name	Parameter	Picture
1	Raindrop Detection Sensor	• The sensor adopts high quality FR-04 double-sided material, large area of 5.0 * 4.0CM, and nickel-plated surface, with more superior performance on anti-oxidation, conductivity, and life • Comparator output, clean signal, good waveform, strong drive ability, more than 15mA • With adjustable sensitivity potentiometer • Operating voltage: 3.3V-5V • Output form: digital switch output (0 and 1) and analog AO voltage output • With a wide voltage LM393 comparator • Can be used for monitoring of various weather conditions and turn it into signal and AO output	
2	Ultrasonic Distance Measurement Sensor	• Operating voltage: DC 2.4V ~ 5.5V • Quiescent current: 2mA • Operating temperature: -20 ~ +70 degrees • Output mode: level or UART (jumper cap selection) • Induction angle: less than 15 degrees • Detection distance: 2cm-450cm • Detection accuracy: 0.3cm + 1% • UART mode serial port configuration: baud rate 9600, start bit 1, stop bit 1, data bit 8, no parity, no flow control	

3	Sound Detection Sensor	• Operating voltage: 3.3V-5V • Output form: digital switch output (0 and 1 high and low level) • The module is most sensitive to ambient sound intensity and is typically used to detect the sound intensity of the surrounding environment • When the ambient sound intensity can't reach the set threshold, the DO port outputs a high level. When the ambient sound intensity exceeds the set threshold, the DO module outputs a low level	
4	Alcohol Sensor	• Loop voltage: ≤15V (AC or DC) • Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 10ppm-1000ppm (Alcohol) • Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2% • Sensitivity: ≥3% • Response time: ≤ 1S (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • With high sensitivity and good selectivity for ethanol vapor	
5	UV Sensor	• Operating voltage: DC 5V • Output voltage: default 0-3V (can modify the magnification itself) • Test accuracy: ± 1UV INDEX • Operating current: typical 0.06mA, maximum 0.1Ma • Response wavelength: 200nm-370nm • Operating temperature: -20 ℃ -85 ℃	

6	High Precision 6 Axis Inertial Navigation Module	• Voltage: 3V ~ 6V • Current: <10mA • Pad spacing: up and down 100mil (2.54mm), about 600mil (15.24mm) • Measurement dimension: Acceleration: 3 dimensions, angular velocity: 3 dimensions, attitude angle: 3 dimensions • Range: Acceleration: ± 16g, angular velocity: ± 2000 ° / s • Resolution: Acceleration: 6.1e-5g, angular velocity: 7.6e-3 ° / s • Stability: Acceleration: 0.01g, angular velocity 0.05 ° / s • Attitude measurement stability: 0.01 ° • Data output frequency 100Hz (baud rate 115200) / 20Hz (baud rate 9600) • Data interface: serial (TTL level), I2C (directly with MPU6050, no gesture output) • Baud rate 115200kps / 9600kps	
7	Photosensitive Sensor	• Sensitivity adjustable • Operating voltage: 3.3V-5V • Output form: a. analog voltage output; b digital switch output (0 and 1)	
8	Thermal Sensor	• NTC thermistor sensor, with good sensitivity • Comparator output, clean signal, good waveform, strong drive ability, more than 15mA • With potentiometer to adjust the temperature detection threshold • Operating voltage: 3.3V-5V • Output type: digital switch output (0 and 1)	
9	Soil Temperature and Humidity Detection Sensor	• The use of the company's high-quality soil sensors to do the detection of soil moisture. The surface is nickel-plated treatment, a wide area of the sensor can improve the conductivity, to prevent rust problems for contacting with the soil, extend the service life • The product can control the humidity of the soil in a wide range. The corresponding threshold is controlled by the potentiometer. When the humidity is lower than the set value, the DO output is high, otherwise, output is low • With LM393 chip comparator, stable operation Operating voltage 3.3V-5V	

10	Load Cell Sensor	• This module with 24-bit high-precision A / D converter chip hx711, is designed for high-precision electronic scale. With two analog channels input, internal integrated 128-bit gain programmable amplifier. The input circuit can be configured to provide bridge-bridge type (eg, pressure, weighing) sensor mode, it is an ideal high-precision, low-cost sampling front-end module	
11	Hall Sensor	• With power indicator and signal output indication • Single signal output • No trigger, low level output; With trigger, high level output • Sensitivity adjustable (fine tune) • If there is magnetic cutting, there is signal output • Circuit output switch can directly access the microcontroller and buzzer modules	
12	Infrared Reflective Sensor	• Detection distance: 1mm ~ 8mm applicable, the focal distance is 2.5mm • Comparator output, clean signal, good waveform, strong drive ability, more than 15mA • Adjustable sensitivity with multi-turn adjustable precision potentiometer • Operating voltage 3.3V-5V • Output type: digital switch output (0 and 1)	
13	Color Recognition Sensor	• This module supports 3V-5V voltage input • TCS3200 is the upgrade version of TCS230, with better effect • Anti-light interference: white LED, can control on/off • Can detect the color of non-luminous object, the best detection distance is 1cm • All pins are drawn	
14	Obstacle Sensor	• The module has a strong ability to adapt to the ambient light, which has a pair of infrared emission and receiver tube, the launch tube emits a certain frequency of infrared, when the detection direction encountered obstacles (reflection surface), the infrared reflection back to be received by the receiving tube, After being processed by the comparator circuit, the green indicator light will be on, and the signal output interface outputs the digital signal (a low level signal). The detection distance can be adjusted by the potentiometer knob, the effective distance range is 2 ~ 30cm, the working voltage is 3.3V-5V.	

11		The detection distance of the sensor can be adjusted by potentiometer, with small interference, easy assembly, easy to use and so on, can be widely used in robot obstacle avoidance, obstacle avoidance car, pipeline count and black and white line tracking and many other occasions	
15	Reed Switch Sensor	• Comparator output, clean signal, good waveform, strong drive ability, more than 15mA • Operating voltage: 3.3V-5V • Output type: digital switch output (0 and 1) • Use a wide voltage LM393 comparator	
16	Triaxial Acceleration / Tilt Angle Sensor	• The module chip is ADXL335. ADXL335 is a small, thin, low power consumption, complete triaxial accelerometer that provides a signal conditioning voltage output that measures acceleration at a full scale of ± 3 g. It measures the static gravitational acceleration in tilt detection applications and the dynamic acceleration due to motion, shock, or vibration. The user uses the capacitors XOUT, YOUT and ZOUT on the CX, CY, and CZ pins to select the bandwidth of the accelerometer. The appropriate bandwidth can be selected according to the application, the bandwidth of the X and Y axes is 0.5 Hz to 1600 Hz, and the bandwidth of the Z axis is 0.5 Hz to 550 Hz • Power supply: 3-5V, analog X, Y, Z three-axis output	
17	Methane / Natural Gas Sensor	• Loop voltage: ≤15V (AC or DC) • Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 300ppm-10000ppm (methane, natural gas) • Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2% • Sensitivity: ≥3% • Response time: ≤ 1S (preheat 3-5 minutes)	

12		• Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • High sensitivity to methane and natural gas	
18	Combustible Gas Sensor	• Loop voltage: ≤ 24V (DC) • Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 300-10000ppm (methane, propane, butane, natural gas) • Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2% • Sensitivity: ≥3% • Response time: ≤ 1S (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • Good sensitivity to combustible gases over a wide range of concentrations	
		• Loop voltage: ≤15V (AC or DC) • Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 100ppm-10000ppm (LPG, butane, propane, LNG)	

| 19 | Liquefied Gas / Butane / Propane Sensor | • Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2%

• Sensitivity: ≥3%

• Response time: ≤ 1S (preheat 3-5 minutes)

• Reply time: ≤ 30S

• With signal output indicator

• Dual signal output; (analog output and TTL level output)

• The low valid TTL output signal, can be directly connected to the microcontroller IO port

• Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage

• High sensitivity to liquefied gas, butane, and propane | |
| 20 | Hydrogen Sensor | • Loop voltage: ≤15V (AC or DC)

• Heating voltage: 5 ± 0.2V (AC or DC)

• Load resistance: adjustable

• Heating resistance: 31Ω ± 3Ω

• Heating power consumption: ≤900mW

• Detection concentration range: 50ppm-10000ppm (hydrogen)

• Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2%

• Sensitivity: ≥3%

• Response time: ≤ 1S (preheat 3-5 minutes)

• Reply time: ≤ 30S

• With signal output indicator

• Dual signal output; (analog output and TTL level output)

• The low valid TTL output signal, can be directly connected to the microcontroller IO port

• Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage

• Good sensitivity to hydrogen detection | |

21	Carbon Monoxide Sensor	• Loop voltage: ≤10V (AC or DC) • Heating voltage (high): 5 ± 0.2V (AC or DC) • Heating voltage (low): 1.5 ± 0.1V (AC or DC) • Heating time (high): 60 ± 1 seconds • Heating voltage (low): 90 ± 1 seconds • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤350mW • Detection concentration range: 10ppm-1000ppm (carbon monoxide) • Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2% • Sensitivity: ≥3% • Response time: ≤ 1S (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • Very high sensitivity and good selectivity for carbon monoxide	
22	Carbon Monoxide / Methane / Liquefied Petroleum Gas Sensor	• Loop voltage: ≤10V (AC or DC) • Heating voltage (high): 5 ± 0.2V (AC or DC) • Heating voltage (low): 1.5 ± 0.1V (AC or DC) • Heating time (high): 60 ± 1 seconds • Heating voltage (low): 90 ± 1 seconds • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤350mW • Detection concentration range: 10ppm-1000ppm (carbon monoxide), 100ppm-1000ppm (combustible gas) • Operating temperature: -10 ~ 50℃ (nominal temperature 20℃) • Storage temperature: -20 ~ 70℃ (nominal temperature 20℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH)	

15		• Oxygen concentration: 21% (standard condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2% • Sensitivity: ≥3% • Response time: ≤ 1S (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output); • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • With high sensitivity and good selectivity for carbon monoxide, methane, liquefied petroleum gas • Loop voltage: ≤ 24V (AC or DC)	
23	Air Quality Sensor	• Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 10ppm-1000ppm (ammonia, toluene, hydrogen) • Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2% • Sensitivity: ≥3% • Response time: ≤ 1S (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • Good sensitivity to harmful gases over a wide range of concentrations	

| 24 | Ozone Sensor | • Loop voltage: ≤ 24V (AC or DC)
• Heating voltage: 5 ± 0.2V (AC or DC)
• Load resistance: adjustable
• Heating resistance: 31Ω ± 3Ω
• Heating power consumption: ≤900mW
• Detection concentration range: 10ppm-1000ppm (ozone)
• Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2%
• Sensitivity: ≥3%
• Response time: ≤ 1S (preheat 3-5 minutes)
• Reply time: ≤ 30S
• With signal output indicator
• Dual signal output; (analog output and TTL level output)
• The low valid TTL output signal, can be directly connected to the microcontroller IO port
• Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage
• Good sensitivity to ozone over a wide range of concentrations | |
| 25 | Hydrogen Sulfide Sensor | • Loop voltage: ≤ 24V (AC or DC)
• Heating voltage: 5 ± 0.2V (AC or DC)
• Load resistance: adjustable
• Heating resistance: 31Ω ± 3Ω
• Heating power consumption: ≤900mW
• Detection concentration range: 1ppm-200ppm (hydrogen sulfide)
• Operating 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 condition) (oxygen concentration will affect the sensitivity characteristics), the minimum value is greater than 2%
• Sensitivity: ≥3%
• Response time: ≤ 1S (preheat 3-5 minutes)
• Reply time: ≤ 30S
• With signal output indicator | |

17		• Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • Good sensitivity to hydrogen sulphide over a wide range of concentrations	
26	Ammonia Sensor	• Loop voltage: 5 ± 0.1V (AC or DC) • Heating voltage: 5 ± 0.1V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 10ppm-300ppm (ammonia) • Operating 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 (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • Good sensitivity to ammonia in a wide range of concentrations	
27	Formaldehyde Sensor	• Loop voltage: 5 ± 0.1V (AC or DC) • Heating voltage: 5 ± 0.1V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 1ppm-300ppm (different gas concentration, including stupid, toluene, methanol, alcohol, acetone, formaldehyde) • Operating 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%	

18		• Response time: ≤ 1S (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • Suitable for the detection of organic solvents such as alcohols, ketones, aldehydes and aromatic compounds	
28	Freon Sensor	• Loop voltage: ≤ 24V (AC or DC) • Heating voltage: 5 ± 0.2V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤900mW • Detection concentration range: 10ppm-1000ppm (R134A) • Operating 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 (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, higher the voltage • With sensitivity and selectivity to freon	
29	Sulfur Dioxide Sensor	• Loop voltage: DC5V (max DC 24V) • Heating voltage: 5 ± 0.2 V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤ 750Mw • Detection concentration range: 1ppm-500ppm (sulfur dioxide)	

19		• Operating 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 (preheat 3-5 minutes) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • High sensitivity to sulfur dioxide gas	
30	Toluene Sensor	• Loop voltage: DC5V (max DC 24V) • Heating voltage: 5 ± 0.1 V (AC or DC) • Load resistance: adjustable • Heating resistance: 31Ω ± 3Ω • Heating power consumption: ≤ 750Mw • Detection concentration range: 1ppm-500ppm (toluene) • Operating 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 (preheated for 3-5 minutes, theoretical warm-up for 48 hours) • Reply time: ≤ 30S • With signal output indicator • Dual signal output; (analog output and TTL level output) • The low valid TTL output signal, can be directly connected to the microcontroller IO port • Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage • High sensitivity to toluene	

31	Acetylene Sensor	- Loop voltage: DC5V (max DC 24V) - Heating voltage: 5 ± 0.2 V (AC or DC) - Load resistance: adjustable - Heating resistance: 31Ω ± 3Ω - Heating power consumption: ≤800mW - Detection concentration range: 1ppm-500ppm (acetylene) - Operating 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: ≤ 10S (preheat 3-5 minutes, theoretical warm-up 24 hours) - Reply time: ≤ 30S - With signal output indicator - Dual signal output; (analog output and TTL level output) - The low valid TTL output signal, can be directly connected to the microcontroller IO port - Analog output 0 ~ 2.5V voltage, the higher the concentration, the higher the voltage - High sensitivity to acetylene gas	
32	Carbon Dioxide Sensor	- Operating voltage: 12 ± 0.2V (AC • DC) - Operating current: <150mA - Loop voltage: DC6V - Load resistance: 70Ω ± 7 - Detection concentration range: 350-10000ppm - Induction electromotive force: 350PPM corresponds to 260-360mV - Sensitivity: 50MV - Response time: ≤ 90S (preheat 3-5 minutes) - Reply time: ≤ 30S - Component power consumption: ≤ 0.5W - Operating temperature: -10 ~ 50 ℃ (nominal temperature 20 ℃) - Operating humidity: 5-95% RH (nominal humidity 60% RH) - Service life: 2-3 years	

33	Flame Sensor	• Can be used to detect the flame or wavelength in the 760 nm to 1100 nm range of light source, lighter test flame distance of 80cm, the greater the flame, the more distant test distance • Detection angle of about 60 degrees, particularly sensitive to the flame spectrum • Sensitivity adjustable (blue digital potentiometer adjustment) • Comparator output, clean signal, good waveform, strong drive ability, more than 15mA • Adjustable sensitivity with adjustable precision potentiometer • Operating voltage: 3.3V-5V • Output type: DO digital switch output (0 and 1) and AO analog voltage output • Use a wide voltage LM393 comparator	
34	Capacitive Touch Sensor	• Operating voltage: 2.4V ~ 5.5V (battery-powered) • The internal regulator circuit function can be enabled by an external Option • Operating current @ VDD = 3V No load: 2.5uA typical in low power mode; typical for fast mode 9uA • @ VDD = 3V, in fast mode KEY fastest response time is 100mS, low power mode is 200mS • Each KEY sensitivity can be adjusted by an external capacitor (0 to 50 pF) • Provide LPMB port selection Fast mode or low power mode • Provides direct output mode, trigger mode, open drain output, CMOS active high or low output, via TOG / AHLB / OD port select • Two diode-free outputs TPQ0D, TPQ2D are available only active low • Provide MOT1, MOT0 port select the maximum output time: 120 seconds / 64 seconds / 16 seconds / infinity • There is a system stabilization time of about 0.5 seconds after power-on. Do not touch the Touch PAD during this period, and the touch function is invalid • Automatic calibration function, when no button is touched, the system recalibration cycle of about 4.0 seconds	

35	Current Sensor	• Operating voltage: DC DC5V • With signal output indicator • Current detection range wide DC ± 35A AC: 25A • Current detection resolution 60mV / A • Output overcurrent signal indication • The overcurrent signal sets the critical point adjustable, setting resolution 1.5A • Sampling current conversion analog signal output, can connect ADC, TTL level signal output, can be connected to the microcontroller IO port control • The output signal is: analog signal and level signal	
36	Condensation Sensor	• Can detect the humidity of the surrounding environment, condensation resistance module is most sensitive to environmental humidity condensation, generally used to detect the humidity condensation of the surrounding environment • High sensitivity in high humidity environments • Fast response • Strong anti-pollution ability • High reliability and stability • Condensation sensor is a positive characteristic switch type element, sensitive to low humidity and only sensitive to high humidity • Sensitivity adjustable • Operating voltage 3.3V-5V • output form: a, analog voltage output; b, digital switch output (0 and 1) • Power indicator (red) and digital switch output indicator • Comparator with LM393 chip, stable operation	
37	Infrared Temperature Sensor	• Measuring range: -33 ~ 220 ° C (-27 ~ 428 ° F) • Operating range: -10 ~ 50 ° C (14 ~ 122 ° F) • Accuracy: Tobj = 15 ~ 35 ° C, Tamb = 25 ° C +/- 0.6 ° C • Full temperature range accuracy: +/- 2%, 2 ° C • Resolution: 1/16 ° C • Response time: (90%) 1 sec • D: S (distance: target surface): 1: 1 • Emissivity: 0.05 ~ 1 step.01 • Update frequency: 1.4Hz • Wavelength: 5um-14um	

38	Buzzer + LED lights Sound and Light Alarm Module	• Only a small number of external devices are required • Output drive current up to 1.5A • 4 ~ 40V input operating voltage • high efficiency • Electrostatic protection voltage 2KV • Integrated buzzer, controlled by PWM	
39	Full Color LED Module	• Excellent PCB design, very beautiful • Three primary colors (red, green and blue) full color LED • 5050 common anode, common termination + 5V, the control side of the low level effective • The use of PWM programs can produce different color change effects	
40	DC Motor Control Module	• Dual L9110S chip motor drive • Module supply voltage: 2.5-12V • Suitable motor range: motor operating voltage between 2.5v-12V, the maximum operating current of 0.8A • Two DC motors can be driven at the same time, or a 4-wire 2-phase stepper motor	
41	Stepping Motor Control Module	• Onboard ULN2003A motor driver chip • All pins of the chip have been drawn for easy connection • 5-12V pin power supply • Onboard 4 signal lights • Onboard XH-5P socket, you can directly connect the 28BYJ-48 model of the stepper motor	
42	LED Lighting Module	• Only a small number of external devices are required • Output drive current up to 1.5A • 4 ~ 40V input operating voltage • high efficiency • Electrostatic protection voltage 2KV	
43	LED Dot Matrix Display Control Module	• Using 2 *595 drive 8X8 dot matrix tube, only 3-way IO port of the single-chip required, will not waste IO usage, to display according to the principle of dot matrix tube dynamic scanning • Wide operating voltage 3.3V to 5V • Compatible with LCD1602 / 12864 interface, can be inserted directly on the module to use, very convenient 8X8 dot matrix LED module compatible LCD1602 / LCD12864 interface, you can display Chinese characters "every day up" characters, English, etc. 51 reference program	

| 44 | IP Camera Network HD Camera | • Derived from Huawei Haisi chip program
• Millions of high-definition pixels
• Mobile phone / network remote monitoring
• Support for two-way voice intercom
• PTZ rotation (horizontal 355 °, vertical 90 °)
• Support mail alarm / motion detection
• Support TF card storage | |

Hardware Parameters——ZigBee Module

ZigBee Master Module	The main chip of this master module is TI company's ZigBee second generation SOC high chip CC2530F256. The module is a true system-on-chip (SOC) solution for 2.4-GHz IEEE 802.15.4, ZigBee and RF4CE applications. The characteristics are as follows, • The module combines the outstanding performance of leading RF transceivers, industry-standard enhanced 8051 CPU, 8KB RAM, 256K flash memory • The module has different low power consumption operation modes, which is particularly suitable for ultralow power consumption requirement systems, and the mode switching time is very short • High sensitivity, long sending distance: the module uses onboard PCB antenna, the average gain of 3dB or more, after the actual outdoor test, open communication distance up to 200-300m, fully meet the external antenna communication distance, with good effect • Working frequency band: 2.4GHz • Operating voltage: 2.0V-3.6V • Operating temperature: -40 ℃ ~ 85 ℃ (nominal temperature 20 ℃) • Storage temperature: -40 ℃ ~ 125 ℃ (nominal temperature 20 ℃) • Relative humidity: less than 95% RH (nominal humidity 65% RH) • The module leads all the IO pins of the CC2530 for easy expansion. The connection is for two rows of pin connections (2 * 11PIN, 2.0mm pitch) • Size: 21mmx25mm • The module and the company produced coordinator, routers and terminal base board combine with the ZigBee network.

ZigBee Coordinator Node Base	The ZigBee master module and ZigBee coordinator node base board make up the ZigBee coordinator node to send or receive the routing node or terminal node data through the host to send the command and send the received data to the host. The base board has the features as below, • Master module interface: 2.0 pitch 22-pin (2 rows, each row of 11-pin) socket interface, connected with the ZigBee master module • Host communication: through the serial port level conversion chip and the host to achieve serial communication • Communicate with other nodes: Implemented via the connected main control board RF function • Power supply: USB, DC 5V or a single lithium battery (3.7V) • ZigBee main control module: the main control module power supply circuit, DC 3.3V • Charging circuit: lithium charging circuit • Function interface: Debug interface, compatible with TI standard simulation tool • Function keys: 1 reset, 3 ordinary buttons • LED indicator: power indicator, charging indicator and networking indicator • Operating 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
ZigBee Router Node Base	The ZigBee master module and the ZigBee router node base board make up the ZigBee routing node. When the coordinator node can't communicate with all the terminal nodes, the router node communicates with the coordinator node and the terminal node as an intermediary to realize the routing and communication function. The base board has the features as below, • Master module interface: 2.0 pitch 22-pin (2 rows, each row of 11-pin) socket interface, connected with the ZigBee master module • Communicate with coordinator or terminal or routing node: Implemented by connecting the main control board RF function • Power supply: USB, DC 5V or a single lithium battery (3.7V) • ZigBee main control module: the main control module power supply circuit, DC 3.3V • Charging circuit: lithium charging circuit • Function interface: Debug interface, compatible with TI standard simulation tool • Function keys: 1 reset, 2 ordinary buttons • LED indicator: power indicator, charging indicator and networking indicator • Operating 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

ZigBee Terminal Device Node Base	ZigBee main control module and ZigBee terminal equipment node and sensor module, control node module, RFID module constitute ZigBee terminal node, complete the equipment control and data acquisition, including sensor module, control node module, RFID module and other data. The base board has the features as below, • Master module interface: 2.0 pitch 22-pin (2 rows, each row of 11-pin) socket interface, connected with the ZigBee master module • Sensor module, control node module, RFID module and other interfaces: 2.0 pitch 22-pin (2 rows, each row of 11-pin) socket interface, together with the sensor module, control node module, RFID module lead all IO port • Communicate with coordinator or routing node: Implemented by connecting the main control board RF function • Power supply: USB, DC 5V or a single lithium battery (3.7V) can be • ZigBee main control module: the main control module power supply circuit, DC 3.3V • Charging circuit: lithium charging circuit • Function interface: Debug interface, compatible with TI standard simulation tool • Function keys: 1 reset, 1 ordinary button • LED indicator: power indicator, charging indicator and networking indicator • Operating 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

Hardware Parameters——RFID RF Development Kit

RFID RF Development Kit (High frequency 13.56MHz)	• The RFID master MCU uses STC's STC89C54RD enhanced 51 microcontroller • The maximum clock frequency can reach 80MHz • On-chip 16KB of FLASH program memory ROM and 1KB of data memory RAM • RF read and write chips using NXP's highly integrated CLRC632, the transmission rate can be as high as 424kbps • Support ISO14443 A & B, ICODE1, ISO15693 multi-standard RF protocol • Maximum non-contact distance up to 100mm • Configuration of 16 × 2 characters dot matrix display, the corresponding data can be displayed in the operation • RFID system through the serial port and the host computer gateway for data communication • Optional 125KHz low frequency, 900MHz UHF and 2.4GHz development kit

Software Parameters——Android 5.1.1 Lollipop

Operating System	Android 5.1.1 Lollipop
Kernel	Linux 3.4.39
Bootloader	U-boot2014.07
Terminal	Minicom
Cross Compiler	Arm-eabi-4.8（gcc4.8）
File System	Ext4
GUI	Android 5.1.1 Lollipop
4G	To achieve 4G Internet access and receive / send information function
Wireless WiFi	Support 802.11b / g / n wireless protocol, to achieve WiFi wireless Internet access
Bluetooth	Support Bluedroid Bluetooth protocol stack, Bluetooth data communication
CMOS Camera	To achieve image preview, camera and video functions
GPS	To achieve the positioning of data collection and reception
LAN Driver	Gigabit wired Ethernet
HDMI Driver	Support HDMI audio, video output
AUDIO Driver	To achieve audio playback
LCD Driver	Support 10.1-inch LCD screen, support backlight adjustment function
TOUCH Driver	Support capacitive multi-touch driver
USB HOST Driver	Support USB mouse, USB keyboard, U disk read function
USB OTG Driver	Support ADB and MTP functions
Keypad Driver	Supports 4 GPIO key functions
SD/MMC Driver	Support 32GB high-capacity SD card read and write operations
RTC Driver	Supports RTC function
UART Driver	Support serial port debugging and communication function

MFC Driver	Support H.264, MPEG4, H.263, MJPEG format's encoding and decoding functions
BEEP Driver	Support the control function of beep
LED Driver	Support the control function of the indicator light
USB Camera Driver	Support USB camera's preview and camera functions
IP Camera	Support video, 24-hour real-time monitoring, alarm monitoring

Experimental Tutorial Content

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	Experiment 41	Smart home system
	Experiment 42	Access control system
	Experiment 43	Canteen meal card management system

Product Configuration List

	8*Sensor, 1*Controller Module 1*ZigBee Coordinator Node Base 3*ZigBee Router Node Base With 10.1 Inch Capacitive Touch Display **(Standard)**		37*Sensor, 7*Controller Module **(Optional)**
	User CD		Touch Pen
	Experimental Tutorial		RFID RF Development Kit
	Serial Line		Emulator
	Cable		Camera
	USB Cable		4G Module
	Power Adapter		SD Card（Optional）
	IP Camera（Optional）		

Accessories parameters——IP Camera

Feature	Function	Body size is small, the use of software limit and the perfect combination of hardware, more stable.
System	Operating System	Embedded Linux
	System Safety	Three levels of user rights management
	Number of online users	4 users watch online at the same time
	Dynamic DNS	Comes with dynamic DNS
	Control Protocol	ONVIF2.4 agreement, global agreement, enhance product interoperability
	Processor	Uses a powerful, high-performance programmable media HiSoft processor with built-in ARM926@Max.440MHz and high-speed video coprocessor
	Reset	Press and hold for 15 seconds to restore factory settings
Collection	Image Sensor	1/4 inch 720p progressive scan CMOS sensor
	Sensor performance	Support automatic white balance, automatic gain control, automatic backlight compensation
	Sensor size	3.84*2.16mm
	Signal to noise ratio	≥39dB
	Minimum illumination	0.8Lux / F1.4 (color mode), 0.3Lux / F1.4 (black and white mode)
	Lens / viewing angle	3.6mm@F1.4/56.14°
	Night vision	Dual filter automatically switch, 9 *850nmΦ infrared light, night vision more clear ,night view 10 meters
	IR Control	IR open, night vision function enabled, infrared, ICR automatic detection; IR closed, night vision function disabled, infrared extinguishing, ICR fixed in day view mode
Video	Compression standard	H.264 Main Profile/H.264 Baseline Profile/MJPEG/JPEG Baseline
	Video coding processing	CBR / VBR two rate control mode, and the output rate range of 128 ~ 4096kbps
	Resolution	720p/VGA/QVGA
	Bit rate	CBR / VBR two rate control mode, and the output rate range of 128 ~ 4096kbps
	Maximum frame rate	25fps
	Image adjustment	Brightness, contrast, saturation, color adjustable

Audio	Input	Built-in 48dB microphone
	Output	Built-in speaker (8Ω1W)
	Sampling frequency / bit width	8KHz/16bit
	Compression standard / bit rate	ADPCM/32kbps
LAN	Network interface	10Mbps / 100Mbps adaptive / RJ45 interface
	Network protocol	TCP/IP, HTTP, TCP, UDP, SMTP, FTP, DHCP, DNS, DDNS, NTP, UPnP, RTSP , P2P etc
	Wireless network	WiFi802.11b/g/n
	Antenna	3dBi antenna, with stronger and more stable signal
	Wireless Network Security	One Touch WIFI Settings
Storage	Storage ways	local storage / client storage, support 128GTF card storage, support for pre-recorded alarm
	Interface	Micro SD
Haeundae	Rotation angle	Horizontal 280 ° / vertical 80 °
	Preset positions	15
	Limit method	Using software limit, more accurate for preset, low PTZ failure rate
Alarm	Alarm detection	Motion detection
	Alarm action	Image E-mail / FTP upload pictures
Physical Instructions	Rated voltage	DC5/2A±0.3V
	Power consumption	Rated Power：3.0W(infrared light on)
	Working environment	Operating temperature: -20～70 ℃, working humidity 90%
	Weight	Gross Weight: 615g (Note: subject to the object)
	Shell material	ABS plastic
	Package size	208*154*137mm（L*W*H）
	Installation Method	Wall hanging, ceiling

Service Support

Technical Support Contact:

TEL：0755-86325375　86325376

E-mail：ces_support@ces-tech.com

Technical Support Service Hours:

Monday to Friday：9：00～12：00，13：30～18：00

Disclaimer

This manual information is for reference only, and is subject to change without notice.

For more product information, please visit www.nrisc.com

SHENZHEN HAITIANXIONG ELECTRONIC CO.,LTD (HEADQUARTERS)

ADD：6th Floor,Skyworth Digital Building, Songbai Road, Shiyan Street,Baoan District, Shenzhen, China.

TEL：(086) 0755-86325375　86325376

E-mail：ces_market@ces-tech.com

URL：www.nrisc.com

SHENZHEN HAITIANXIONG ELECTRONIC CO.,LTD (CHENGDU BRANCH)

ADD：No. 27, Section 4, Renmin South Road, Chengdu, Sichuan, China.

TEL：(086)028-85123126

E-mail：cqmarket@ces-tech.com