모비우스 플랫폼
[ “&CUBE”를 활용한 Mobius 연동 IoT DIY ]

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Korea Electronics Technology Institute
김재호
Agenda

1. Open IoT Platform – Mobius, &CUBE
2. IoT HW Platform
3. IoT SW Platform “&Cube”
4. “&Cube” Applications
5. Conclusion
1. Open IoT Platform – Mobius, &CUBE

**&CUBE**
- Application Manager
- Resource Manager
- Security Manager
- Interaction Manager
- Device Manager

**Mobius**
- Smart City
- Environment
- Energy
- Smart Home
- Agriculture
- Health

KETI (WiFi, Ethernet)
B&P (3G)
B&P (LTE)
Arduino
Raspberry Pi
mbed
1. Open IoT Platform – Mobius, &CUBE

사물인터넷 서비스 참조 구조

KETI Open IoT Platform

Ecosystem

IoT Service

IoT Platform

IoT Devices

Data Processing Platform

Mobius

&CUBE (Rosemary)

&CUBE (Mint)

&CUBE (Chamomile)

&CUBE (Lavender)
Agenda

1. IoT Device Platform
2. IoT HW Platform
3. IoT SW Platform “&Cube”
4. “&Cube” Applications
5. Conclusion
### 2. IoT HW Platform – Development platforms

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<th>Image</th>
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<td>PanStamps</td>
<td><img src="image1" alt="PanStamps" /></td>
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<tr>
<td>TinyDuino</td>
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<tr>
<td>Arduino</td>
<td><img src="image3" alt="Arduino" /></td>
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<tr>
<td>RFDuino</td>
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<td>OpenKontrol</td>
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<tr>
<td>Pinoccio</td>
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<tr>
<td>Raspberry-Pi</td>
<td><img src="image8" alt="Raspberry-Pi" /></td>
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<tr>
<td>BeagleBone</td>
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<tr>
<td>CubieBoard</td>
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<tr>
<td>Nanode</td>
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<tr>
<td>mbed</td>
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<tr>
<td>pcDuino</td>
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<tr>
<td>Flyport</td>
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<tr>
<td>Hackberry</td>
<td><img src="image15" alt="Hackberry" /></td>
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<tr>
<td>UDOO</td>
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2. IoT HW Platform – Raspberry-Pi

Description:
"The Raspberry Pi is a single-board computer developed in the UK by the Raspberry Pi Foundation. The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It's a capable little PC which can be used for many of the things that your desktop PC does."

Hardware:
- ARM1176JZF-S 700 MHz processor
- 256/512 MB memory
- HDMI, RCA / composite
- USB, Audio, SD/MMC memory card

Software:
- OS: Linux, Android, RISC OS, etc.
2. IoT HW Platform – BeagleBone

Description:
"BeagleBone Black is a low-cost, community-supported development platform for developers and hobbyists. Boot Linux in under 10 seconds and get started on development in less than 5 minutes with just a single USB cable."

Hardware:
- AM335x 1GHz ARM® Cortex-A8
- 512 MB memory
- 3D graphics accelerator, NEON floating-point accelerator
- HDMI, Ethernet, USB

Software:
- OS: Linux, Android, etc.
- BoneScript library (Node.js library, function calls for Linux)
2. IoT HW Platform – Arduino

Description:

"Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists and anyone interested in creating interactive objects or environments."

Hardware:

- Uno - ATmega328, Digital I/O 14, Analog Input 6
- Leonardo - ATmega32u4, Digital I/O 20, Analog Input 12
- Due - AT91SAM3X8E, Digital I/O 54, Analog Input 12, Analog output 2
- Yun - ATmega32u4USB (Arduino) + Atheros AR9331 (Linux)

Software:

- Software IDE Blink, Software library Wiring, Processing project
Description:

“Herbas is a Linux-based IoT adapter for providing various IoT-based devices with Internet connectivity including Ethernet, Wi-Fi, Bluetooth, and ZigBee. It is designed to work with a SW platform for IoT devices, &Cube and IoT server platform, Mobius.

Hardware:

- ARM Cortex-A9 1.4 GHz
- 1 GByte SDRAM
- USB, Ethernet, Wi-Fi, Bluetooth, ZigBee interface

Software:

- OS: Linux
- IoT SW platform: &Cube
Agenda

1. IoT Device Platform
2. IoT HW and SW Platform
3. IoT SW Platform “&Cube”
4. “&Cube” Applications
5. Conclusion
3. IoT SW Platform “&Cube” – Definition

- **IoT devices**
  - Devices supporting IoT-based services
  - Things + Adaptor

- **Mobius**
  - A family of **server platforms** providing capabilities to register, manage, and discovery IoT devices and services (e.g., Web/Apps)

- **&Cube**
  - A **middleware platform** providing common functions for interconnecting IoT devices (i.e., Things) with Mobius
3. IoT SW Platform “&Cube” – Categories

- **&Cube: Core**
  - Application Manager
  - Resource Manager
  - Security Manager
  - Interaction Manager
  - Device Manager

- **&Cube: Rosemary**
- **&Cube: Mint**
- **&Cube: Lavender**
- **&Cube: Chamomile**
3. IoT SW Platform “&Cube” – Interconnection

- &Cube: Lavender
- &Cube: Mint
- &Cube: Rosemary
- &Cube: Chamomile

Service Platform
3. IoT SW Platform “&Cube” – Overview

- IoT Device
  - IoT Adaptor
    - Device Application
    - &Cube
      - Application Manager
      - Resource Manager
      - Security Manager
      - Thing Manager
      - Device Manager
      - Interaction Manager (MQTT)
  - TAL
  - MicroServer
  - Linux OS

- Things
  - Sensors
  - Actuators
  - IoT Device

Open IoT Server Platform

- IoT Service
- IoT Service
- IoT Service
3. IoT SW Platform “&Cube” – TAL

- Thing Adaptation Layer (TAL)
- Why?
3. IoT SW Platform “&Cube” – TAL & TAS

- Support interworking between &Cube and things
- Convert data templates
- Create TAS, then Apps
3. IoT SW Platform “&Cube” – Device manager

- Init & create
- Monitor
- Register
- Device Mgmt
3. IoT SW Platform “&Cube” – Resource manager

- Manage device resource
- Support CRUD
- Trigger managers
3. IoT SW Platform “&Cube” – Application manager

- Manage device apps
- Run, quit, delete apps
- RM-triggered
3. IoT SW Platform “&Cube” – Security manager

- Manage access tokens
- Encrypt, decrypt data
- RM-triggered
3. IoT SW Platform “&Cube” – Thing manager

- Support interoperating with things
- TAL ↔ TM ↔ RM
3. IoT SW Platform “&Cube” – Interaction manager

- Microserver
- MQTT
- RM
Agenda

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4. “&Cube” Applications – Design (Lavender)
4. “&Cube” Applications – Design (Rosemary + Mint)
4. “&Cube” Applications – HWs for &Cube

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mango LCD to VGA Board [CX-VGA]</td>
<td>33,600</td>
</tr>
<tr>
<td>Mango 5D Logger (Accelerometer + Gyroscope) Module</td>
<td>41,250</td>
</tr>
<tr>
<td>Mango Humidity Module (CM-Humidity)</td>
<td>16,500</td>
</tr>
<tr>
<td>Mango eMMC Module</td>
<td>33,600</td>
</tr>
<tr>
<td>IR Remote Sensor Module</td>
<td>16,500</td>
</tr>
<tr>
<td>3 Axis Gyroscope Module</td>
<td>27,500</td>
</tr>
<tr>
<td>5MP Fix Camera Module</td>
<td>66,000</td>
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</tbody>
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4. “&Cube” Applications – Example 1

- Smart Mailbox
4. “&Cube” Applications – Example 2

**Talking Tag**

![Talking Tag Diagram]

- **IoT Platform Mobius**
- **Data Control**
- **Data Control**

- **Android + Arduino**
- **Get it!**
- **TalkingTag (어두이노)**
- **TalkingTag (어두이노)**
- **TalkingTag (어두이노)**
4. “&Cube” Applications – Example 3

- Planty (http://youtu.be/ITLosxtdlj0)
1. IoT Device Platform
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5. Conclusion

- **IoT Device Platform**
  - HW platform
  - SW platform

- **&Cube**
  - Architecture
  - Applications

- **Awaken your innovation spirit!**
Thank you

Questions?

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