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IOT-100
Innovative IoT Experiment Platform

Notebook is excluded.

With the advent of IoT (Internet of Things), more physical objects are connected to internet to make everyday life easier. Topics about creating a user-friendly IoT experience become popular to IoT solution providers.

The Innovative IoT Experiment Platform (IOT-100) is a module-based solution to IoT experiment systems. It is constructed by various communication node boards, sensor modules, wireless integrated gateway, and open-source applications. The experiment topics include not only traditional "wireless sensing technology", but also embedded system development, intelligent sensing technology, IoT composition technology, IoT chip control technology, and IoT engineering applications.

IOT-100 adopts 4 different wireless protocols: ZigBee, Bluetooth, WiFi, and EnOcean. Users can select one (or more) wireless sensing technology and transmit data to wireless integrated gateway via MQTT (Message Queuing Telemetry Transport) protocol for observation.

The functions of the Wireless Integrated Gateway are acquisition, packaging, and transmission of data. The data is transmitted to the cloud using MQTT protocol. On the webpage, students can observe the experiment results of data acquired from the wireless sensing node boards and sensor modules.

● Components

1. Wireless Integrated Gateway (IOT-13011):
   Wireless Cortex-M4 processor x 1
   Ethernet interface
   UART interface * 2
   (1 for setting and 1 for transmission)

2. Communication Node Boards :
   (1) IOT-13001 : WiFi communication node board x 1
       TI CC3200, Cortex-M4, compatible with 802.11b/g/n 2.4GHz
       A. USB Interface : Used for program and debug for Wi-Fi Communication Node Board
       B. LCD Display : 3.5" dot matrix monochrome LCD
       C. Peripherals :
           (a) RGB LED x 3pcs, Switch Button x 4pcs
           (b) Joystick x 1pce, with 6 statuses such as up, down, left, right, push and default state
           (c) Supports I^2C/SPI/GPIO/UART/ADC extension applications

   (2) IOT-13002 : Bluetooth communication node board x 2
       Tiva TM4C123GH6PMI+CC2564B
       Dual-mode Bluetooth controller 2.4GHz
       A. 20pin JTAG : 20-PIN JTAG connector, used for program and debug for Bluetooth Communication Node Boards.
       B. USB Interface : Used for debug
       C. LCD Display : 3.5" dot matrix monochrome LCD
       D. Peripherals :
           (a) RGB LED x 3pcs, Switch Button x 4pcs
           (b) Joystick x 1pce, with 6 statuses such as up, down, left, right, push and default state
           (c) Supports I^2C/SPI/GPIO/UART/ADC extension applications

(3) IOT-13003 : EnOcean communication node board x 2
Tiva TM4C123GH6PMI +TCM310F, 868.3MHz, FSK
A. 20pin JTAG : 20-PIN JTAG connector, used for program and debug for EnOcean Communication Node Boards.
B. USB Interface : Used for debug
C. LCD Display : 3.5" dot matrix monochrome LCD
D. Peripherals :
(a) RGB LED x 3pcs, Switch Button x 4pcs
(b) Joystick x 1pce, with 6 statuses such as up, down, left, right, push and default state
(c) Supports I^2C/SPI/GPIO/UART/ADC extension applications

(4) IOT-13004 : ZigBee communication node board x 5
TI CC2538 Cortex-M3 Processor , 2.4GHz
A. 20pin JTAG : 20-PIN JTAG connector, used for program and debug for ZigBee Communication Node Boards.
B. USB Interface : Used for debug
C. LCD Display : 3.5" dot matrix monochrome LCD
D. Peripherals :
(a) RGB LED x 3pcs, Switch Button x 4pcs
(b) Joystick x 1pce, with 6 statuses such as up, down, left, right, push and default state
(c) Supports I^2C/SPI/GPIO/UART/ADC extension applications

3. Wired Sensor Modules :
(1) IOT-13021 : Temperature and humidity sensor module x 1

(2) IOT-13022 : Alcohol sensor module x 1

(3) IOT-13023 : Smoke sensor module x 1

(4) IOT-13024 : Triaxial accelerometer sensor module x 1

(5) IOT-13025 : Pyro-electric infrared detector module x 1

(6) IOT-13026 : Relay control module x 1

(7) IOT-13027 : Illuminance sensor module x 1
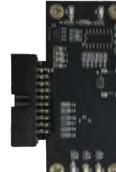
(8) IOT-13028 : Ultrasonic distance sensor module x 1

(9) IOT-13041 : Voltage detection sensor module x 1


(10) IOT-13042 : Current detection sensor module x 1

(11) IOT-13043 : Barometric pressure sensor module x 1

(12) IOT-13044 : 9-axis motion tracking sensor module x 1

(13) IOT-13045 : Voltage output sensor module x 1
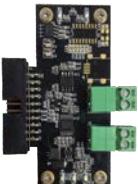
(14) IOT-13046 : Displacement sensor module x 1

(15) IOT-13047 : Photoelectric switch counting sensor module x 1

(16) IOT-13048 : Carbon dioxide sensing device module x 1

(17) IOT-13049 : Hall (magnetic) detection sensor module x 1

4. Wireless Sensor Modules:

(1) IOT-13029 : EnOcean door/window magnetic sensing module x 1

(2) IOT-13030 : EnOcean rocker switch sensing module x 1

5. IPv6 Network Device (ITS-200 Package E)

(1) ITS-201 Host : Client x 1
   A. Input power : 100V ~ 240V AC, 47Hz ~ 63Hz
   B. Network interface: (Auto-Negotiation)
      (a) Console: 10/100 MB Ethernet (802.3) 1 Port
      (b) Port 1 ~ 4: 4-port Switch Hub
   C. Embedded multi-tasking operating system
   D. IPv4 / IPv6 dual stack
   E. Configuration parameters setting through web browser
   F. Enable Remote Packet Capture Service (RPCAP) and use Wireshark software to observe network packets

(2) ITS-202 Host : Server x 1
   A. Input power : 100V ~ 240V AC, 47Hz ~ 63Hz
   B. Network interface : (Auto-Negotiation)
   C. Embedded multi- tasking operating system
   D. IPv4 / IPv6 dual stack
   E. Configurable network-related parameters through web browser

(3) ITS-203 Router x 2
   A. Input power : 100V ~ 240V AC, 47Hz ~ 63Hz
   B. Network interface : 10/100 MB Ethernet (802.3) 3 Ports (Auto-Negotiation)
   C. Embedded multi- tasking operating system
   D. IPv4 / IPv6 dual stack
   E. Configurable routing parameters through GUI or web browser

(4) ITS-200 Package E Accessories :
   A. RJ-45 cable 1M x 10
   B. Integrated Experiment Manual x 1

(5) ITS-200-P3 Rack

6. IOT-13088 : 802.11 b/g/n Wireless broadband router with built-in 4-port(or more) 10/100 MB switch hub

7. IOT-13092 : Rack frame

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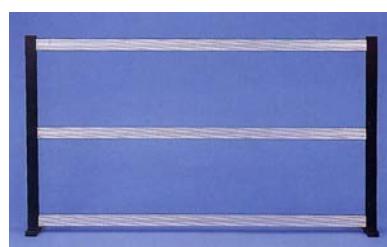
● Experiment List

1. Network Chip

		ZigBee	WiFi	Bluetooth	EnOcean
Fundamental experiments	1	IAR project establishing experiment	IAR project establishing experiment	IAR project establishing experiment	IAR project establishing experiment
	2	GPIO experiment	GPIO experiment	GPIO experiment	GPIO experiment
	3			Watchdog experiment	
	4	I^2C experiment	I^2C experiment	I^2C experiment	I^2C experiment
	5	GPIO interrupt experiment	GPIO interrupt experiment	GPIO interrupt experiment	GPIO interrupt experiment
	6	ADC experiment	ADC experiment	ADC experiment	ADC experiment
	7	Timer experiment	Timer experiment	Timer experiment	Timer experiment
	8			Hibernation experiment	
	9	UART experiment	UART experiment	UART experiment	UART experiment
	10	SSI experiment	SSI experiment	SSI experiment	SSI experiment
	11	USB to Serial experiment		USB to Serial experiment	USB to Serial experiment
	12	Smart sensor experiment	Smart sensor experiment	Smart sensor experiment	Smart sensor experiment
Communication experiments	1	Peer to peer communication experiment	WLAN station example experiment	HID: Human Interface Device Profile experiment	
	2	Power Transmission setup experiment	WLAN AP example experiment	ANP: Alert Notification Profile experiment	
	3	Wireless channel setup experiment		HRS: Heart Rate Service Profile experiment	
	4	Wireless monitoring experiment			
	5	ACK Response experiment			
	6				
		※At least 2 ZigBee sensing node boards for communication experiments.	※ At least 2 WiFi sensing node boards for communication experiments.	※ At least 2 Bluetooth sensing node boards for communication experiments.	
Comprehensive experiments	1	Star network topology experiment			
	2	Mesh network topology experiment			
	3	Grouping control experiment			
	4	Binding Control experiment			
		At least 5 ZigBee sensing node boards for comprehensive experiments.			

Remark : Please refer to above ※ for minimum quantity of node boards required for Communication experiments.

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2. Integrated Experiment
   (1) IPv6 Host - Client
      Exp 1: Configuration settings
      Exp 2: IPv6 Packet sniffer
   (2) IPv6 Host - Server
      Exp 1: IPv6 DHCP
      Exp 2: IPv6 DNS
      Exp 3: IPv6 Web service
      Exp 4: IPv6 Mail service
      Exp 5: IPv6 FTP service
   (3) IPv6 Router
      Exp 1: Static routing
      Exp 2: Dynamic routing (RIPng)
      Exp 3: Dynamic routing (OSPFv3)
   (4) IPv6 Integration experiments:
      Exp 1: Network topology
      Exp 2: Network segment and IP address
      Exp 3: Routing rule
      Exp 4: Observes HTTP Packet
      Exp 5: Observes remote packets via ITS-201
   (5) IOT-100 + IPv6 Integration experiments:
      Exp 1: Integrates network topology
      Exp 2: IPv4 and IPv6 Network settings
      Exp 3: IOT-100 Configuration setting
      Exp 4: IOT-100 + IPv6 Integrated demonstration
      Exp 5: IOT-100 Packet sniffer

● Optional (but necessary):

IOT-13089 IAR Embedded Workbench

(1) Supports Cortex M

(2) Includes C/C++ Compiler, Assembler, Linker/Lib,
    MISRA C Checker, Debugger, IDE
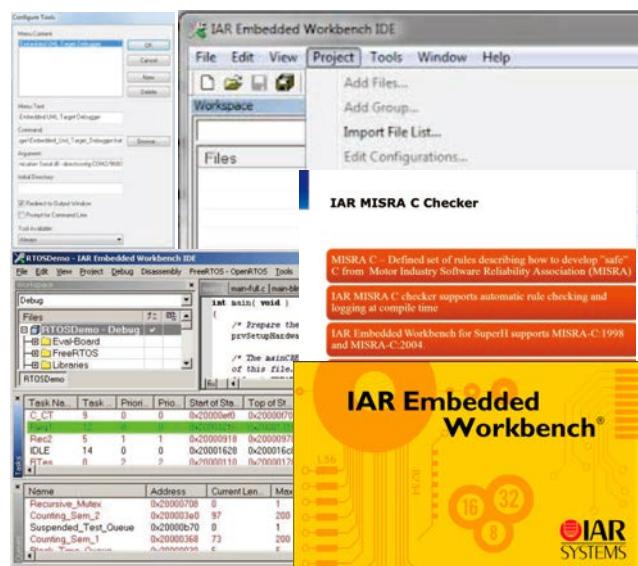
(※ please prepare the IAR Embedded Workbench compilation software locally or download the free trial version on the IAR official website.)

● System Requirements

1. PC with Pentium IV or above CPU
2. Windows 7 Service Pack 1 or upper version

● Accessories (IOT-19001)

1. Storage case x 1

2. USB Hub
   IOT-100-P2 USB Hub Plate x 1

IOT-100-P2

3. USB-to-Serial Cable x 1
4. Operation Manual x 1
5. Sensor Experiment Manual x 1
6. WiFi Experiment Manual x 1
7. ZigBee Experiment Manual x 1
8. Bluetooth Experiment Manual x 1
9. EnOcean Experiment Manual x 1
10. CD of Source code for IOT-100 Experimental Resources x 1

ITS-203#1: IPv6 route fc02::/16 fc27::121 eth1
           IP route 192.168.2.0/24 192.168.27.121

ITS-203#2: IPv6 route fc01::/16 fc27::111 eth1
           IP route 192.168.1.0/24 192.168.27.111