Presentation summary:

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1. Overview

Following the global trend of IoT development, both wired and wireless connectivity have become more crucial than ever. Even the Hong Kong Government sees positive outlook on smart city with the thriving IoT network, which strengthens grounds for developing smart transportation, smart healthcare, smart manufacture, and smart building. Instead of establishing smart buildings as premises, it is even more sustainable and profitable to compile standards that run through the IoT system and make automated decisions with backend artificial intelligence to create more customised services.

2. Smart buildings

2.1. Benefits of smart buildings

2.1.1. Conserve outdoor environment

The idea of smart and green buildings is rapidly growing for the sake of lower cost and less release of CO_2.

2.1.2. Improve indoor air quality (IAQ)

Sustainable development is commonly referred to the outdoor environment. However, smart buildings and green buildings also play a crucial role in preserving better indoor environmental standard.

2.2. Wireless measurement and control

2.2.1. Objective

To study how small multi-model sensing technology can affect building operations.

2.2.2. Motivation

- Wireless:
  50% to 90% of sensor cost is derived from wiring; with wireless technology, costs will be reduced while revenue will be increased
- Small:
  The size of device allows embedment, attachment, or installation to furniture, ceiling tile, or wall. Such micro devices are also known as “smart dust”
- Self-located:
  Location of fixture or equipment is traceable
- Low cost:
  Cost of below HK$5 for each device is available

2.3. Outlook on future smart buildings

2.3.1. Smart healthcare

To cope with the huge healthcare and medical demand derived from the aging population, sensors, wearable devices, monitoring devices and other ICT means featuring back-to-back services that send and receive real-time health data for analytical purposes and give early warnings can even be life-saving.

2.3.2. IoT application

The presence of IoT technology is seen to be prevalent in smart apartment, smart hotel, and smart office.

3. Development and applications of IoT

3.1. What’s hot?

3.1.1. Philips® Light Balancing

This is an advanced energy control that automatically adjusts light level for maximum user comfort and minimum energy consumption.

It effectiveness on sustainability and profits are as below:

- Reducing electricity bill by up to 70% (for users)
- Reducing HVAC energy by up to 60% (for users)
- Increasing asset valuation by 3-5%, resulting in higher rental rates (for property developers)

3.1.2. Future needs of IoT development

- Micro-computering:
  Smaller and lower profile components (micro computering) with higher computation power and pervasive computation
- User experience:
  Feedback of user experience for evaluation
- Interconnected devices:

We need IoT means to connect devices such as narrowband IoT technology derived from cellular technology, WiFi, Zigbee, BLE, RFID light, LoRa, Sigfox, etc.

3.2. What's not?

3.2.1. Earthquake-resistant building

This development is prevalent and can be life-saving in some countries. However, Hong Kong has seen no necessity on that as yet.

3.3. What's next?

3.3.1. Indoor air quality (IAQ) control

IAQ-related parameters usually record the appropriateness of temperature, air freshness, humidity, and air cleanliness. There is a high tendency to suffer from volatile organic compounds (VOCs) if IAQ is poorly managed, especially in newly renovated buildings.

3.3.2. Remote patient monitoring system

Regarding tele-health system, commonly measured signals, including pulse oximeter, ECG, blood pressure meter, thermometer, weight scale, and glucose meter are combining into one device. The accuracy of data transmission is therefore essential, which calls for precise and robust backend systems.

4. Challenges

A few questions should be asked for effective solutions to cope with challenges facing enterprises:

4.1. On energy-plus buildings

- What kind of new energy concept or facility should be adopted?
- Is solar panel, green root top, or green side-wall a suitable solution?

4.2. On wireless network

- Will there be interferences?
- How should enterprise solve the problem of mis-transmission to reduce energy release?
- How should enterprise minimise unwanted outcome which may also result in energy inefficiency?

The end

To learn more, please visit the presentation video at here.