

「IPv6 物聯網智慧應用計畫」

IPv6 enable Sensors

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Outline

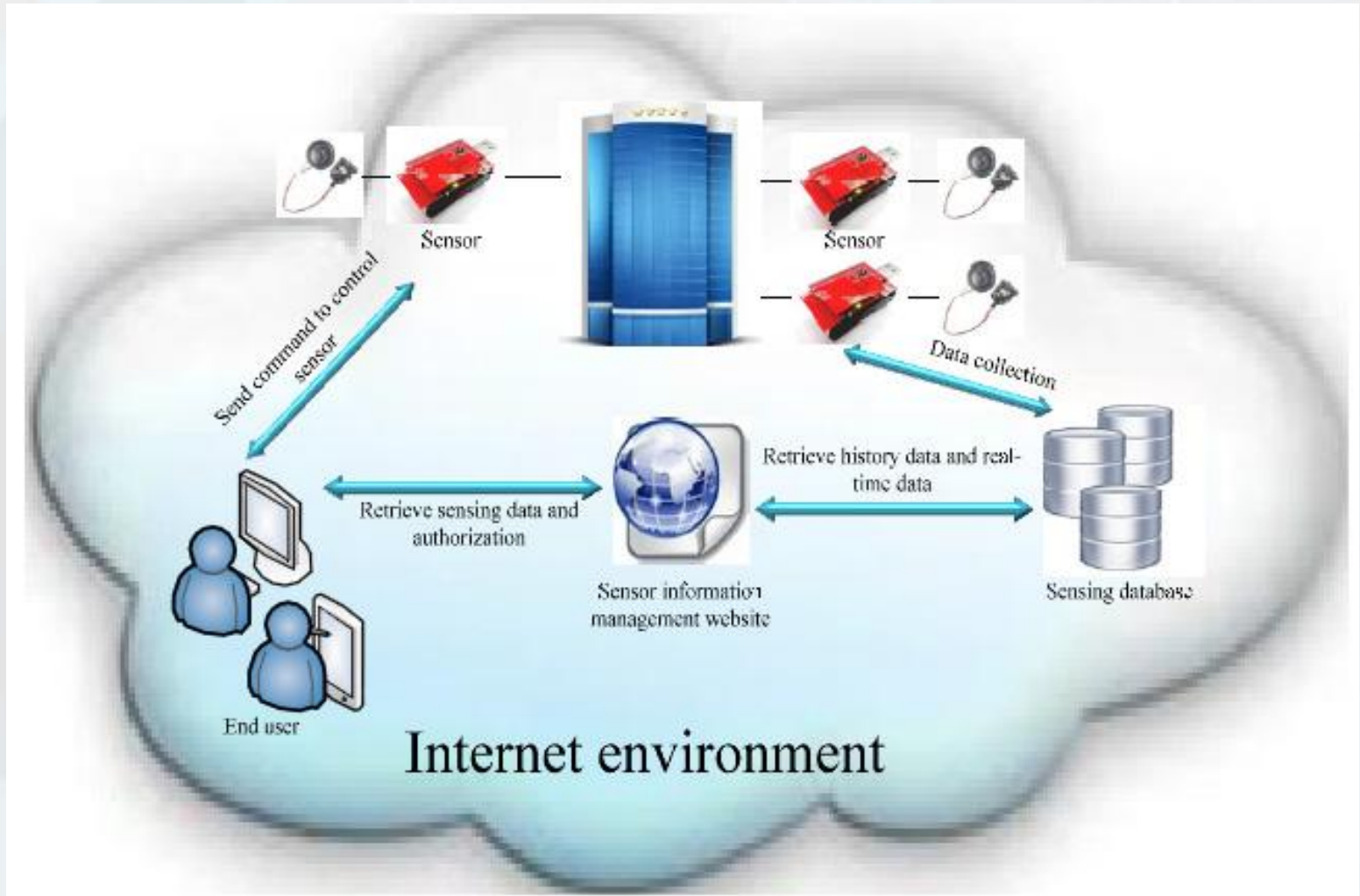
- **IPSO introduction**
- **Software stack**
 - Contiki O.S. introduction
 - uIPv6 library introduction
 - CoAP Protocol introduction
- **System component**
 - Sensor platform
 - Plug-in module
- **Application scenario**

Introduction

- **Internet of Things represented as**
 - "Worldwide network inter connecting Things/Objects"
- **Objects/Things could be sensor, RFID tag, mobile devices etc.**
- **IoT will improve ultimately the quality of life**

- **Internet of Things brings out**
 - New services and applications
 - M2M, remote management
 - New Markets
 - Process Control for factories
 - Control and Automation for home, building, cities
 - Larger Core Market
 - Open standards to the sensor
 - Lower cost
 - More connected devices and new applications
 - A wider Internet

- **System architecture**



- **Contiki O.S. introduction**
 - Open source-BSD license
 - C programming language
 - Released in March 2003 by Adam Dunkels
 - Highly portable
 - Tmote sky, Jcreate, TelosB, MSB, ESB... sensor devices
 - Simulators: Cooja, MSPsim, AvroraZ, netsim
 - Native platform
 - Dynamic program loading



Software stack-Contiki

- **Contiki O.S. features**
 - Multitasking kernel
 - Preemptive scheduling
 - Managed memory allocator
 - Proto-threads
 - TCP/IP networking, including IPv6
 - Support CoAP protocol

- **uIP introduction**

- An open source TCP/IP stack for wireless sensor object.
- Widely used in the embedded systems and several platforms
- Provide IPv6 stack for wireless sensor device.
- Support by





Software stack-uIP

- **uIP features**
 - World's smallest TCP/IP stack
 - Open source project
 - 4 KB code, 1 KB RAM
 - Fully RFC compliant
 - IP, ICMP, UDP, TCP

- **CoAP introduction**

- A software protocol intended to be used in very simple electronics devices that allows them to communicate interactively over the Internet.
- CoAP is an application layer protocol that is intended for use in resource-constrained internet devices, such as WSN nodes.



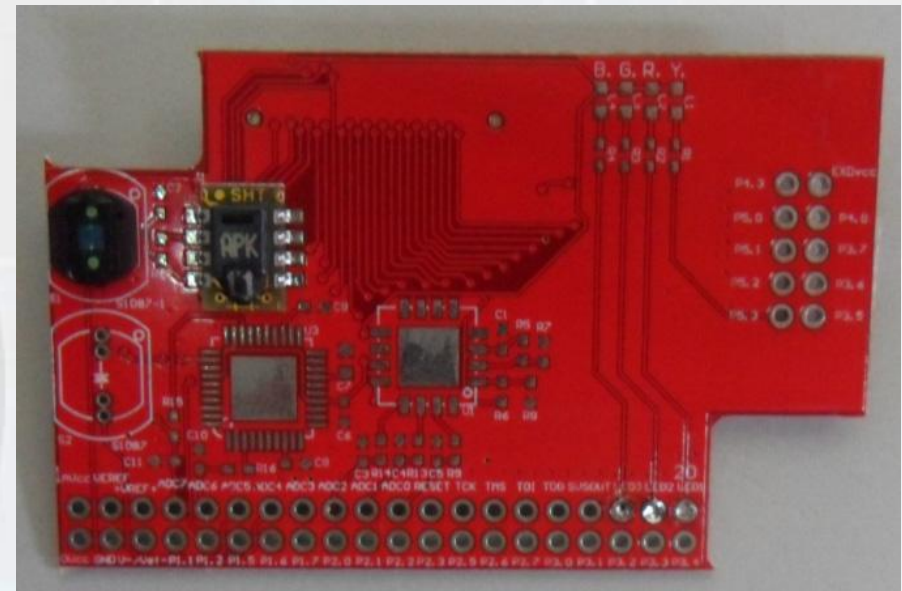
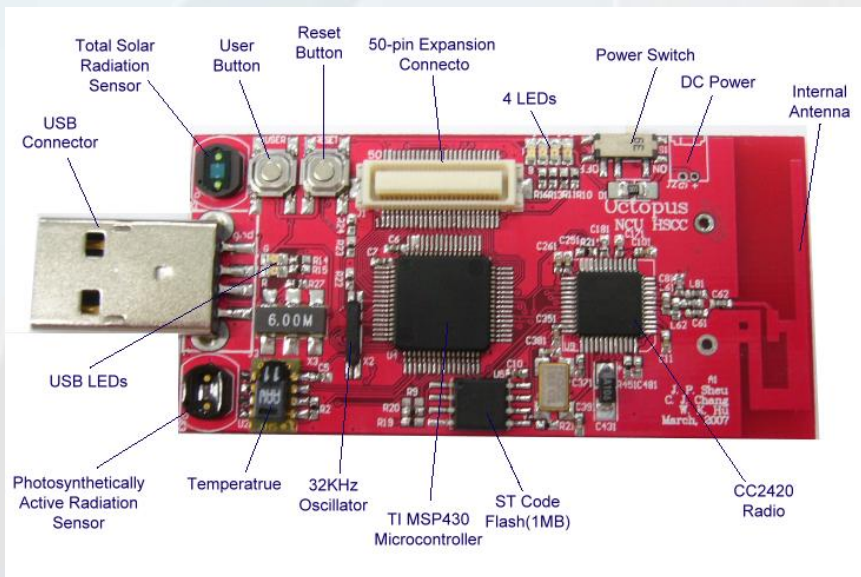
Software stack-CoAP

- **CoAP features**

- RESTful protocol design minimizing the complexity of mapping with HTTP.
- Low header overhead and parsing complexity.
- URI and content-type support.
- Support for the discovery of resources provided by known CoAP services.
- Simple subscription for a resource, and resulting push notifications.
- Simple caching based on max-age.

- **Sensor device**
 - Octopus II platform
 - CC2420-IEEE 802.15.4 wireless transceiver
 - MSP430-8MHz Core microcontroller
 - Expandable flash memory – up to 1 MB
 - External oscillator – For the deep sleep mode
 - A connector with expansion I/O pins
 - Sensor devices
 - Light sensors
 - Temperature-humidity sensor

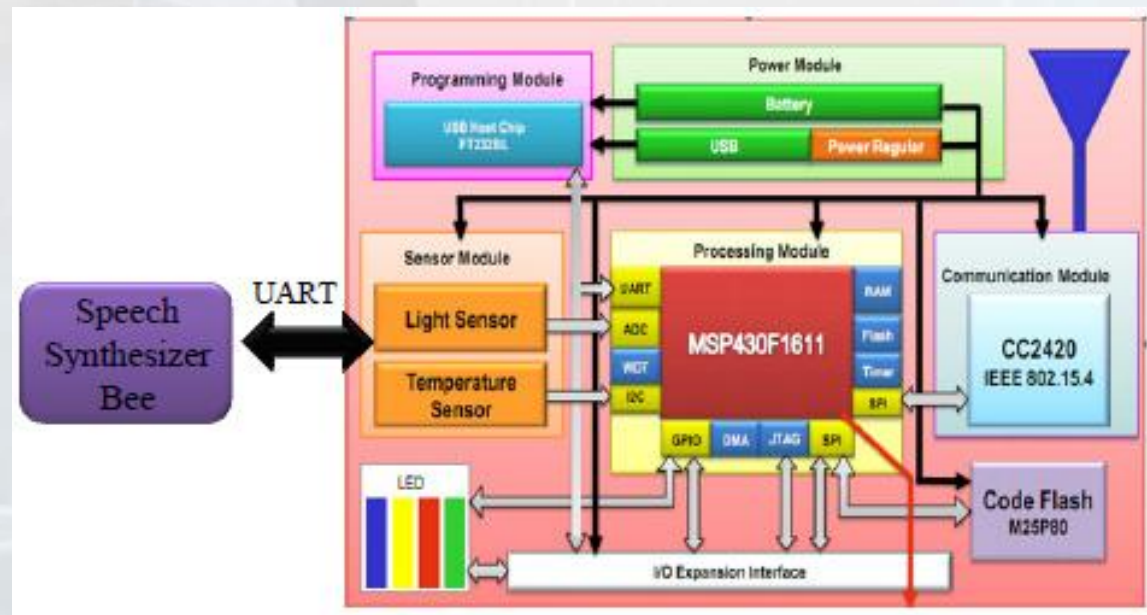
- Octopus II**



- **Plug-in module**

- Speaker module

- Speech synthesizer bee
- Xbee pin spec.
- Connected with Octopus II through UART



Hardware Components





Application Scenario

- **Safe building system**
 - Prevent some accident on a building
 - Such as: fire accident, earthquake
 - Developed program on IPv6 sensor
 - Accident detection algorithm
 - Escaping algorithm
 - Placed IPv6 sensor devices in a building.
 - Speaker guides people to escape from building.

Application Scenario

