Discovering Computers 2016

Tools, Apps, Devices, and the Impact of Technology

Chapter 7

Input and Output

課前練習

- 請說明4種基本形式的輸出
- 滑鼠之父
- 描述影響LCD監視器或LCD螢幕品質的因素
- 分辨非撞擊式與撞擊式印表機的差異
- OMR光學記號與MICR字元使用於哪些場合
- QR code的發明人
- 4K TV
- 身障者使用的輸出裝置有哪些

Objectives Overview

Differentiate among various types of keyboards: standard, compact, on-screen, virtual, ergonomic, gaming, and wireless

Describe characteristics of various pointing devices: mouse, touchpad, and trackball

Describe various uses of touch screens

Describe various types of pen input: stylus, digital pen, and graphics tablet

Describe various uses of motion input, voice input, and video input

See Page 318
for Detailed Objectives

Objectives Overview

Differentiate among various scanners and reading devices

Explain the characteristics of various displays

Summarize the various types of printers

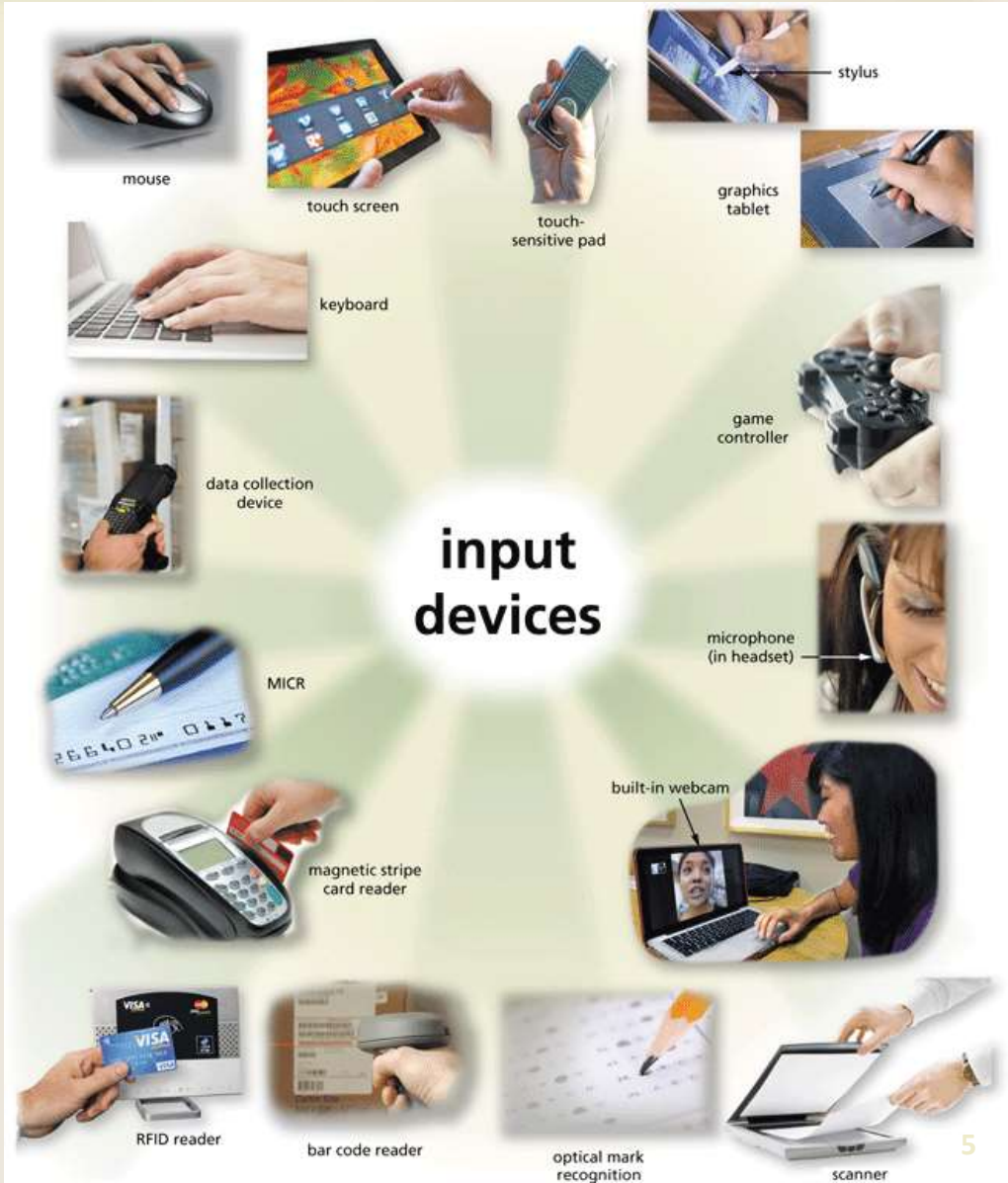
Identify the purpose and features of speakers, headphones and earbuds, data projectors, interactive whiteboards, and force-feedback game controllers
動力回饋遊戲控制器
and tactile output觸感輸出

Identify various assistive technology input and output methods

See Page 318
for Detailed Objectives

What Is Input?

- **Input** is any data and instructions entered into the memory of a computer
  輸入指的是讓資料與指令進入電腦記憶體的動作
- **Data**
  - A collection of unprocessed items, which can **include text, numbers, images, audio, and video**.



Pages 318 – 319
Figure 7-1

What Is Input?

- **Instructions** that a computer or mobile device process can be **in the form of software (programs, apps)**, **commands**, and **user responses**.
  電腦或行動裝置所處理的指令可以是軟體指令與使用者回應三種型式

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What Is Input?

Software (program)

- **A series** of **related instructions**, organized for a common purpose, that tells the computer what tasks to perform and how to perform them.
  程式是由**一系列**相關的指令所組成，這些指令告訴電腦要執行什麼工作和如何執行

Command

- **An** instruction that causes a program or app to **perform a specific action**.
  使用指令執行特定的工作

User response

- **An instruction a user issues** by responding to a message displayed by a program or app.
  使用者回應指的是使用者回覆程式所顯示的訊息所下達的指令

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What Is Input?

- An **input device** is any hardware component that allows users to enter data and instructions into a computer
  輸入裝置 是指任何能讓使用者將資料與指令輸入電腦的硬體元件
- Commonly used input methods include:

Keyboard	Pointing devices	Touch screens	Pen input
Motion input	Voice input	Video input	Scanners and reading devices

Keyboards

- A **keyboard** is an input device that contains keys users press to enter data and instructions into a computer or mobile device

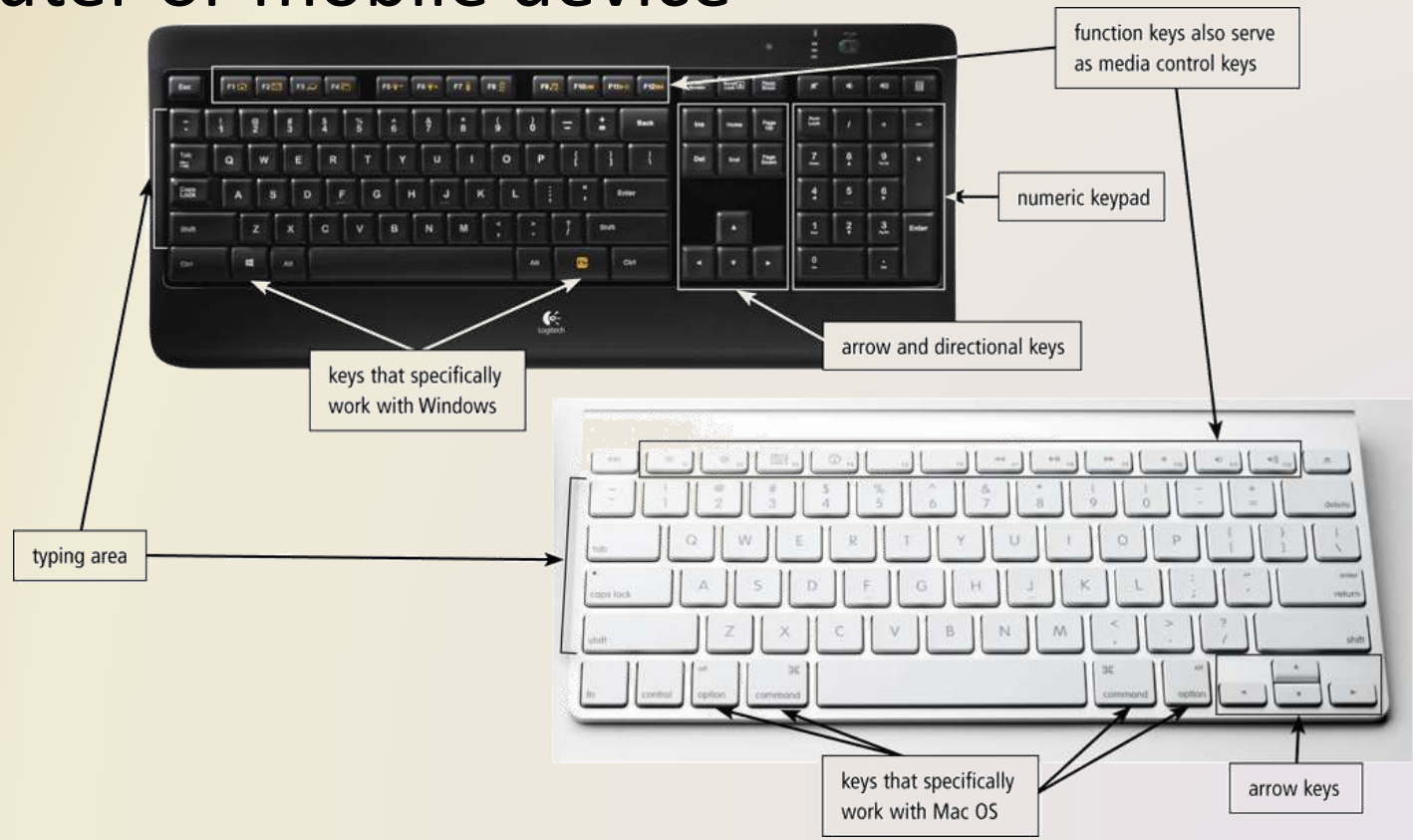

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Figure 7-2

Keyboards

- Most desktop computer keyboards have…

Typing area	Function keys	Toggle key 切換鍵	Directional keys
Media control buttons	Internet control buttons	**Fingerprint reader**	**Pointing device**

The Keyboard

- The **insertion point**, also known as the **cursor**, is a symbol on the screen that indicates where the next character you type will appear

  插入點 也稱為游標 ，指的是在螢幕上的一個符號，代表輸入的下一個文字的位置

KEYBOARD MONITORING

Do you know anyone who has installed keylogging software?

Is keylogging software an invasion of privacy?

Should employers inform employees if the software is installed? Why or why not?

Keyboard Monitoring

- Keyboard monitoring software
  - Software that runs undetected and stores every keystroke in a file for later retrieval.
  - also called **keylogging** used for malicious purposes
- When used in a positive fashion 正途
  - employers can measure the efficiency of data entry Personnel
  - verify that employees are not releasing company secrets, are not viewing personal or inappropriate content on work computers, and are not engaging in activities that could subject the company to harassment, hacking, or other similar charges.
  - troubleshoot technical problems and to back up their networks.
  - Parents, likewise, can verify their children are using the home computer safely and are not visiting inappropriate websites.

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Keyboard Monitoring

- When used for malicious purposes悪意
  - criminals use the program on both public and private computers to capture user names, passwords, credit card numbers, and other sensitive data and then use this data to access financial accounts and private networks.

Type of Keyboards

- There are various types of keyboards in addition to standard keyboards found on desktops
  - Standard keyboard (101 to 105 鍵)
  - Compact keyboard
  - on-screen
  - virtual keyboards
  - QWERTY keyboard
  - ergonomic keyboard
  - gaming keyboard

Type of Keyboards

- An **ergonomic keyboard** has a design that reduces the chance of **repetitive strain injuries (RSIs)**

  人體工學鍵盤的設計，可以減少手腕與手部的受傷機會

  【Repetitive Strain Injury ，RSI】重複施緊傷害，腕隧道症候群

- **Ergonomics** incorporates comfort, efficiency, and safety into the design of the workplace

  人體工學的目標是在工作場所的設計中，

  納入舒適、效率與安全等考量因素

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Figure 7-4

The Keyboard

- A wireless mouse is a battery powered device that transmits data using wireless technology.
- A wireless mouse typically transmits data to a receiver that plugs in a USB port or uses Bluetooth technology to pair with the device.

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Pointing Devices

- A **pointing device** is an input device that allows a user to control a pointer on the screen

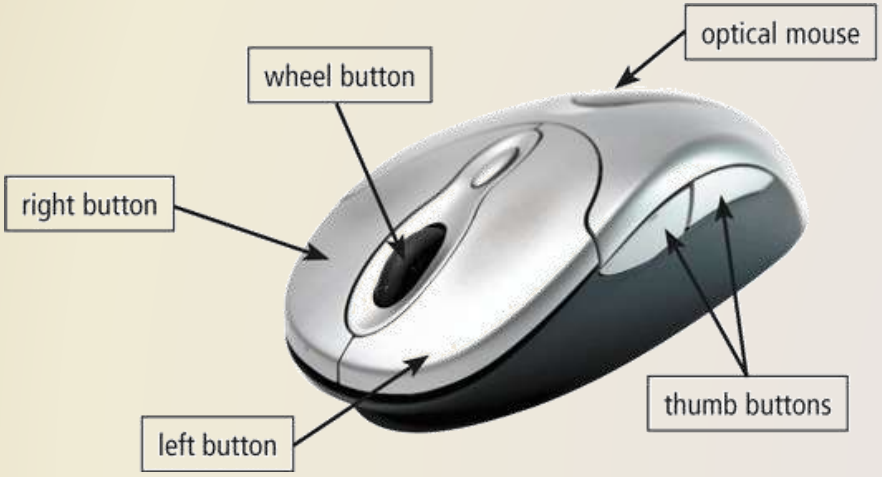
  指向裝置是一種輸入裝置，可以讓使用者控制螢幕上的指標

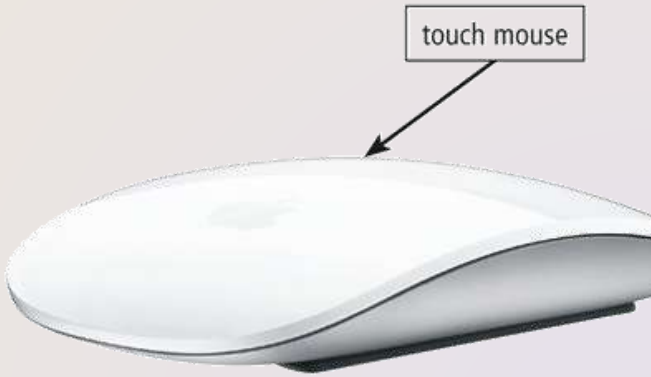
- A **pointer** is a small symbol on the screen whose location and shape change as a user moves a pointing device

  指標是螢幕上的小型符號，它的位置與外形會隨著指向裝置的移動而改變

Pointing Devices

- A **mouse** is a pointing device that fits under the palm of your hand comfortably
  滑鼠是一種能夠舒適的用手掌操控的指向裝置
  - **Optical mouse,**
  - **laser mouse,**
  - **touch mouse**





Page 322-323
Figure 7-5

Pointing Devices

- **Optical mouse**
  - Mouse that uses **optical sensors** that emit and sense light to detect the mouse's movement.
- **Laser mouse**
  - Mouse that uses **laser sensors** that emit and sense light to detect the mouse's movement.
- **Touch mouse**
  - A touch-sensitive mouse that recognizes touch gestures, in addition to detecting movement of the mouse and traditional click and scroll operations. 觀看影片
- A **wireless mouse** typically transmits data to a receiver that plugs in a **USB port** or uses **Bluetooth** technology to **pair** with the device.

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Pointing Devices

January 30, 1925 – July 2, 2013

Engelbart's prototype of a computer mouse, as designed by Bill English from Engelbart's sketches.

- Douglas Engelbart
  - 道格拉斯·卡爾·恩格爾巴特
  - creator of the mouse
  - American engineer and inventor, and an early computer and Internet pioneer. He is best known for his work on founding the field of human–computer interaction
  - 他在 PC 革命中扮演的角色，除了革新了人機對話模式，發明了滑鼠，他的研究還領導了諸如 hypertext、圖形化使用者介面等技術的發展。

Douglas Engelbart

- **60 年代初**，Douglas Engelbart 在參加一個會議時隨手掏出了隨身攜帶的本子，畫出了一種在底部使用兩個互相垂直的輪子來跟蹤動作的裝置草圖，這便是滑鼠的**雛型**。
- 到了 **1964 年**，Engelbart 再次對這種裝置的構思進行完善，並動手製作出了**原型**。
- 當時還沒有滑鼠這個名字。
  - **這個一個木盒子狀的原型表面只有一個按鈕，木盒下面有兩個小輪子，它們分別與電位計相連接：一個負責尋找 X 座標位置，另一個負責 Y 座標位置。**
  - **它的工作原理是由滾輪帶動軸旋轉，使變阻器的阻值發生改變，從而產生位移訊號，經電腦處理後螢幕上指示位置就可以移動。**

http://www.techbang.com/posts/13906-mouse-the-father-of-doug-engelbart-who-died

Douglas Engelbart

- 1967 年，Douglas Engelbart 為這項技術申請了專利。這項頒發於1970年、編號為 3541541 專利的定義為：「**通過手控制顯示系統 X-Y 位置指示器在任何表面的移動，從而移動在陰極射線管顯示器上的游標；指示器控制產生的信號表明其位置，讓游標在顯示幕相應的位置得以呈現。**」
- 後來，**SRI 以 40000 美元的價格將其授權給蘋果公司**。
- 在滑鼠發明後的若干年後，Xerox PARC研究中心將滑鼠應用於Alto 電腦中，然而遺憾的是，當時這些系統只是用於實驗，滑鼠很很長一段時間都沒能進入大眾視野。
- 後來，賈伯斯看到了 Alto 的技術備受震撼，意識到使用滑鼠交互和圖形化使用者介面的重大意義。
- **在 1983 年推出的 Lisa 電腦中，蘋果首次應用了滑鼠**，並逐漸為大眾所熟識。

http://www.techbang.com/posts/13906-mouse-the-father-of-doug-engelbart-who-died

Prototype Engelbart mouse

http://www.dougengelbart.org/

SRI engineer Bill English built the first Engelbart mouse prototype, which used knife-edge wheels and had space for only one button.

Date Introduced : 1964 ca.
Dimensions : 2 3/4 x 4 x 3 1/8 in.
Manufacturer : Stanford Research Institute (SRI)

Pointing Devices

Touchpad

- A touchpad is a small, flat, rectangular pointing device that is sensitive to pressure and motion

  觸控板這種指向裝置是小型而平坦的一小塊矩形，對於壓力與動作相當敏感

Trackball

- A trackball is a stationary pointing device with a ball on its top or side

  軌跡球屬於固定式指向裝置，在它的上方或側邊有一顆球

Pages 323- 324
Figures 7-6 – 7-7

Pointing Devices

Pointing Stick

- A **pointing stick** is a pressure-sensitive pointing device shaped like a pencil eraser that is positioned between keys on a mobile computer keyboard

  指向桿屬於壓力感應的指向裝置，外形像是個鉛筆擦，位置安插在鍵盤上的按鍵之間

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Figures 7-6 – 7-7

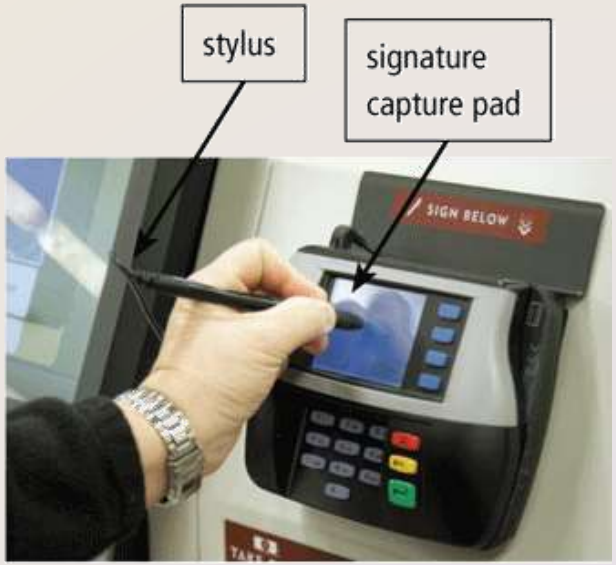
Touch Screens

- A **touch screen** is a touch-sensitive display device
  觸控螢幕是一種觸控感應的顯示裝置
- A **gesture** is a motion you make on a touch screen with the tip of one or more fingers or your hand.
- Touch screens that recognize **multiple points** of contact at the same time are known as **multi-touch**.

Pen Input

- With **pen input**, you touch a **stylus** or **digital pen** on a flat surface to write, draw, or make selections

  使用者透過筆式輸入方式，即可使用觸控筆或數位筆在平坦的表面上書寫、繪圖或標示選取



Page 326-327
Figure 7-10

Pen Input

- A **graphics tablet**, also called a **digitizer**, is an electronic plastic board that detects and converts movements of a style or digital pen into signals that are sent to the computer

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Figure 7-11

MINI FEATURE 7-2

MOTION INPUT

Motion Input

- **With motion input**, sometimes called **gesture recognition**, users can guide on-screen elements using **air gestures**

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Voice and Aduio Input

- Voice input is the process of entering input by speaking into a microphone
  語音輸入是對麥克風說話來執行輸入作業的程序
- **Voice recognition**, also called **speech recognition**, is the computer or mobile device's capability of distinguishing spoken words
  語音辨識指的是電腦辨識人類說話內容的能力

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Figure 7-13

Audio Input

- Audio input is the process of entering any sound into the computer such as speech, music, and sound effects

  音訊輸入指的是將任何聲音輸入電腦的程序,例如語音,音樂與音效

- Music production software allows users to record, compose, mix, and edit music and sounds

  音樂製作軟體可以讓使用者錄音、作曲、混音，以及編輯音樂和聲音

Page 330
Figure 7-14

Mini Feature 7-3:

DIGITAL VIDEO TECHNOLOGY

Digital Video Technology

- **Video input** is the process of capturing **full-motion images** and storing them on a computer or mobile device's storage medium
  視訊輸入指的是擷取動態影像，並將它們存放在電腦儲存媒體的程序
- A **digital video (DV)** camera records video as digital signals, which you can transfer directly to a computer or mobile device with the appropriate connection.

Digital Video Technology

The following sections outline the steps involved in the process of using DV technology.

1. Select a DV Camera
   - DV camera models that support Blu-ray or HDV standards
2. Record a Video
3. Transfer and Manage Videos
   - 可使用USB port 將DV連接到電腦
   - 上傳或分享到社群網站
   - The **frame rate** of a video refers to the number of frames per second (fps).

Digital Video Technology

4. Edit a Video
   - Morphing transforms one video image into another image over the course of several frames of video.
5. Distribute a Video
   - upload video directly to video sharing and social networking sites
   - You can save digital video to media such as a DVD or Blu-ray Disc and package it

Mini Feature 7-3:

DIGITAL VIDEO TECHNOLOGY

CH7 Free Resources P19-21

DV cameras

- DV cameras fall into three general categories:

high-end consumer	Consumer	webcasting and monitoring

- Video cameras record in either analog or digital format.

Analog formats	Digital formats
• 8mm • Hi8 • Super VHS-C • VHS-C	• Blu-ray • Digital8 • DVD • HDV (high-definition video) • MICROMV

CH7 Free Resources P19-21

Blu-ray or HDTV Standards

- Blu-ray is an optical disc storage format that can store more than 100 GB. Unlike DVDs, which use a red laser, Blu-ray uses a laser in the blue spectrum to read and write data.
- The blue laser has a shorter wavelength, which enables it to read and write data in tighter sequences, resulting in higher quality and greater storage capacity.

- HDTV (high-definition television) is the most advanced form of digital television. It works with digital broadcast signals to transmit digital sound, supports wide screens, and provides resolutions up to 1920 × 1080.
- **Ultra HD 4K** currently is the highest-quality digital format.

CH7 Free Resources P19-21

Video File Format

- The table below lists popular video file formats.

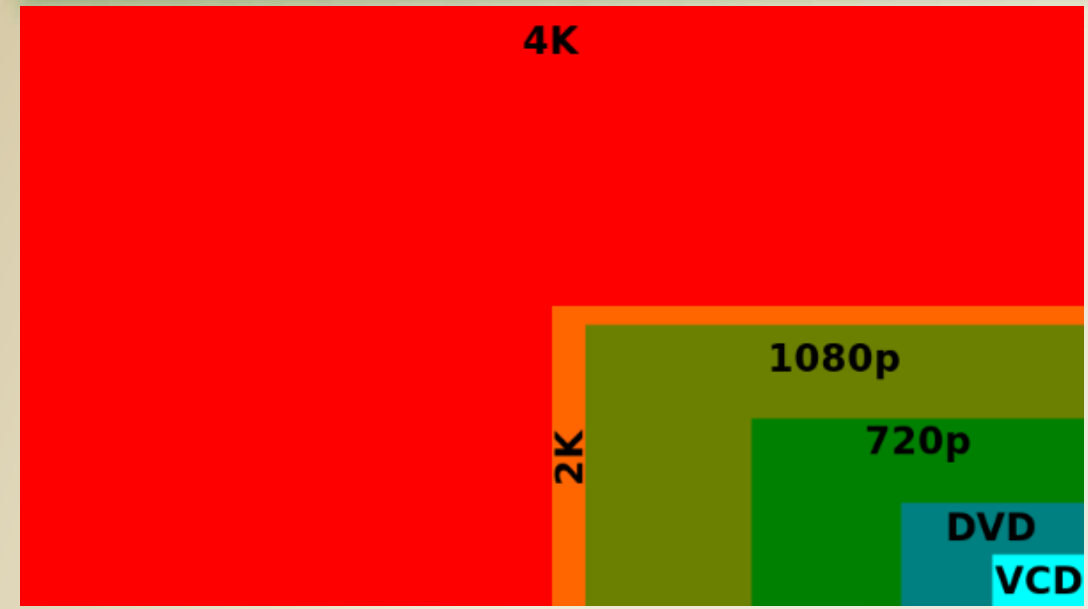
File Format	File Extensions	Description
Audio Video Interleave	**.AVI**	Developed by Microsoft in 1992; one of the oldest formats used in browsers
Apple QuickTime	**.MOV or .QT**	Known for high-quality, large-sized video files.
DivX	**.DIVX**	High-quality; format supported by some DVD players
Microsoft Windows Media Video	**.WMV or .ASF**	Small files; can be sent via email easily
MPEG	**.MP4**	Compatible with HTML5 standards; uses separate compression for audio and video
RealMedia	**.RM or .RAM**	Can contain audio, video, or both; popular for streaming
3GP	**.3GP OR .3G2**	Commonly used with mobile phones that capture video

4K resolution

- **4K解析度（4K resolution），**或簡稱作**4K**，是指顯示器或顯示內容的水平解析度達到4000像素的級別、而垂直解析度達到2000像素的級別。
- 現時在數位電視及數位攝影的領域裡出現多種4K解析度。
- 新興的數位電影及電腦視訊的超高解析度標準，以搭配超高畫質電視，常見的解析度有3840×2160和4096×2160畫素2種規格。
- 4K顯示面板採用氧化物薄膜電晶體（TFT）製作，具備高速電子移動速度，呈現畫面內容具高解析度及薄邊框，呈現超薄質感，可使電視機更輕薄，畫面更為細緻。

Ultra HD-搞懂4K新名詞

4K



4K TV (3840×2160)	
1080p (1920×1080)	1080p (1920x1080)
1080p (1920×1080)	1080p (1920×1080)

Sony 4K Demo: Another World

What Is 4K (Ultra HD)?

Webcams and Integrated DV Cameras

- A **webcam** is a type of DV camera that enables a user to:

Capture video and still images
攝影或擷取靜態影像

Send email messages with video attachments
附加在電子郵件送出

Add live images to instant messages
將現場影像加入即時訊息

Broadcast live images over the Internet
在網際網路上發佈現場影像

Conduct videoconferences
召開視訊會議

Make **video calls**
打視訊電話

Video Input

- A **videoconference** is a meeting between **two or more geographically separated people** who use a network or the internet to transmit audio and video data

視訊會議是由位在兩個或多個不同地點的人員透過網路或網際網路來傳送聲音及影像一起舉行的會議。

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Figure 7-15

Scanners and Reading Devices

- Some input devices save users time by capturing data directly from a source document, which is the original form of the data.
- Devices that can capture data directly from a source document include

optical scanners	optical readers	bar code readers
RFID (radio frequency identification) readers	magnetic stripe card readers	MICR (magnetic-ink character recognition) readers

Scanners and Reading Devices

- An optical scanner, usually called a **scanner** is a **light-sensing** input device that reads **printed text and graphics** and then translates the results into a form the computer can process
  - A flatbed scanner works in a manner similar to a copy machine except it creates a file of the document in memory instead of a paper copy
- The quality of a scanner is measured by its resolution
  - **The number of bits it stores in a pixel**
  - **The number of pixels per inch**

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Scanners and Reading Devices

- Many scanners include **OCR (optical character recognition) software**, which can read and convert text documents into **electronic files**.
- OCR software converts a scanned image into a **text file that can be edited**.

Flatbed
平台式

Pen or Handheld
筆式或手持式

Sheet-fed
饋紙式

Drum
滾筒式

Scanners and Reading Devices

Page 334
Figure 7-16

Scanners and Reading Devices

- An **optical reader** is a device that uses a **light** source to read characters, marks, and codes and then **converts them into digital data** that a computer can process
  - Optical character recognition (OCR)光學字元辨識
  - Optical mark recognition (OMR)光學記號辨識

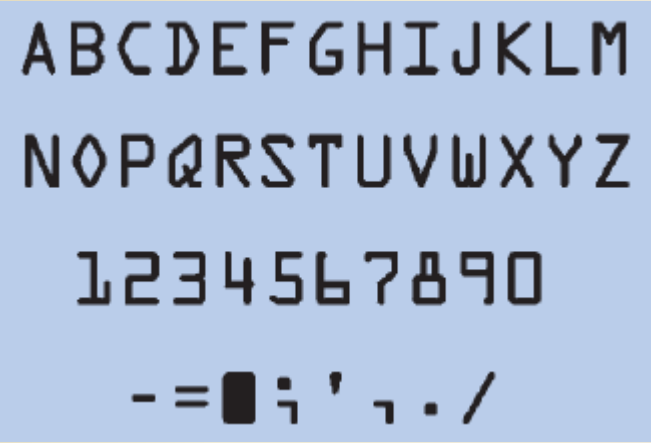
光學字元辨識 (OCR)

光學記號辨識(OMR)

Scanners and Reading Devices

- **Optical character recognition (OCR)** involves reading characters from ordinary documents

  光學字元辨識 技術讀取紙張文件中的字元



Scanners and Reading Devices

- There are different ways to integrate OCR into an application, and different systems for processing OCR-encoded data.
- Some examples of common OCR fonts include OCR-A, OCR-B, MICR E-13B, and SEMI M12.

Examples of OCR on labels and directly marked

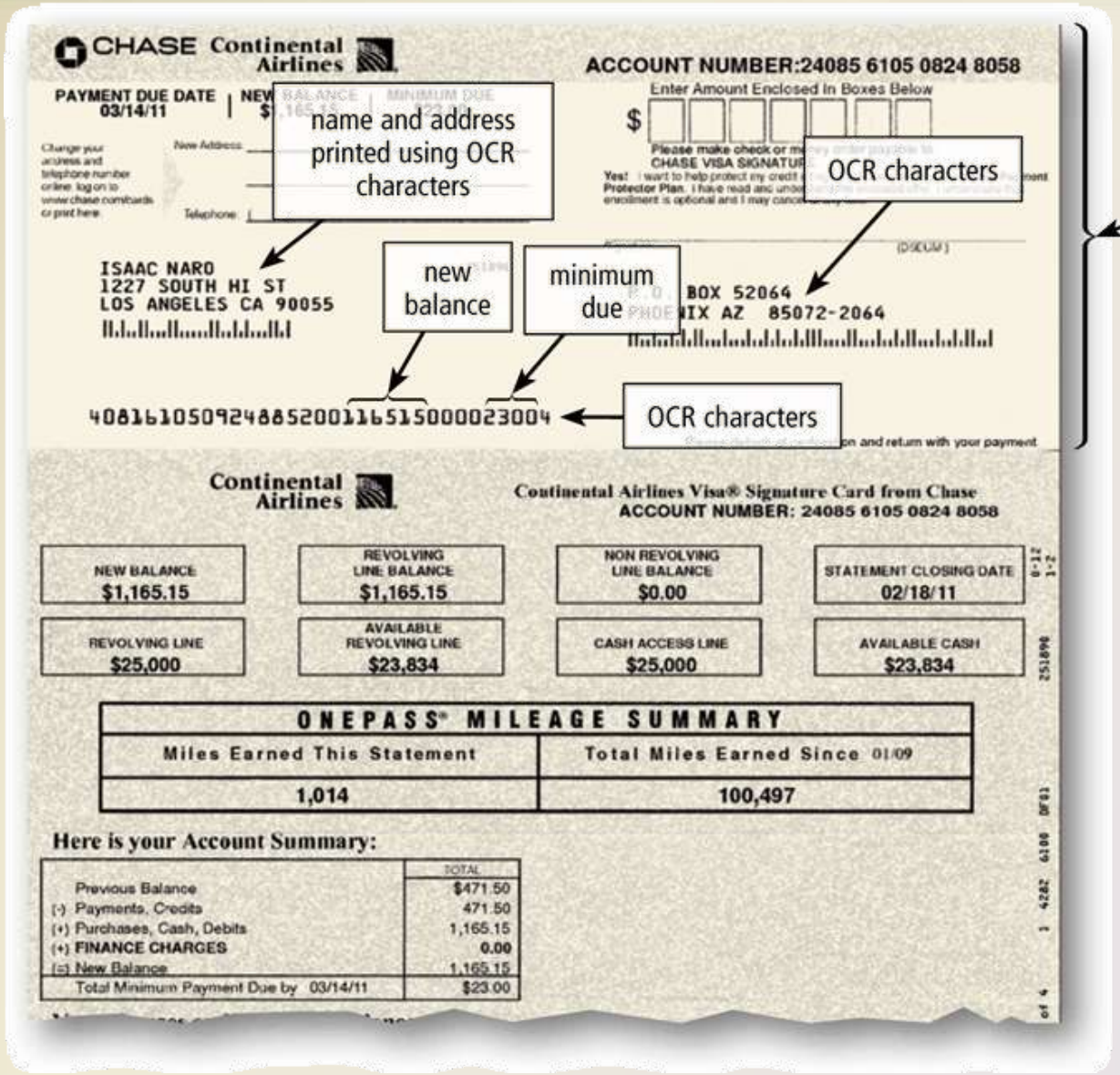
Examples of some OCR fonts

http://www.microscan.com/en-us/resources/know-your-tech/optical-character-recognition-ocr

Scanners and Reading Devices

- A **turnaround document** is a document you return to the company that creates and sends it

  回轉文件這類文件是需要送回給原來建立和送出此文件的公司
- 這是一個包含回執聯的外部輸出，必須將它撕開後寄回,作為輸入系統之用
- 需要在稍後，再次登錄於相同或是另一個資訊系統中
- 電話或是水電帳單，也可算是由電話等公司的帳單系統所印出來的回轉文件。
- 當你使用此帳單去繳款時，此帳單就被掃描進入該公司的應付帳款系統中以記錄你已繳付的帳款。


this portion is returned with payment
CHASE Continental Airlines
ACCOUNT NUMBER:24085 6105 0824 8058
PAYMENT DUE DATE 03/14/11
Enter Amount Enclosed In Boxes Below
name and address printed using OCR characters
OCR characters
ISAAC NARO
1227 SOUTH HI ST
LOS ANGELES CA 90055
new balance
minimum due
BOX 52064
IX AZ 85072-2064
408161050924885200116515000023004
OCR characters
Continental Airlines
Continental Airlines Visa® Signature Card from Chase
ACCOUNT NUMBER: 24085 6105 0824 8058
NEW BALANCE $1,165.15
REVOLVING LINE BALANCE $1,165.15
NON REVOLVING LINE BALANCE $0.00
STATEMENT CLOSING DATE 02/18/11
REVOLVING LINE $25,000
AVAILABLE REVOLVING LINE $23,834
CASH ACCESS LINE $25,000
AVAILABLE CASH $23,834
ONEPASS® MILEAGE SUMMARY
Miles Earned This Statement 1,014
Total Miles Earned Since 01/09 100,497
Here is your Account Summary:
Previous Balance $471.50
(-) Payments, Credits 471.50
(+) Purchases, Cash, Debits 1,165.15
(+) FINANCE CHARGES 0.00
(=) New Balance 1,165.15
Total Minimum Payment Due by 03/14/11 $23.00

Scanners and Reading Devices

- **Optical mark recognition (OMR)** reads hand-drawn marks such as small circles or rectangles

  光學記號辨識技術是讀取手繪的記號，例如小圓圈或矩形

- An OMR device scans the documents and matches the patterns of light

  OMR裝置會先掃描答案卡，再與正確解答的光線模式進行比對

光學記號辨識的基本原理是進行掃描時，紙的上下兩邊置有光源和感官器。當某部位被填上答案(塗黑)，光源則無法穿過。反之，光源可穿過紙，而被感官器感應到。
OMR掃描器就是運用這一原理去讀取數據。

Optical mark recognition

- OMR 為一種可靠的資料收集技術， 以卡片劃記方式，利用光學閱讀設備大量閱讀輸入，取代人工繁瑣重覆的工作，減少因人工輸入造成資料的錯誤及省下可觀的人事成本。
- OMR 技術可以在短時間內收集大量的數據資料。
- OMR 簡介
- 光學閱讀技術 OMR 進化


INFO-FORMS
PRINTER
COMPUTER
NANHAO OPTICAL MARK READER

Scanners and Reading Devices

- A **bar code reader**, also called a bar code scanner uses **laser beams** to read bar codes

  條碼讀取裝置也叫做**條碼掃描器**，是一種使用雷射光束掃過**條碼**辨識其光線模式的光學讀取裝置

- A **bar code** is an identification code that consists of either a set of **vertical lines and spaces of different widths** or a **two dimensional** pattern of dots, squares, and other images.

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Figures 7-17 – 7-18

Scanners and Reading Devices

- 條碼用在產品包裝或標籤上
- **每個產業會使用自己的條碼系統**
  - ✓ Universal Product Code條碼
  - ✓ POSTNET條碼

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Bar Code- Universal Product Code

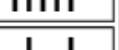
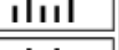
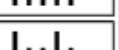
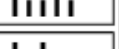
- 美加地區零售商使用 **Universal Product Code (UPC)** 商品通用條碼

Bar Code-PostNet barcode

- 美國郵政服務使用 **POSTNET**條碼

- The **PostNet** barcode is used by the United States Postal Service to automatically sort mail.
- The **PostNet** code consists of **evenly spaced bars of two different heights**.
- Each character is represented by five bars, two tall and three short.

- The character set includes the digits 0 through 9.

Value	Encoding
1	
2	
3	
4	
5	
6	
7	
8	
9	
0	

相同寬度兩種不同高度
2長3短的5個條碼

Bar Code-PostNet barcode

- The code begins and ends with a tall bar ('frame bar'), and may contain
  - a **5-digit** ZIP code,
  - a **9-digit** ZIP+4 code,
  - an **11-digit** Delivery Point Code.
- A Modulo 10 check digit ('correction character') is inserted after the ZIP code and before the ending frame bar.

Linear Barcodes

Code 128 

Considered a condensed symbology, and has a check digit.

UPC/EAN 

Familiar code found on almost **any grocery store product**.
Numeric characters only: 0-9.
Contains a two part label: manufacturing ID # and product ID #.

Code 39 

Can be situated as a shorter rectangle. Most commonly used barcode, and was the first alphanumeric code developed.
Adopted by the **healthcare industry**.

Scanners and Reading Devices

- A **QR code** (quick response code)
  - 於1994年由日本DENSO WAVE公司發明
  - is knows as a 2-D bar code
  - stores information in both a vertical and horizontal direction
    QR code是由一串的垂直線和寬度不一的線組成
  - 呈正方形，常見的是黑白兩色。在3個角落，印有較小，像「回」字的正方圖案。這3個是幫助解碼軟體定位的圖案，使用者不需要對準，無論以任何角度掃描，資料仍然可以正確被讀取。
- **QR code**是由點方塊與其他影像樣式所組成，可以儲存比較多的資訊
  - Webs address
  - Phone numbers

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Figures 7-17 – 7-18

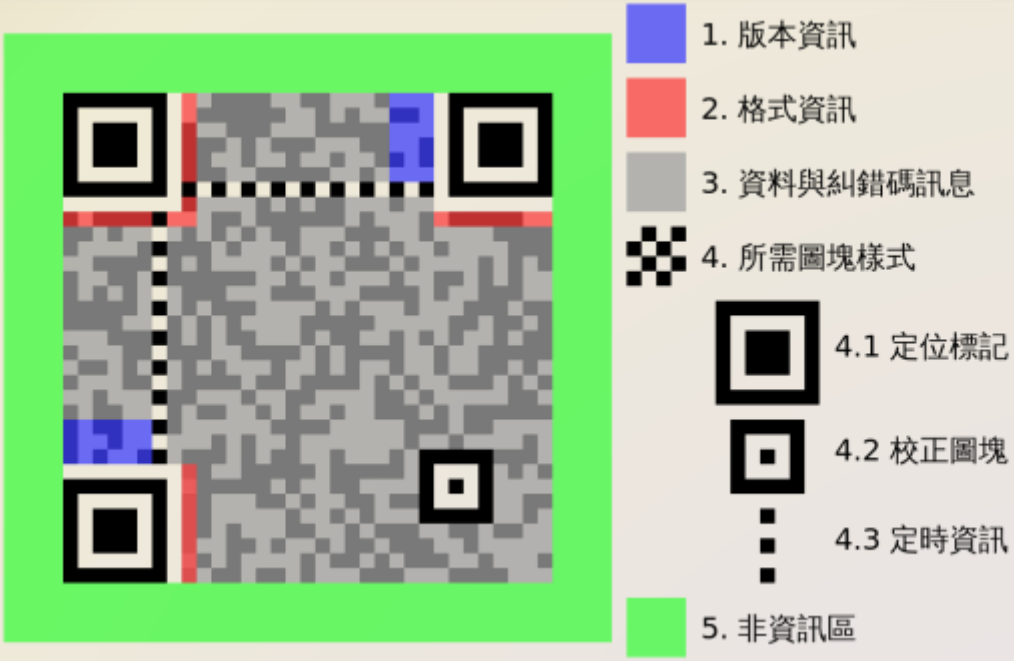
QR Code 條碼產生器

QR code產生器 - QR Code 二維條碼技術與開發服務

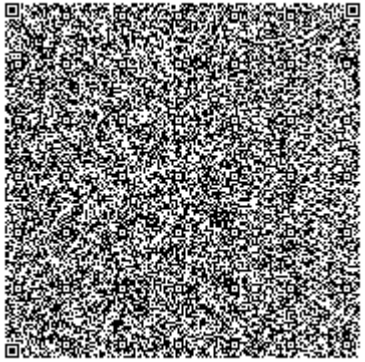
A QR code used on a large billboard in Japan, linking to the sagasou.mobi website

QR Code 版本

QR Code一共提供40種不同版本儲存密度的結構，對應指示圖的「版本資訊」，版本1為21×21模組（模組為QR Code中的最小單元），每增加一個版本，長寬各增加4個模組，最大的版本40為177×177模組。



Version 4 (33×33). Content: "Version 4 QR Code, up to 50 char"



Version 40 (177×177). Content: 1,264 characters of ASCII text describing QR codes

QR COD由哪一個人發明

Technology Innovators: Masahiro Hara and Denso Wave

- **Masahiro Hara**
- When Japanese supermarket cashiers developed carpal tunnel syndrome and wrist numbness from repeatedly typing product prices, engineers developed bar codes in the 1960s that could link an item and its price and then send that data to a computer. The cashiers could scan the bar codes and no longer had to type the prices manually.
- The bar codes were a success. Other businesses soon found other uses for this innovation and wanted to store more information than the approximate 20 characters a bar code could hold.

Masahiro Hara et al - the QR code

http://www.qrcode.com/en/history/

Technology Innovators: Masahiro Hara and Denso Wave

- Denso Wave, Inc. was manufacturing bar code readers at this time, and its engineers began designing other two-dimensional storage methods.
- Managing Director Masahiro Hara and one other employee embarked on a methodology using a pattern of squares instead of lines.
- Nearly two years later, they finalized their invention: the QR code that could store approximately 7,000 numbers and be read 10 times more quickly than a bar code.

What is a QR Code
Types of QR Code

Masahiro Hara et al - the QR code
http://www.qrcode.com/en/history/

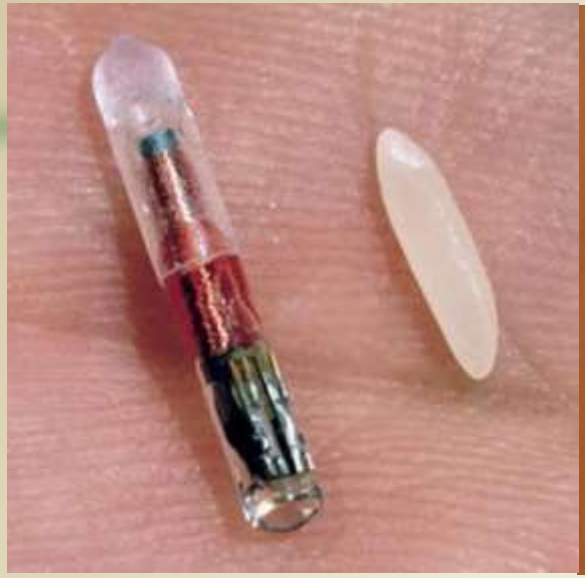
DENSO Wave, Masahiro Hara wins European Inventor Award for invention of QR Code

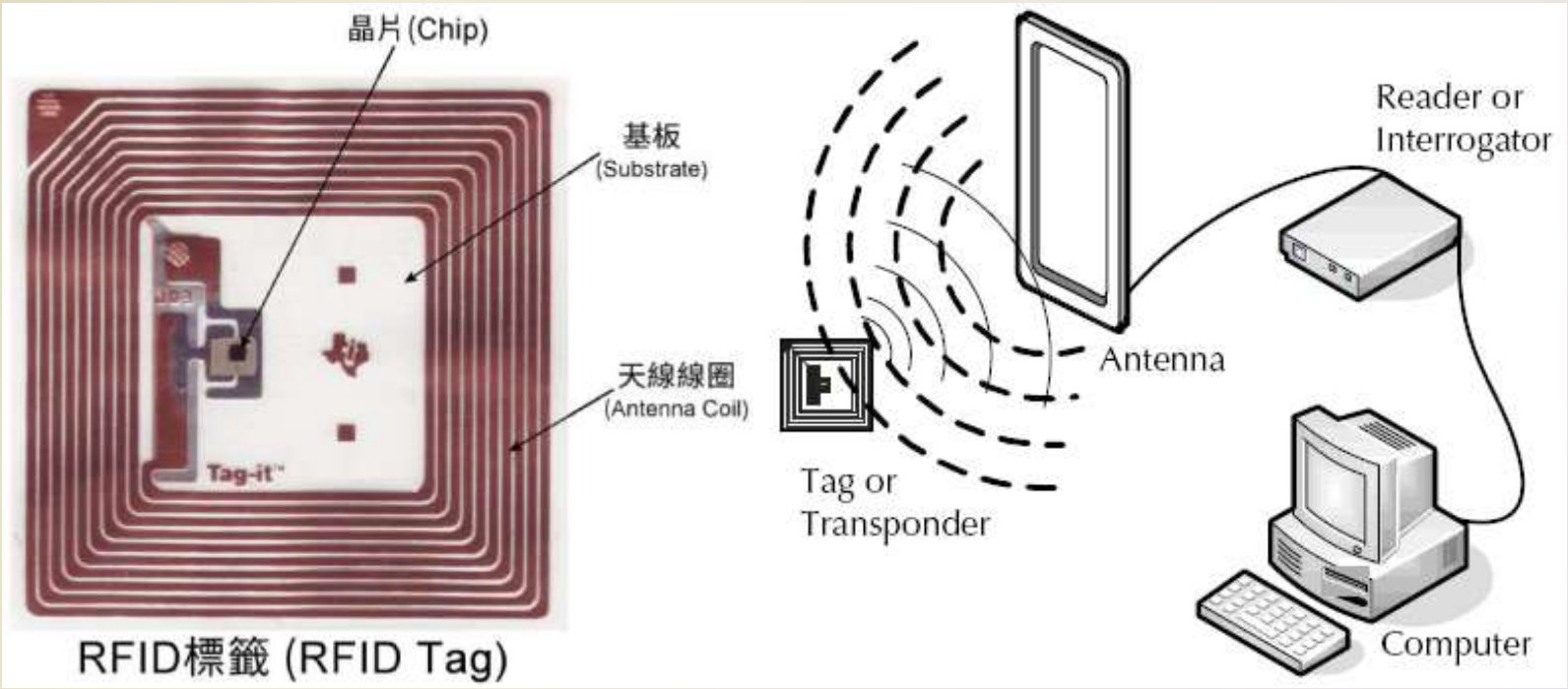
Berlin, Germany – 17 June 2014.

Laurent Tonnelier (mobiLead) between Takayuki Nagaya (DENSO Wave) and Masahiro Hara (DENSO Wave) at European Inventor Award in Berlin, Germany.

Scanners and Reading Devices

- **RFID** (radio frequency identification) uses **radio signals** to communicate with a **tag** placed in or attached to an object, an animal, or a person.
  RFID 技術是使用**無線訊號**，與物件、動物或人員身上的標籤連線
- **RFID tags** contain a **memory chip** and an **antenna,** are available in many shapes and sizes.
- An **RFID reader** reads information on the tag via **radio waves**
  RFID讀取裝置可透過**無線電波**讀取標籤上的資訊
- RFID readers can be handheld devices or mounted in a stationary object, such as a doorway.




晶片 (Chip)
基板
(Substrate)
天線線圈
(Antenna Coil)
Tag-it™
RFID標籤 (RFID Tag)
Reader or
Interrogator
Antenna
Tag or
Transponder
Computer

RFID

- 許多零售商把RFID當作傳統條碼的另一種選擇，因為它不需要直接與商品接觸或一次掃瞄一個的傳輸。
- 商店中的每個產品都有一個識別的標籤，當消費者從貨架上拿走產品，並通過結帳區時，RFID讀取器就會讀取這些標籤，並與電腦通訊，**計算出產品的總金額，不需要為個別的商品結帳，自動更新庫存**。

IBM RFID Commercial - The Future Market

That´s how we will shop within a couple of years!

What is RFID?

Scanners and Reading Devices

- RFID can track

應用範例

Tracking times of runners in a marathon 記錄馬拉松選手的時間	Tracking location of soldiers 追蹤士兵	Employee wardrobes 員工衣服
Airline baggage 飛機行李	Checking lift tickets of skiers 記錄雪橇	Managing inventory 管理庫存量
Gauging pressure and temperature of tires 測量輪胎的壓力與溫度	Checking out library books 圖書館的借書作業	Tracking toll payments 記錄車輛通過收費站的付款

RFID

- **RFID** 通常是由感應器(Reader)和RFID標籤(Tag)所組成的系統，其運作的原理是利用感應器發射無線電波，感應範圍內的RFID標籤，藉由電磁感應產生電流，供應RFID標籤上的晶片運作並發出電磁波回應感應器。
- RFID的特性特別適合用來作為人或物品在通路上的管控追蹤及識別，所以RFID廣泛應用在倉儲系統、流程管控以及電子資訊等方面。

RFID已制定全球統一的ISO規範，塑膠工業將現有產品加上RFID，完整呈現物料資訊，讓管理省時省力，是自動倉儲系統的最佳幫手。

物流管理

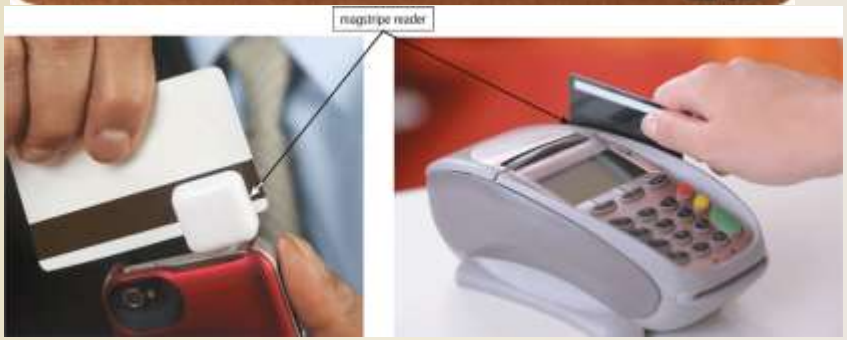
RFID

- 美國食物及藥物管理局允許VeriChip公司將無線射頻辨識晶片直接移植到人體內，讓使用者不需攜帶卡片也可被識別。
- 此外，也有科技狂熱者Greek將無線射頻辨識植入體內，控制自己的電子設備。

RFID Microchip Implant Available NOW 2016

Scanners and Reading Devices

- **Magnetic stripe readers** read the magnetic stripe on the back of cards such as:



- Credit cards
- Entertainment cards
- Bank cards
- Identification cards
- Other similar cards

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Figure 7-20

Scanners and Reading Devices

- The stripe, which is divided in **three horizontal tracks**, contains information identifying you and the card issuer.
  - Your name, account number, card's expiration data and a country code.
- Exposure to a magnetic field can erase the contents of a card's magnetic stripe
  暴露在磁場中將會消除磁條卡的資訊

Secure IT 7-4

PROTECTING CREDIT CARDS FROM SCANNING DEVICES

- 在信用卡上的RFID晶片約郵票大小
- 將這樣的信用卡放在皮包或皮夾仍會發出訊號
- Radio waves 穿透水或金屬
- 將信用卡用錫箔紙包起來，或放在水瓶旁
- 放在皮夾中時，磁條朝內
- 或使用RFID Blocking Wallet

How to Block RFID From Your Wallet for Free

Scanners and Reading Devices

- **MICR** (magnetic ink character recognition) **devices** read text printed with magnetized ink
  MICR裝置能讀取以磁性墨水印刷的文字
- An **MICR reader** converts MICR characters into a form the computer can process
  MICR讀取裝置會將MICR字元轉換成電腦能處理的格式
- Banking industry uses MICR for check processing
  銀行業使用MICR來處理支票
  - MICR 字元印在支票上有
    - 銀行流水號
    - 客戶的帳號
    - 支票編號
    - 當支票兌現時再將支票金額打在支票的右下角

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Figure 7-21

Scanners and Reading Devices

- **Data collection** devices obtain data **directly** at the location where the transaction or event takes place
  資料收集裝置可直接從交易或事件發生的地點取得資料
- Used in常應用在
  - Restaurants餐廳
  - Grocery stores商店
  - Factories工廠
  - Warehouses倉庫
  - The outdoors室外

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Figure 7-22