

物聯網/工業物聯網科技 發展.趨勢.策略:
挑戰與機會

IoT/IIoT Technologies, Trends and Strategies:
Challenges and Opportunities

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At

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Taiwan**

Presented by

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Topics of Presentation

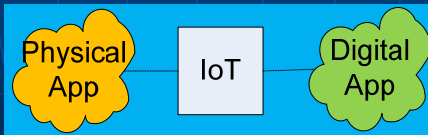
- What is IoT/IIoT?
- IoT Supporting Technologies
- IoT Applications
- IIoT Applications
- Challenges and Opportunities
- IoT/IIoT-based Technology Strategies

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What is IoT (Internet of Things)?

- IoT includes: “Internet” & “Things”
 - Things:
 - **Physical** things or **Virtual** things
 - **Products, Services, places**, etc
 - Network connected things (devices) with sensors and/or actuators communicating with one another without human in the loop
 - Served as a main conduit between the physical and digital applications.



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What is IoT (Internet of Things)?

- IoT includes: “Internet” & “Things”
 - States of Things – our most interested data & info
 - **Motion info**: location, position, in-motion (how fast, direction), proximity
 - **Environment info**: temperature, humidity, pressure, light
 - **Health monitoring devices**: heart rate, blood pressure, step detector and counter, face gesture, and body fall
 - **Power and machines**: current, voltage, power, power factor, service time, problems

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What is IIoT (Industrial Internet of Things)?

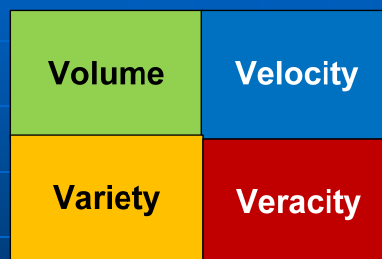
- IIoT \approx IoT applications in smart factory manufacturing setting for
 - Continuous improvement
 - Reduced unplanned downtime
 - Greater asset availability and reliability
- Harnessing the existing **sensor** data, **machine-to-machine** (M2M) communication and **automation** technologies
- Incorporating technologies
 - Machine learning
 - Big data analytic

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IoT Supporting Technologies

- State of Things
 - Raw data, aggregated data (info)
 - Big data, Analytic



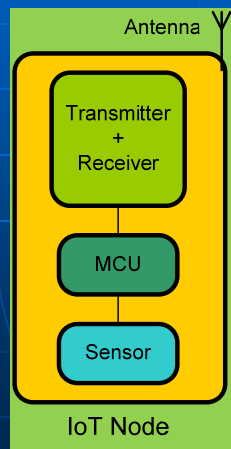
- Optimized decision making and action

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IoT Nodes

- IoT nodes = Smart devices
 - Sensors, Analog electronics & Signal processing, Embedded processor, Communication Units, Programs



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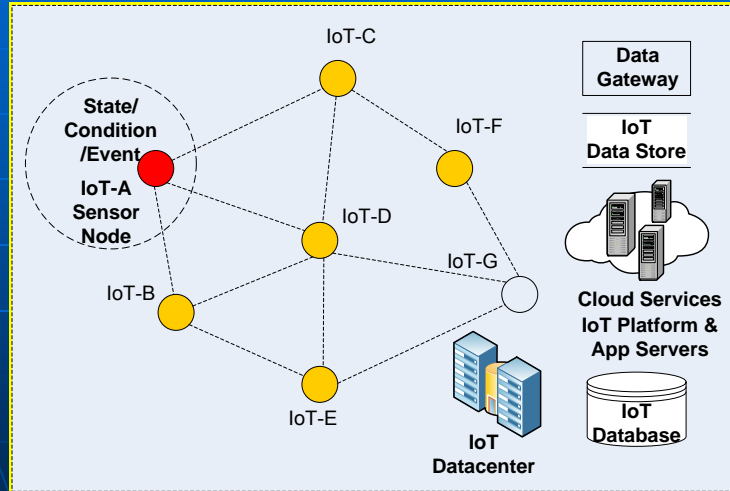
IoT/IIoT Enabling Technologies and Supporting Infrastructures

- Sensors technologies
- Micro-electronics subsystems
- Embedded computing subsystems
- Wired/wireless communications and Internet
- Distributed computing systems
- Cloud computing services
- Database, Datacenter
- Big data and analytic

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IoT/IIoT Enabling Technologies and Supporting Infrastructures



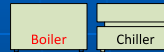
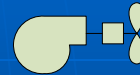
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IoT Connected Things

■ Connected Things

- Shoes, Clothing
- Health monitoring devices
- Home appliances
- HVAC system
- Cars, buses, trucks
- Power sources, switches & power panels
- etc



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IoT Applications

- Personal Health IoT
- Smart Home
- Financial services
- Retail and service IoT
 - Customer Services, Buying behaviors, Retention
- Manufacturing IoT
- Smart Transportation
 - Connected vehicles
 - Autonomous

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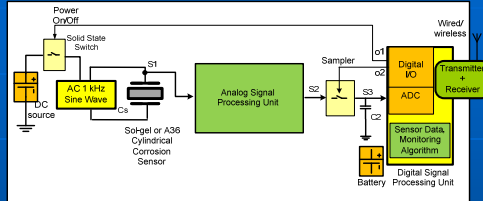
IoT Applications

- Smart Infrastructure Monitoring
- Smart Energy Management IoT
- IoT for Smart Grid – renewable energy resources + traditional power generation
- Smart Building
- Smart and Sustainable Cities

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Smart Infrastructure Monitoring



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Personal Health IoT

- IoT –
 - Connected devices: hand-held devices, wearable devices, tablet, smartphones
 - Body sensor network, mobile gateway, cloud services
 - Mobile health/medical app
- Applications
 - Intelligent personal health assistant
 - Monitoring Patients and Medical Devices in Real-Time

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Healthcare IoT

- IoT in Healthcare Architecture
- IoT endpoint:
 - sensors
 - Smart and connect medical devices
 - Little data
- Gateways/Smartphone
- Cloud Services
 - Big data and Data analytics

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Smart Building IoT

- IoT (sensors) – Real-time building operational and security data gathering
 - Temperature, Humidity, Light, Air Quality, Weight, Force, Sound, Motion, Fluid Flow
 - Building operational data: Lighting, HVAC, Water, Parking, Energy, Access and Security
 - Occupancy monitor, Fitness trackers, Elevator, Waste, Fire Safety

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Smart Building IoT

- Data Analytics and Real-time Management & Control to Improve
 - **Building automation and operations**
 - Improved serviceability and reduce the risk of downtime
 - Optimized comfort and reducing energy costs
 - **Security**
 - Risk management: act or react to people and other machines in a nonintrusive manner

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Smart Building IoT

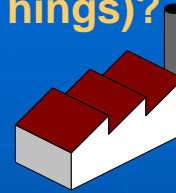
- **Building AI & Learning**
 - Sense, Tuning/Learning
 - Anticipate, Act/Respond, Adapt

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What is IIoT (Industrial Internet of Things)?

- IIoT \approx IoT applications in smart factory manufacturing setting
- More operation data management
 - Manufacturing systems, machines and devices
 - Throughput, cycle time, lead time, availability, uptime
 - Production quality, defects and rework
 - Maintenance logs, technician notes
- Data analytic
 - Spot trends, streamline processes
 - Optimize assets
 - Predictive maintenance



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IIoT Knowledgebase

- The Connected Enterprise in Action: How Industrial IoT Delivering Results Today, **Rockwell Automation**, 38:16 minutes, Oct 29, 2014, <https://www.youtube.com/watch?v=8V93wpmwiU8>
- Industrial Internet of Things: How big is the opportunity? **Accenture**, 30:31 minutes, Jan. 21, 2015, https://www.youtube.com/watch?v=MgjD46_IGbU
- Industrial Internet of Things Deeper Dive, **Rockwell Automation**, 19:36 min, April 6, 2016, <https://www.youtube.com/watch?v=27k9clbmjhE>

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Industry 4.0

- A German initiative which promotes Intelligent Factory
 - Computerization of the manufacturing industry
 - Communications and IT system automate production in a smart way creating connected intelligent factory
- Industry 4.0 also referred to as the 4th Industrial revolution

Industry 4.0 Examples

- The Fourth Industrial Revolution, <https://www.youtube.com/watch?v=HPRURtORnIs>, 5:34 minutes, Nov. 2013, **Siemens**
- **Bosch plant** in Blaichach, Germany, 3:37 minutes, April 20, 2015, <https://www.youtube.com/watch?v=GKhSTjraHlU>
- EN | Future Production with Industry 4.0 - by **Bosch Global**, 4:28 min, June 29, 2016, <https://www.youtube.com/watch?v=ISk64bJ35yM>

IoT Challenges

- IoT - open global standardization and implementation at various levels
- Interoperability of software and protocols
 - Platform, Connectivity
- Data control and access
- Data Security
- Privacy
- Regulation

IoT Opportunities

- **Bain** predicts that by 2020 annual revenues could exceed \$470 B for the IoT vendors selling hardware, software and comprehensive solutions.¹
- **McKinsey** estimates the total IoT market size in 2015 was up to \$900 M, growing to \$3.7 B in 2020 attaining a 32.6% CAGR (Compound Annual Growth Rate)¹.

IoT Opportunities

Company	Forecasts and/or Market Estimates
Bain & Company ²	By 2020 annual revenues > \$470 B for the IoT vendors selling the hardware, software and comprehensive solutions.
McKinsey & Company ³	Total IoT market size in 2015 was up to \$900M, growing to \$3.7B in 2020 attaining a 32.6% CAGR.
Gartner	* Estimate that 4 billion connected things will be in use in the consumer sector in 2016, and will reach 13.5 billion in 2020 *The IoT will support total services spending of \$235 billion in 2016, up 22 percent from 2015

¹Roundup of Internet of Things Forecasts and Market Estimates, 2016, Louis Columbus, Nov. 27, 2016,
<https://www.forbes.com/sites/louiscolumbus/2016/11/27/roundup-of-internet-of-things-forecasts-and-market-estimates-2016/#631099d5292d>

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IoT Technology Management Strategies

- Balancing old and new technical constraints
- Building your technology portfolio
- Lesson learned from the disruptive technology histories, Technology S curve, Technology Lifecycle
- Planning innovative IoT technology development
 - Making sure the end product/services enhanced by additional IoT technology and components
 - Explore opportunity for further inventive enhancement
-

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Disk Storage Technology S-Curve Examples

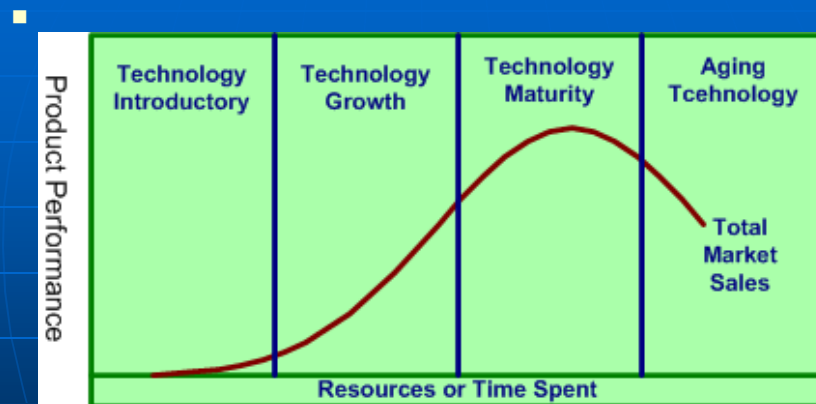
- Previous ...
- Floppy disk,
https://en.wikipedia.org/wiki/Floppy_disk
- Zip drive,
https://en.wikipedia.org/wiki/Zip_drive
- USB Flash Drive
- Portable Hard Drive
- Storage Area Network (SNA)
- Cloud storage



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IoT Technology S Curve



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Thank
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Questions?

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